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**MEASURING LAND-USE REGULATION:
AN EXAMINATION OF THE SAN FRANCISCO
BAY AREA, 1992 - 2007**

By

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August 2007

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UNIVERSITY OF CALIFORNIA, BERKELEY

**Measuring Land-Use Regulation:
An Examination of the San Francisco Bay Area, 1992 - 2007**

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Abstract

Land use regulation is undertaken by units of local government and is notoriously hard to measure. This paper assembles and reports the results of five separate and complementary surveys of local regulation for the governments in a large metropolitan area. For the San Francisco Bay Area, we compare measures of local regulation derived from surveys of public officials conducted in 1992 and 1998 with a survey conducted in 2006-2007, as well as surveys of developers and land use intermediaries conducted in the recent period. A rich description and comparison of survey results is provided. The paper also presents a preliminary analysis relating land use outcomes to these measures of regulation. We find, for example, that in the San Francisco Bay Area almost half of the large increase in housing values between 1990 and 2000 is associated with variations in the stringency of land use regulations.

JEL codes: R38, L51, R31

Keywords: Land use regulation, building restrictions, zoning rules

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I. Introduction

Land-use regulation is ubiquitous across American cities and metropolitan areas. Local political jurisdictions derive authority over land use from state governments, and, for the most part, they exercise these regulatory powers independently. The rules and regulations adopted affect the form of urban areas, the pattern and pace of urban development, the price of land to developers, and the price of housing to consumers.

Land-use regulations are themselves varied and detailed, and they range from rules about residential densities to prescriptions about features of building design and the aesthetics of urban and suburban neighborhoods. Besides codes governing construction of housing and commercial properties, land-use regulations extend to the procedures and processes required to secure permission to build. These processes include requirements for public hearings, the assessment of environmental impacts, and the consideration of the fiscal implications construction projects.

The application of these regulations affects the demographic character of local communities, the economic and ethnic composition of neighborhoods and cities, and the rents and selling prices of residences. But the specific rules are, for the most part, locally enacted and locally controlled; so therefore are descriptions of their attributes and their administration. The details of regulations are nowhere assembled, and the ways in which the regulations are enforced and administered are not readily available.

This paper assembles data on the local regulation of housing and its administration for each of the separate jurisdictions in one large metropolitan housing market.

We focus on the San Francisco Bay Area, comprised of nine of the eleven counties in the San Francisco Consolidated Metropolitan Statistical Area (CMSA), the fifth-largest CMSA in the United States with a population of more than seven million people. We assemble and analyze raw data on land-use regulation and administration from five independent sources recorded over eighteen years. Significantly, we assemble information from builders and developers as well as local building officials. It is the developers who must contend with local codes, and we incorporate their perspectives and their interpretations into the description and the analysis. We also utilize survey information obtained from members of the professional association of land-use consultants who facilitate the permitting process in the region.

Beyond this, we utilize data from three independent surveys of building officials in this metropolitan region -- conducted in 1992, 1998, and in 2006-2007. All data described and discussed in this paper are available for download at <http://urbanpolicy.berkeley.edu>. Details, definitions, and data collection methods may be found in Calfee et al. (2007).

We begin with a brief description of the San Francisco Bay Area and its regulatory environment. Section III introduces the surveys and instruments used to assemble information on land use regulations. Section IV presents descriptive information on these rules and the indexes of regulation derived from them. Section V describes the interrelationships between the different measures of regulation and relates these measures to observable outcomes in the regional housing market – the change in housing stock, housing prices and the regional distribution of population by income.

II. The San Francisco Regulatory Environment

The San Francisco Bay Area is composed of 101 local political jurisdictions (called “cities” under the California constitution) and nine county governments. One jurisdiction, San Francisco, has a consolidated City and County government. Each of the 101 incorporated cities is empowered to adopt its own land-use regulations. Each county adopts land-use regulations for the unincorporated areas it contains. There are thus 109 jurisdictions with the power to enact ordinances or to change zoning rules to facilitate or inhibit growth and development. Although the geographical size of the county unincorporated areas greatly exceeds the combined size of the cities, more than ninety percent of the Bay Area’s population lives in the latter. Figure 1 is a map of the region, indicating the locations of these various regulatory bodies.

For each of these jurisdictions, we have sought to link information from five independent surveys of local regulation: a survey of public officials concerning growth control and management from 1992, an update of that survey from 1998, a more general survey of public officials on land use regulation conducted in 2006/2007, a survey of private sector developers conducted in 2006/2007, and a survey of environmental professionals conducted in 2007.

III. The Survey Instruments

The first systematic survey of growth control measures in California was undertaken by Glickfeld and Levine in 1988 and reported in a monograph four years later (Glickfeld and Levine, 1992). A shorter version of the same survey was applied in 1992 and formed the basis for several analyses of the effects of growth control measures

Figure 1
Cities and Counties of the San Francisco Bay Area



on local demographic outcomes (Levine, 1999; Rosenthal, 2000; Quigley, Raphael and Rosenthal, 2004) and the effects upon housing prices (Quigley and Raphael, 2005).

In 1998, the California Department of Housing and Community Development (HCD) administered a similar instrument to follow up on the Glickfeld and Levine (G&L) survey. This survey (published in 2002) asked about growth-control measures enacted between 1995 and 1998. This survey, combined with the previous G&L survey, formed the basis for recent analyses of local growth-control and growth-management programs by Landis and his associates (Landis, 2006; Landis, Deng and Reilly, 2002). Responses on these two surveys are available for 102 of the 109 jurisdictions in the Bay Area which exercise authority over land use regulations.

We conducted a third survey of the regulation of land use by political jurisdictions in the Bay Area in 2006-2007. This survey was modeled on the one originally designed by Anita Summers and her associates and administered to a national sample of political jurisdictions in 1990. The results of that survey of local officials were analyzed in Summers, Cheshire and Senn (1993). Subsequently, the Summers survey formed the basis for a series of extensions by Stephen Malpezzi and his associates (Malpezzi, 1996; Malpezzi and Green, 1996; Green, Malpezzi, and Mayo, 2005) analyzing national land-use patterns.

The original Summers survey instrument was modified in 2005 for national distribution (see Gyourko, Saiz, and Summers, 2007). A revised version was subsequently administered to all jurisdictions in the greater Philadelphia region, the sixth largest CMSA in the U.S. (Gyourko and Summers, 2006). Our survey, administered in

the San Francisco Bay Area in 2006-2007, is modeled on this most recent instrument. Information is reported for 86 of the 109 jurisdictions in the Bay Area.¹

We also devised and administered an on-line survey of builders and developers operating in the nine-county San Francisco Bay Area, asking them to report their experiences in seeking permission to build in various jurisdictions. This survey was undertaken with the cooperation and assistance of the Home Builders Association of Northern California, with a membership of about 1,000 firms in the home building industry. During 2006-2007, we obtained information on the experiences of builders for 62 projects in 33 jurisdictions of the San Francisco CMSA.

Finally, we undertook an on-line survey of members of the Bay Area Chapter of the National Association of Environmental Professionals with the cooperation of the leadership of the association. This body is an interdisciplinary non-profit organization whose members are closely linked to the operation and enforcement of the California Environmental Quality Act (CEQA). The provisions of CEQA apply to any discretionary land use project requiring approval by a local government body in California. Members of the Association serve as consultants to governments and firms in the land-use approval process. The Bay Area membership in the Association consists of about 275 professionals. We were able to obtain survey responses related to 27 projects in 14 different land-use authorities.

¹ Our response rate, 79 percent, is somewhat higher than the 64 percent response rate obtained by Gyourko and Summers (2006).

IV. Survey Results

A. The G&L and the HCD Surveys

The G&L 1992 survey and the HCD 1998 survey were devoted entirely to issues of growth regulation and management. The G&L survey contained questions for local public officials about: explicit growth-control caps adopted; growth management measures; the zoning and rezoning of vacant land; and voting requirements for changes in land use, in addition to some questions about pro-growth measures. The 1998 HCD survey was strictly limited to questions in the areas of local growth control and management and asked local officials to enumerate any changes enacted between the years of 1995 and 1998.

The four general areas covered by the surveys are:

Growth Control Measures: caps on residential permits, caps on commercial space, and restrictions on annexation. Caps on permits ration the number of permits for new construction issued annually, and annexation restrictions limit the amount of land a city can annex.

Growth Management Measures: the enforcement of residential or commercial “adequate public facilities ordinances,” urban limit lines, and/or growth management elements in a general plan. “Appropriate public facilities ordinances” increase the requirements imposed on developers.

Zoning Changes: significant multi-parcel upzoning, downzoning, or rezoning of land, and height and floor area ratio (FAR) restrictions. Upzoning land allows or requires denser development. Downzoning reduces possible densities, and rezoning changes the

possibilities of substituting among commercial, industrial or residential development on land parcels. Height and FAR restrictions effectively reduce the density of development.

Related Measures: the imposition of majority or supermajority voting requirements for land-use changes or the increasing of fees required for residential construction. Supermajority voting is the requirement of a two-thirds plurality.

Table 1 summarizes the survey results for land use authorities in the Bay Area. It reports the extent of growth restrictions which were imposed in 1992 and the changes in these measures recorded several years later. It is clear from the table that jurisdictions in the San Francisco Bay Area grew more restrictive during the decade of the 1990s. The number of jurisdictions imposing requirements of “adequate public facilities” before permitting residential or commercial development increased substantially, as did the number of cities including some aspect of growth management in their general plans. The number of jurisdictions imposing urban limit lines increased by eighty percent, from 21 to 38 jurisdictions.

The findings from the San Francisco region are consistent with these reported elsewhere for other regions (e.g., Quigley and Rosenthal, 2006); land use regulations are becoming more strict. Building is becoming more difficult, reducing the supply of new construction.

Table 2 summarizes three indexes of the stringency of growth control derived from these surveys. It also reports the frequency distribution of these measures. Appendix Table A1 summarizes the raw data on which these measures are based. The indexes have been used elsewhere to describe the restrictiveness of land use regulation for the state as a whole (Quigley and Raphael, 2005), and their derivation from the survey questionnaires

Table 1
Growth Restrictive Measures Specified in Local Ordinances in 1992 and 1998
(95 of 109 Bay Area Jurisdictions in 1992 and 85 of 109 Jurisdictions in 1998)

Measure	<u>Number of Jurisdictions with Measure*</u>	
	1992	1998
<i>Residential</i>		
Identification of phased development areas	8	NA
Restriction on sub-divisions	6	NA
Floor area ratio restriction*	44	62
Restriction on building permits	14	17
Restriction on population growth	13	NA
Adequate services requirement	37	45
Redesignation of residential to open space or agricultural use	15	21
Density reduction via general plan or rezoning	31	38
Referendum requirement for density increases	12	16
Legislative supermajority requirement for density increases	2	3
<i>Commercial</i>		
Adequate services requirement	34	39
Square footage cap (commercial)	9	9
Square footage cap (industrial)	7	NA
Rezoning to less intense use	24	NA
Reduction in allowable height	24	NA
<i>Growth Control</i>		
Adoption of growth Management element for general plan	21	31
Adoption of urban growth boundary	22	31
Other development restrictions	12	14
Restrictions on Annexation	NA	2
Annexation Act	NA	20
Increases in impact fees	NA	7

Note: The numbers for 1992 are based upon survey work by Glickfeld and Levine (Levine, 1999) and the numbers for 1998 are based upon the California Department of Housing and Community Development (2002).

NA: Not Available

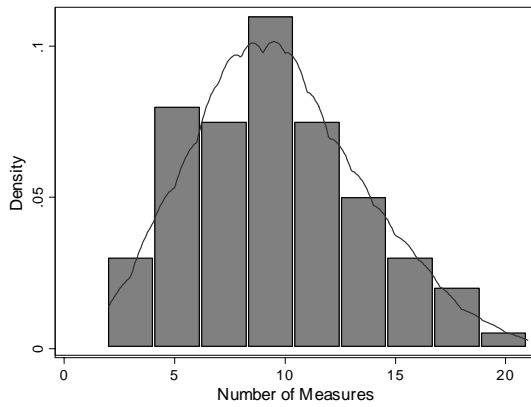
*Number is based upon 77 jurisdictions with responses to questions in both surveys.

Table 2
Indexes of Growth Control and Management for Bay Area Jurisdictions

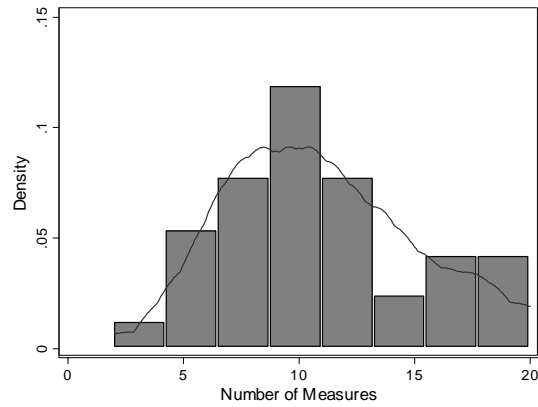
A. Index	Mean	Std. Dev.
Restrictiveness Index, 1992	9.67	3.84
Restrictiveness Index, 1998	10.96	4.21
Hospitality Index, 1992	21.44	6.51

B. Frequency Distribution

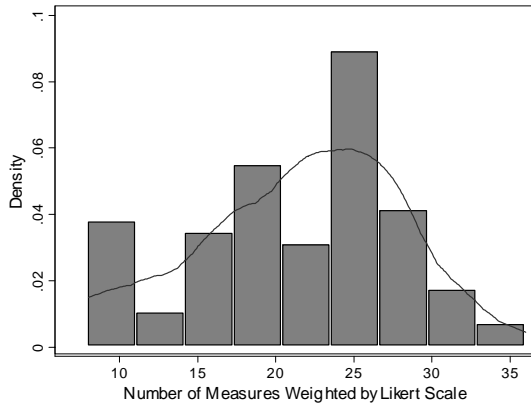
**Restrictiveness Index
1992**



1998



Hospitality Index 1992



Note: These indexes are defined in Rosenthal (2000) and Quigley, Raphael, and Rosenthal (2004). See Appendix Table A1 for their components.

can be found in Rosenthal (2000). Figure 2 reports the spatial distribution of these measures for the San Francisco Bay Area.

B. The 2007 Survey and the Berkeley Land Use Regulation Index (BLURI)

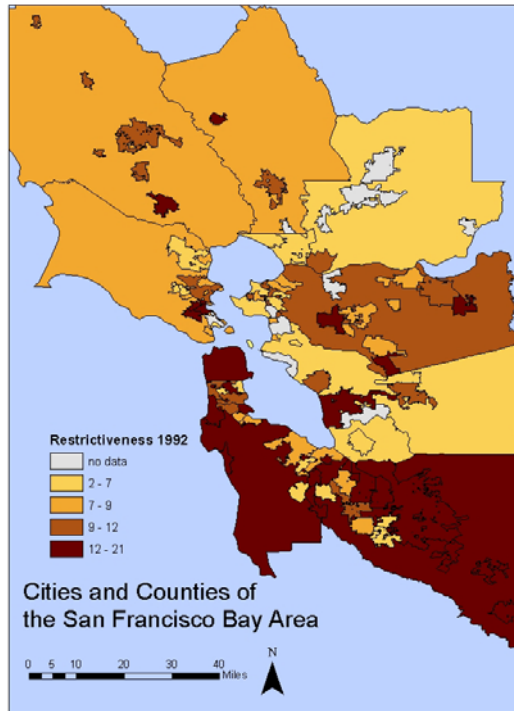
The third survey of local building officials was conducted in 2006-2007, eight or nine years after the HCD survey of growth control and management. The survey design was based, not upon the earlier G&L survey of 1992, but upon the instrument designed by Summers and her associates in 2006. An earlier version of that survey was administered to a national sample of political jurisdictions. More recently it was administered to all jurisdictions in the Philadelphia CMSA. Our survey of the San Francisco Bay Area facilitates a direct comparison with Philadelphia.

Our survey asked government officials about the level of recent development and the involvement of various stakeholders in affecting development. We asked about a variety of factors in affecting single-family and multi-family development. Duration, timing, and specific regulations were addressed.

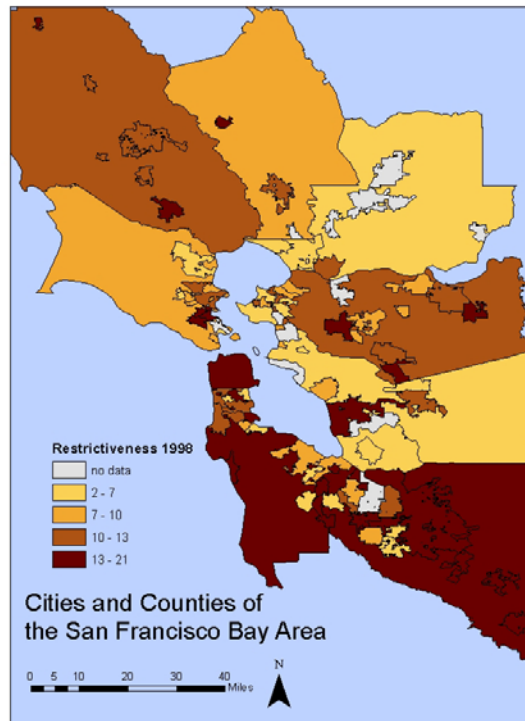
Our 2007 survey was broader than the two earlier surveys. In particular, in the more recent survey, we asked about political influence, the project approval process, delays, inclusionary zoning, and open space. There was some overlap in emphasis, however. The earlier surveys asked about “exactions” imposed by local communities. The 2007 survey asked about “appropriate facilities ordinances,” the modern term for the same requirement. The older surveys asked about development caps, density restrictions, and zoning changes. The 2007 survey asked more detailed questions about these same phenomena. Survey responses were obtained from 86 jurisdictions and the specific

Figure 2
Indexes of Growth Management for the San Francisco Bay Area

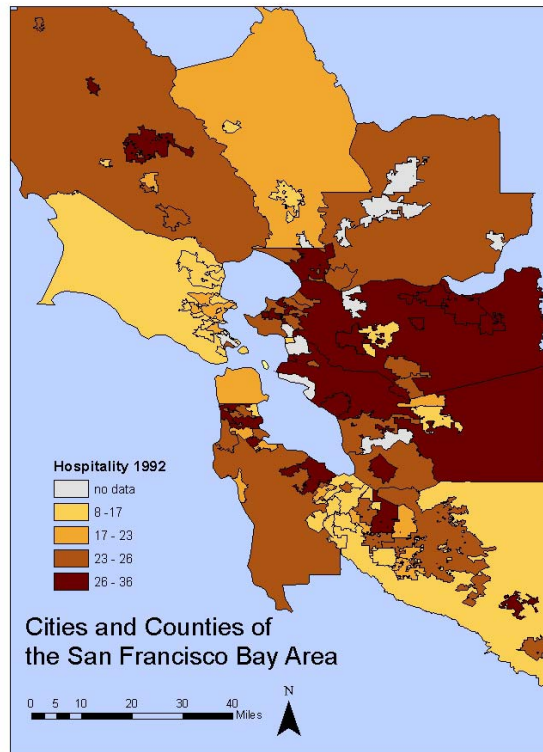
A. Restrictiveness Index, 1992



A. Restrictiveness Index, 1998



B. Hospitality Index, 1992



questions on the 2007 survey, together with a summary of their responses are found in Appendix B.

1. The Ten Sub-Indexes

We use the responses to the 2007 survey to create an index of the regulatory environment in each of the 86 jurisdictions in the San Francisco Bay Area. This index, the Berkeley Land Use Regulation Index (BLURI) is composed of ten sub-indexes measuring distinct aspects of the regulatory environment. The ten component indexes of the BLURI are noted below, together with the details on their calculation.

a. Political Influence Index

This component of the BLURI combines responses to two questions. The first asked respondents to indicate the involvement of different actors in the development process. The second rated the importance of different policies and local issues in influencing residential development. Respondents were asked to rate stakeholders between 1 and 5 in terms of involvement (from 1, “not involved,” to 5 “very involved”) and to note the importance of various issues affecting policies. The political influence index is the sum of the rankings.

Table 3 summarizes the responses to these questions for the Bay Area governments. The results document the importance of local officials, elected and appointed, and local neighborhood groups in affecting development in the Bay Area. We aggregate these responses to a single index of political influence. Figure 3 reports the frequency distribution of index values across the sample of jurisdictions.

Table 3
BLURI: Political Influence Index
(Observations in 86 Bay Area Jurisdictions)

Involvement in Residential Development	Mean	Std. Dev.
Local Elected Officials	4.5	0.90
Neighbors/community pressure	4.1	0.97
State legislature	1.9	1.03
Courts and litigation	1.8	0.93
Ballot measures	1.9	1.24
Organized labor	1.6	0.99
Planning/zoning staff	4.8	0.57
Environmental advocates	3.0	1.20

Factors Affecting Development of Single Family Housing	Mean	Std. Dev.
Supply of developable land	4.7	0.84
Density restrictions	3.3	1.41
Infrastructure requirements	2.8	1.36
Local fiscal conditions	2.4	1.18
Inclusionary housing ordinances	2.3	1.10
Parking requirements	2.4	1.29
School crowding	1.9	1.06
CEQA review	2.7	1.33
Density bonuses	1.7	0.79
Citizens' attitudes on growth	3.4	1.23
Elected officials' positions on growth	3.5	1.26
Mixed-use requirements	2.0	1.16
Impact fees/exactions	2.5	1.17
Duration of entitlement process	2.7	1.17

Factors Affecting Development of Multi Family Housing	Mean	Std. Dev.
Supply of developable land	4.5	0.92
Density restrictions	3.4	1.40
Infrastructure requirements	2.9	1.30
Local fiscal conditions	2.4	1.16
Inclusionary housing ordinances	2.6	1.27
Parking requirements	2.9	1.28
School crowding	1.9	1.05
CEQA review	2.8	1.17
Density bonuses	2.2	1.07
Citizens' attitudes on growth	3.6	1.21
Elected officials' positions on growth	3.8	1.14
Mixed-use requirements	2.6	1.29
Impact fees/exactions	2.7	1.20
Duration of entitlement process	2.9	1.22
Political Influence Index Score	98.63	23.56

b. Project Approvals Index

To describe the approval process for new development projects, respondents were asked to note which reviews were required for the approval of a project that did not also require a zoning change. Reviews may be mandated by the planning commission, the city council or board of supervisors, a landmark or historical preservation commission, an architectural or design review body, the building department, fire department, health department, parking or transportation authority, a provision of the California Environmental Quality Act, a growth management analysis, or some other procedures. The index is constructed as the sum of eleven dichotomous variables.

c. Zoning Change Index

In addition to the review process for general projects not requiring a zoning change, respondents were asked about reviews required for projects that do necessitate zoning changes. Again, possible reviews may be required by the planning commission, city council or board of supervisors, a landmark or historical preservation commission, an architectural or design review, the building department, the fire department, the health department, a parking or transportation authority, a provision of the California Environmental Quality Act, a growth management analysis or some other procedures. The index is constructed as the sum of eleven dichotomous variables.

Table 4 reports the variables and their frequencies across Bay Area jurisdictions for both the Project Approval Index and the Zoning Change Index. The table also summarizes each of the indexes derived. Figures 4 and 5 present the frequency distribution of index values.

Table 4
BLURI: Project Approval and Zoning Change Indexes
(Observations in 85 Bay Area Jurisdictions)

Required Reviews	<u>Frequency</u>	
	Project Approval	Zoning Change
Planning Commission	65	80
City Council (or Board of Supervisors)	19	82
Landmarks/Historical Commission	14	1
Architectural/Design Review	51	10
Building Department	72	45
Fire Department	71	63
Health Department	23	65
Parking/Transportation	23	24
CEQA Review	68	26
Growth management analysis	12	73
Other	20	17
	Mean	Std. Dev.
Project Approval Index Score	5.01	2.13
Zoning Change Index Score	5.74	2.41

d. Development Caps Index

A series of direct questions inquired about the existence of caps on the number of permits issued for: single-family housing, multifamily housing, new single-family units, new multifamily units, or the population as a whole. The index is the sum of five dichotomous variables.

e. Density Restrictions Index

Density restrictions are measured by minimum lot size requirements. Public officials were asked if their jurisdiction imposed minimum lot sizes of less than one-half acre, between one-half and one acre, between one-and-two acres, and greater-than-two acres. The index was created by summing the four dichotomous variables for each of these minimum lot size categories.

Table 5 reports the frequencies of responses for questions which underlie the Development Caps and the Density Restrictions Indexes. Figures 6 and 7 present the frequency distribution of index values in the nine-county region.

f. Open Space Restrictions Index

Public officials were asked whether developers were required to leave some land as open space in new developments. This is recorded as a dichotomous variable. However, in some communities, developers have the option of paying a fee in lieu of leaving open space in a project. While this option is less restrictive, it is still quite onerous. The index has a value of one if there are open space requirements; if in-lieu fees are an option, the index takes on a value of 0.7.

Table 5
BLURI: Development Caps and Density Restrictions Indexes
(Observations in 86 Bay Area Jurisdictions)

Development Caps	Frequency	
Single Family Home building permits	14	
Multi Family Home building permits	13	
New Single Family Housing	10	
New Multi Family Housing	10	
Population Growth	4	
Density Restrictions	Frequency	
Minimum lot size less than .5 acres	73	
Minimum lot size between .5 and 1 acres	31	
Minimum lot size between 1 and 2 acres	26	
Minimum lot size 2 or more acres	20	
	Mean	Std. Dev.
Development Caps Index Score	0.59	1.26
Density Restrictions Index Score	1.69	1.34

Figure 3
BLURI: Histogram of Political Influence Index

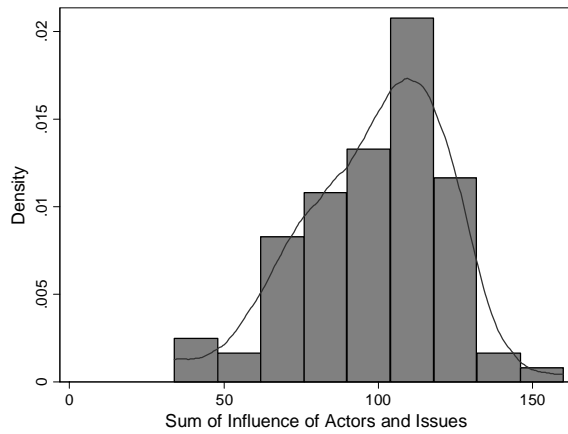


Figure 4
BLURI: Histogram of Project Approval Index

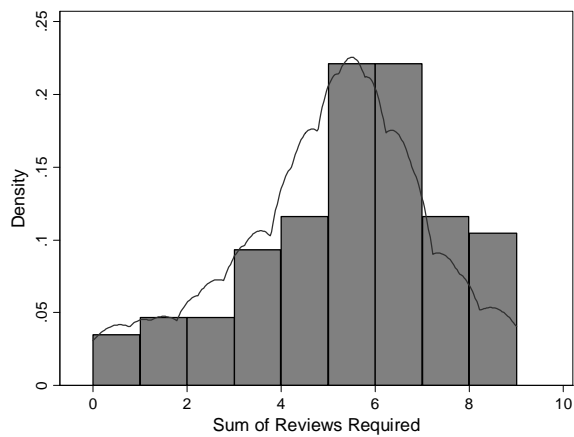
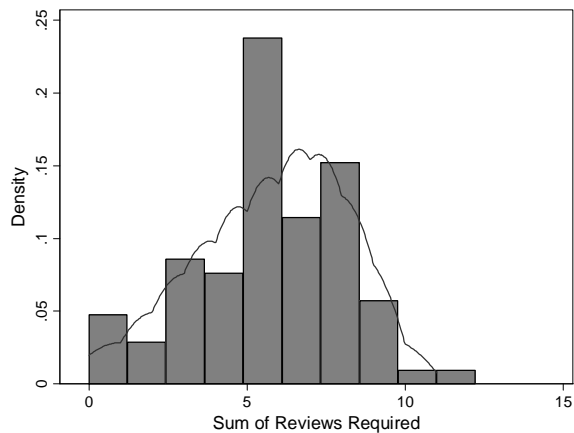


Figure 5
BLURI: Histogram of Zoning Change Index



g. Infrastructure Improvements Index

Public officials were asked whether developers were required to provide infrastructure improvements for new developments. As in the open space restrictions, this is recorded as a dichotomous variable. Again, if developers have the option of paying a fee in lieu of providing infrastructure improvements in conjunction with a development, the index value is lower. The index has a value of one if infrastructure improvements are required; if in-lieu fees are an option, the index takes on a value of 0.7.

h. Inclusionary Housing Index

Public officials were asked whether developers were required to set aside units as “affordable housing” in new developments. As in open space and infrastructure requirements, this is recorded as a dichotomous variable; if developers have the option of paying a fee in lieu of setting aside units as affordable, the index value is lower. The index has a value of one if there are inclusionary ordinances; if instead, in-lieu fees are permitted as an option, the index takes on a value of 0.7.

Table 6 reports a summary of responses to the questions which underlie the Open Space Restrictions Index as well as the Infrastructure Improvements and the Inclusionary Housing Indexes. Figures 8, 9, and 10 present the frequency distribution of index values in the nine-county region.

Table 6
BLURI: Open Space, Infrastructure Improvement & Inclusionary Housing Indexes
(Observations in 86 Bay Area Jurisdictions)

Measure	<u>Frequency</u>		
	Open Space	Infrastructure Improvements	Inclusionary Housing
No restrictions	10	3	13
In lieu fees option	47	55	54
Restrictions	29	28	19

	Mean	Std. Dev.
Open Space Index Score	0.71	0.32
Infrastructure Improvements Index Score	0.75	0.23
Inclusionary Housing Index Score	0.64	0.32

Figure 6
BLURI: Development Cap Index

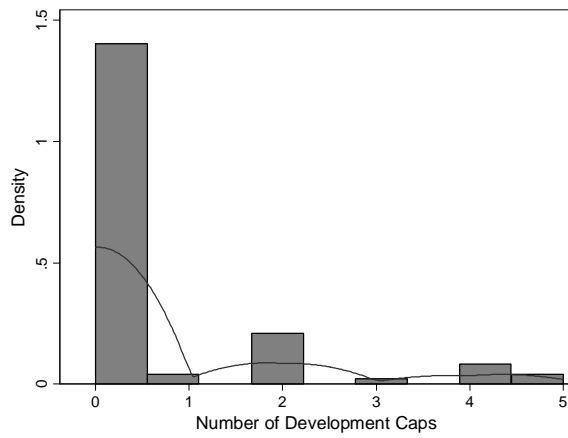


Figure 7
BLURI: Density Restrictions Index

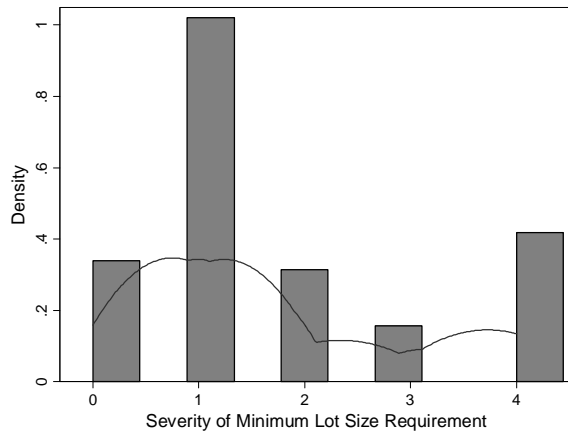


Figure 8
BLURI: Open Space Index

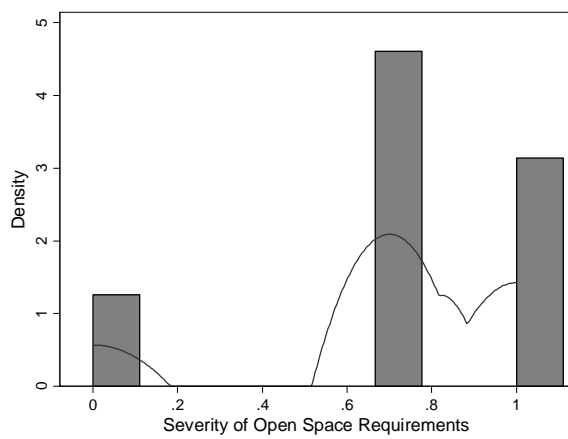


Figure 9
BLURI: Infrastructure Improvements Index

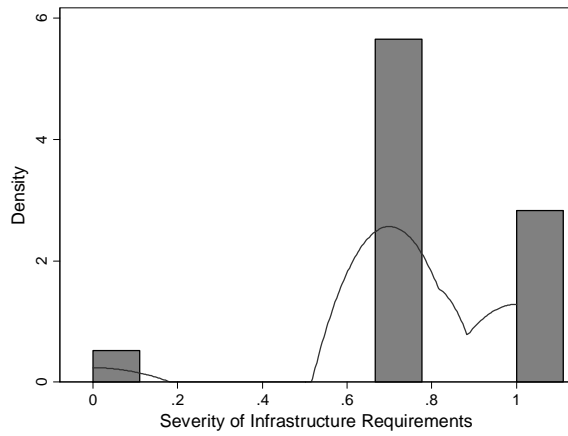


Figure 10
BLURI: Inclusionary Housing Index

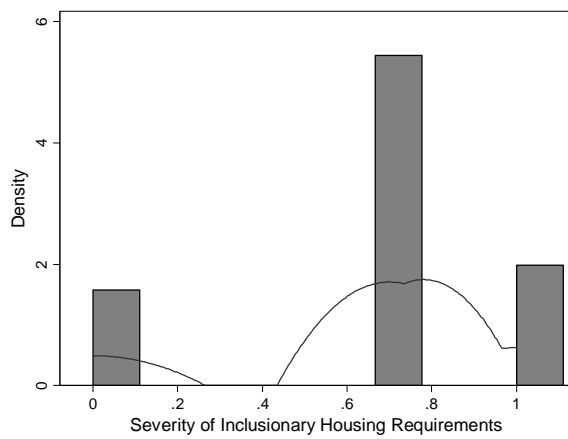
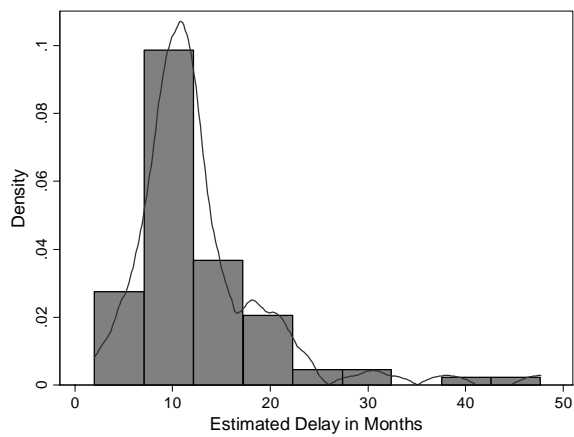


Figure 11
BLURI: Histogram of Approval Delay Index



i. Approval Delay Index

There are three separate components of the approval delay question. The first asks for an estimated elapsed time for the review process, from filing an application to issuing the permit. The second asks for the length of time from application to permit approval for projects requiring a zoning change. The third asks the same question regarding subdivision approvals. Each component asks respondents for an estimated average time for four different types of projects: 1 to 4 single-family homes, 5 to 49 single-family homes, over 50 single-family homes and multifamily residential. The approval delay index was created by averaging the average times for different types of projects in months.

Table 7 reports the frequencies of responses for questions which underlie the Approval Delay Index. Figure 11 presents the frequency distribution of index values in the sample of local governments in the San Francisco Bay Area.

j. Rate of Approval Index

A final index used to describe the regulatory environment is the fraction of zoning changes and subdivision applications that were approved over the past twelve months. The value is calculated by dividing the number of zoning change and subdivision approval applications filed by the number approved, and averaging these two proportions. The index is thus a percentage.

Table 8 reports the mean number of applications filed and approved, as well as the mean value of the Rate of Approval Index. Figure 12 reports the distribution of index values for the sample of jurisdictions in the San Francisco Bay Area.

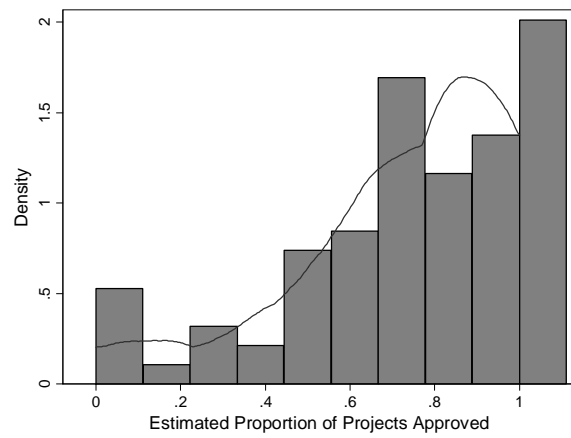
Table 7
BLURI: Approval Delay Index
(Observations in 79 Bay Area Jurisdictions)

Type of project	<u>Estimated Delay in Months</u>		
	No zoning change	Zoning change	Subdivision
1-4 Single Family Home	7	10	NA
5-49 Single Family Home	15	15	15
50 plus Single Family Home	17	17	18
Multi Family Home	14	14	14
Median	13	14	17
	Mean		Std. Dev.
Approval Delay Index Score	12.66		7.32

Table 8
BLURI: Rate of Approval Index
(Observations in 69 Bay Area Jurisdictions)

Type of Project	Mean Applications	Mean Approvals
Zoning change	72	32
Subdivision applications	8	4
	Mean	Std. Dev.
Rate of Approval Index Score	0.74	0.30

Figure 12
BLURI: Histogram of Rate of Approval Index



2. Combining the Sub Indexes

The sub indexes are combined to produce the BLURI Index – a single value that summarizes the restrictiveness of regulation in each Bay Area jurisdiction – by standardization and aggregation. Each of the sub indexes is normalized to a mean of one and standard deviation of one so that their different metrics are accorded equal weight. Two techniques are used to aggregate the ten components: a simple summation and a factor extraction. Standard factor analysis techniques using the principal factors method, when applied to the ten sub indexes, produce a single factor that explains 76 percent of the covariances among the ten variables. Moreover, the second factor generated by this method has an eigenvalue of less than one, suggesting that a single factor is sufficient to explain the variability of the underlying data. In this case, moreover, the simple correlation between the scores of the single factor extracted from the ten indexes and the sum of the sub-indexes is 0.79. Table 9 reports the complete set of factor loadings and correlations between the sub indexes and the composite BLURI factor. Table 10 reports the correlations among the values of the ten standardized sub indexes. It also reports the correlations of the sub indexes with the two BLURI Indexes constructed from the underlying data.²

A scatter plot of the factor scores and the sum of the standardized values of the ten sub indexes is shown in Figure 13. Remarkably, the complexity of the ten underlying

² We deemed it was necessary to impute missing data points as when aggregating the sub indexes, missing data for one sub index value would either make the values of the other sub indexes unusable, or bias the final aggregated index. Data were missing from one jurisdiction for the Project Approval Index, 15 jurisdictions for the Approval Delay Index and 20 jurisdictions on the Rate of Approval Index. In order to impute the missing data points we used the Stata 9.0 impute command, which uses a multivariate regression to predict the missing values.

Figure 13
Scatter of BLURI Factor Scores and Raw Sum of Indexes

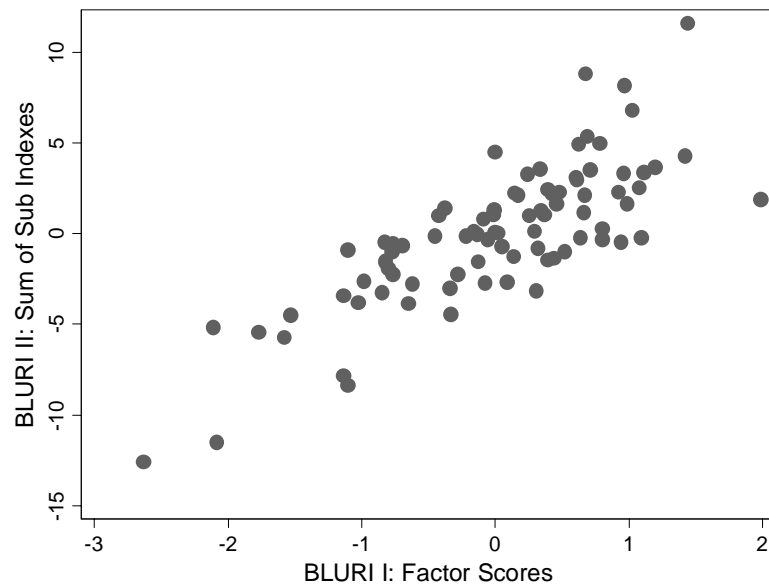


Table 9
Factor Loadings and Correlations between Sub Indexes and BLURI Index I

Sub Indexes	Factor Loading	Correlation with Factor Score
Political Influence	0.197	0.225
Project Approvals	0.756	0.866
Zoning Changes	0.788	0.902
Development Caps	0.229	0.262
Density Restrictions	0.199	0.228
Open Space Restrictions	0.314	0.359
Infrastructure Improvements	0.126	0.145
Inclusionary Housing	0.202	0.231
Approval Delays	0.195	0.223
Rate of Approvals	-0.319	-0.366

Table 10
Correlation Matrix of BLURI Sub Indexes and BLURI Values

	Political Influence	Project Approve	Zoning Changes	Dev. Caps	Density	Open Space	Infras. Improve	Inc. Hsg.	Apprv. Delays	Rate of Apprv.	BLURI Index I	BLURI Index II
Political Influence	1.00											
Project Approvals	0.11	1.00										
Zoning Changes	0.06	0.72	1.00									
Dev. Caps	0.17	0.01	0.19	1.00								
Density	-0.07	0.04	0.13	0.22	1.00							
Open Space	0.08	0.29	0.20	0.01	0.04	1.00						
Infras. Improve	-0.04	0.07	0.09	0.02	0.10	0.19	1.00					
Inc. Hsg.	0.19	0.20	0.15	-0.03	-0.20	-0.04	-0.13	1.00				
Approval Delays	0.20	0.02	0.16	0.33	0.14	0.03	-0.02	0.04	1.00			
Rate of Approval	-0.12	-0.16	-0.20	-0.07	-0.30	-0.12	-0.09	-0.18	0.07	1.00		
BLURI Index I	0.23	0.87	0.90	0.26	0.23	0.36	0.14	0.23	0.22	-0.37	1.00	
BLURI Index II	0.41	0.59	0.64	0.48	0.29	0.43	0.31	0.26	0.51	-0.04	0.79	1.00

Note: BLURI Index I is computed by factor analysis using the first principal factor of the covariance among the ten sub indexes.
BLURI Index II is computed as the simple sum of values of the ten sub indexes.

measurements can be summarized by a single factor or by the sum of the underlying sub-indexes. Figure 14 summarizes the BLURI calculations; it indicates the restrictiveness in land use regulation across the San Francisco Bay Area as described by these two comprehensive measures of restrictiveness.

B. The Developer Survey

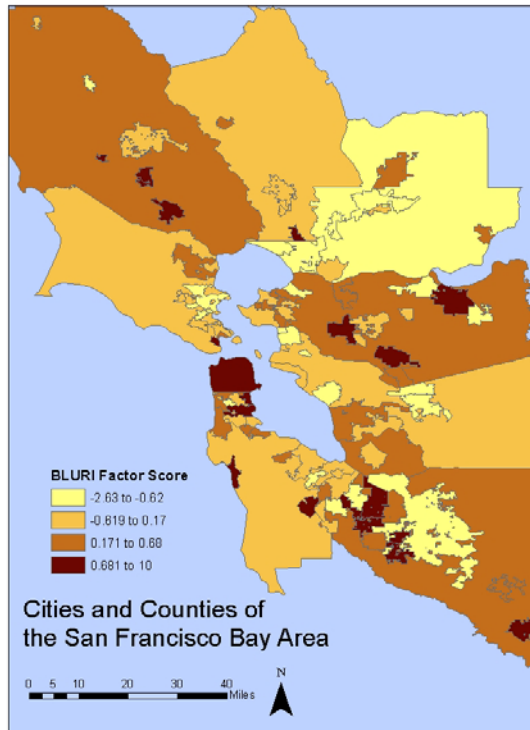
The fourth survey was administered in 2006/2007 to builders and developers operating in the San Francisco Bay Area. The survey was designed and administered in collaboration with the Home Builders Association of Northern California (HBANC). The survey was advertised in emails and letters to the HBANC membership and was administered anonymously through an on-line survey firm.

Survey respondents provided information on a total of 62 projects located in 33 jurisdictions of the Bay Area. For each project, respondents were asked to identify the product type, size, and a few other project characteristics. They were asked to indicate the inherent ex-ante entitlement risk of the project and its level of “controversy.” Developers were then asked to provide three summary measures of the regulatory process for each project: the time required for the completion of the process; the all-inclusive cost of securing entitlements; and the accuracy of their own ex ante estimates of the time that would be required to secure entitlements.

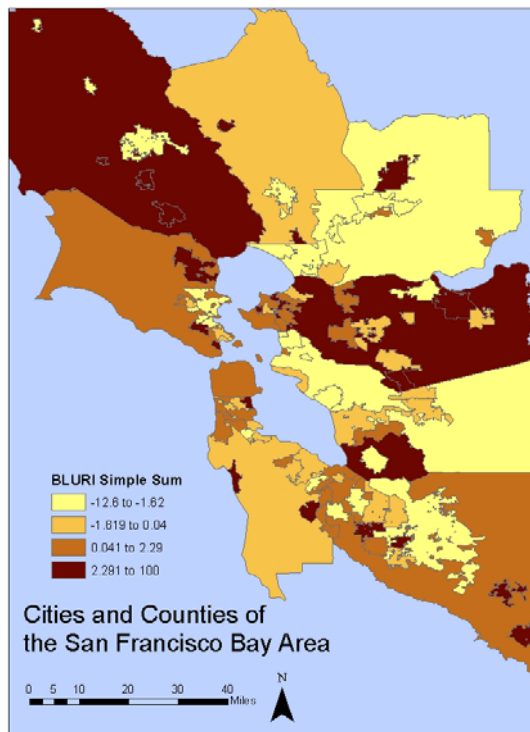
Table 11 summarizes developer responses separately for single family housing developments and for all other projects (apartments, condominiums, mixed-use developments, and those requiring master plans). As indicated in the table, developments of single family housing were somewhat smaller, measured by the number of units

Figure 14
Berkeley Land Use Regulation Index for San Francisco Bay Area

A. BLURI Index I



B. BLURI Index II



constructed – 121 units on average versus 331 units for other developments. The level of controversy, ex ante, was considered substantially lower for single family developments, averaging 1.6 on a scale of 1 (a “standard” project) to 3 (a “pushing-the-envelope” project). By comparison, other projects averaged 2.0 in terms of controversy. The ex ante entitlement risk was an average of 2.7, on a scale of 1 (“very low risk”) to 5 (“very high risk”) for single family projects, while in comparison, non-single family home projects had an average of 3.1. Single family projects also required fewer special permits for construction than did other projects.

The cost of the entitlement process averaged \$1.3 million for single family home developments, or about \$22,600 per dwelling unit built. Entitlement costs for other types of development, which tended to be significantly larger and more complex, averaged \$2.3 million or about \$9,100 per dwelling unit built. For the average single family housing development, the entitlement process took almost two and a half years. The delay averaged about two years for multifamily housing and mixed-use projects.

These averages conceal a great amount of variation. Figure 15 displays the frequency distribution of the out-of-pocket costs associated with the entitlement process, per unit costs, the time to entitlement and the accuracy with which that time was estimated, all for both single family home projects and multifamily projects.

Table 12 reports the same selected indicators of projects, entitlement delays and costs by the level of ex ante controversy of the project. It compares “standard” projects with those characterized as “mildly controversial” or as “pushing the envelope.” As expected, more controversial projects were larger, had more entitlement risk ex ante, and required more special permits in order to secure development rights. “Standard” projects

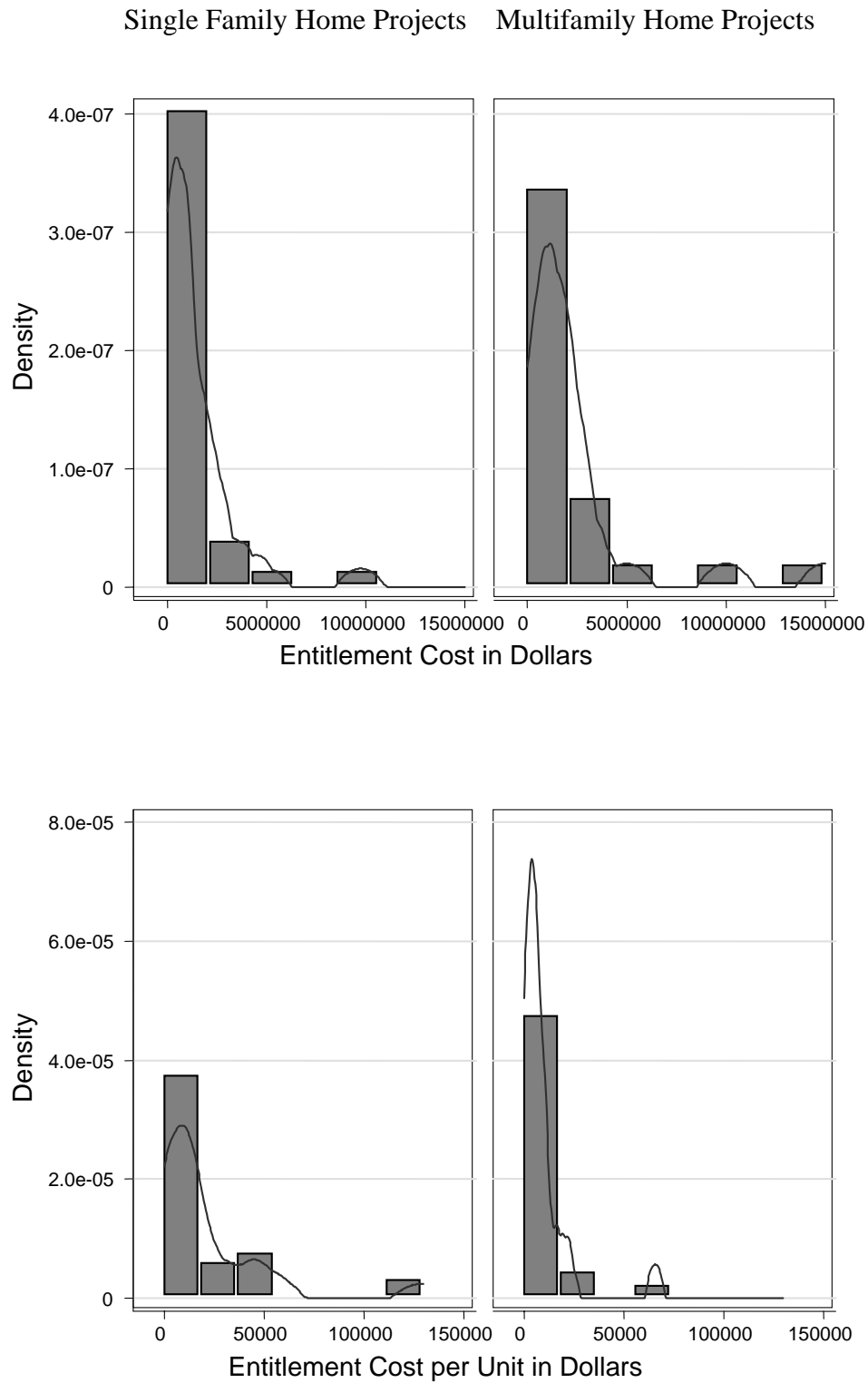
Table 11
Selected Project Level Indicators by Product Type,
Survey of Developers

Indicator	<u>Single Family Homes</u> (37 projects)		<u>Apartments, Condominiums, Mixed Use and Master Plans</u> (25 projects)	
	Mean	Std. Dev.	Mean	Std. Dev.
Number of Units	121	173	331	219
Controversy Level (1 to 3)	1.57	0.55	2.04	0.89
Entitlement Risk (1 to 5)	2.70	0.91	3.08	1.15
Number of Special Permits	2.03	1.40	2.60	1.47
Cost (millions of dollars)	1.31	1.88	2.34	3.34
Cost per Unit (thousands of dollars)	22.62	30.76	9.07	13.25
Time (years)	2.46	1.25	2.04	1.24
Accuracy (years)	1.25	0.88	0.72	0.85

Table 12
Selected Project Level Indicators by Controversy Level,
Survey of Developers

Indicator	<u>Standard Projects</u> (26 projects)		<u>Mildly Controversial and Pushing the Envelope</u> (36 projects)	
	Mean	Std. Dev.	Mean	Std. Dev.
Number of Units	175	184	227	239
Entitlement Risk (1 to 5)	2.31	0.93	3.25	0.91
Number of Special Permits	1.65	1.02	2.69	1.56
Cost (millions of dollars)	1.41	2.01	1.98	2.98
Cost per Unit (thousands of dollars)	18.87	28.93	15.74	23.63
Time (years)	2.00	1.20	2.52	1.26
Accuracy (years)	0.92	0.78	1.12	0.98

Figure 15
Histogram of Entitlement time, Costs and Accuracy for Single Family Housing
Projects and Other Types of Development



Single Family Home Projects

Multifamily Home Projects

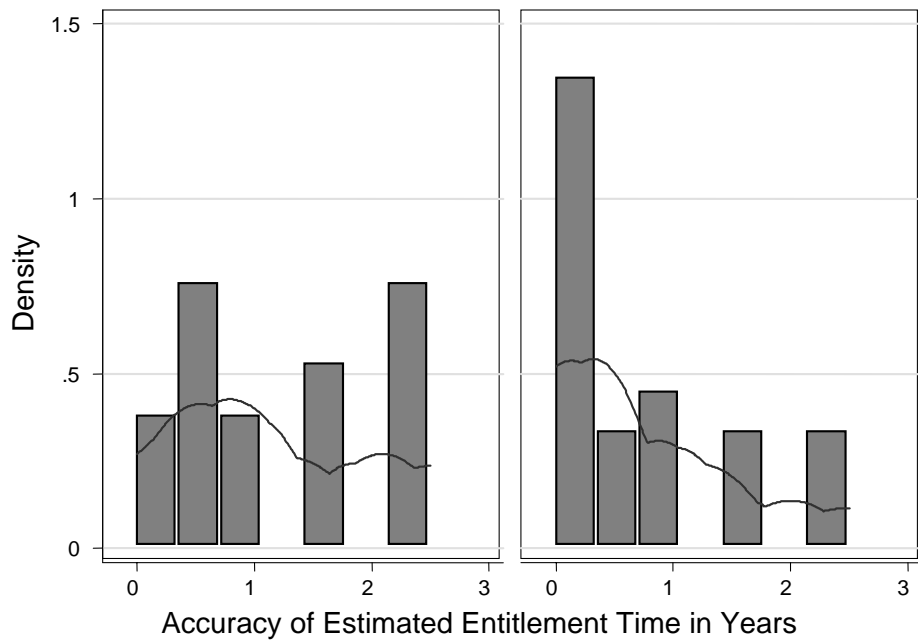
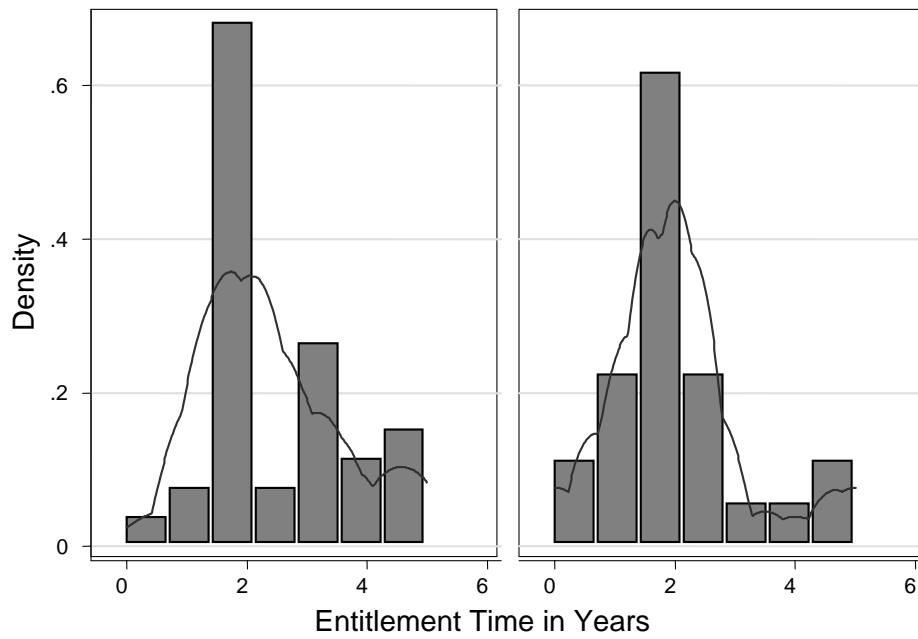
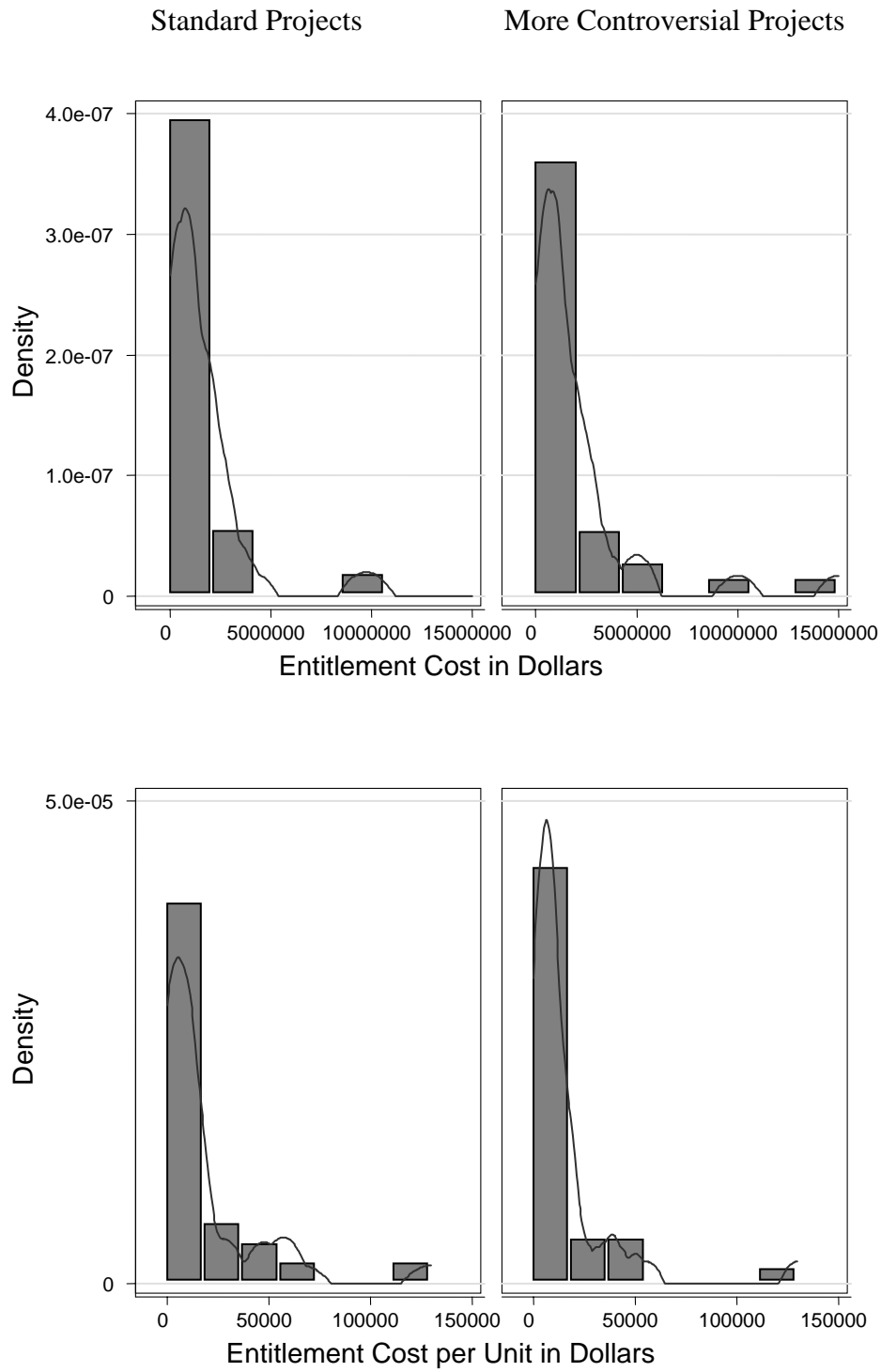
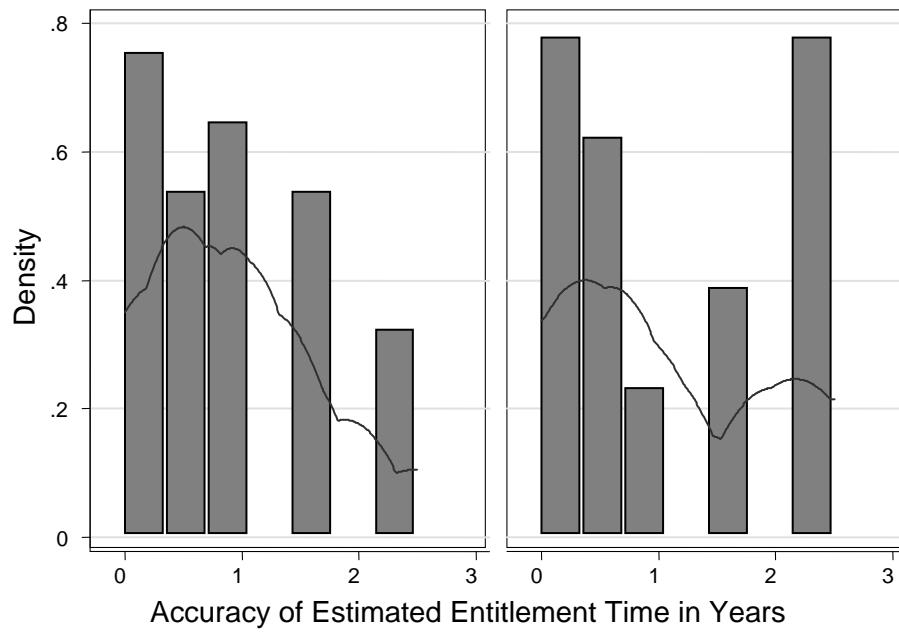
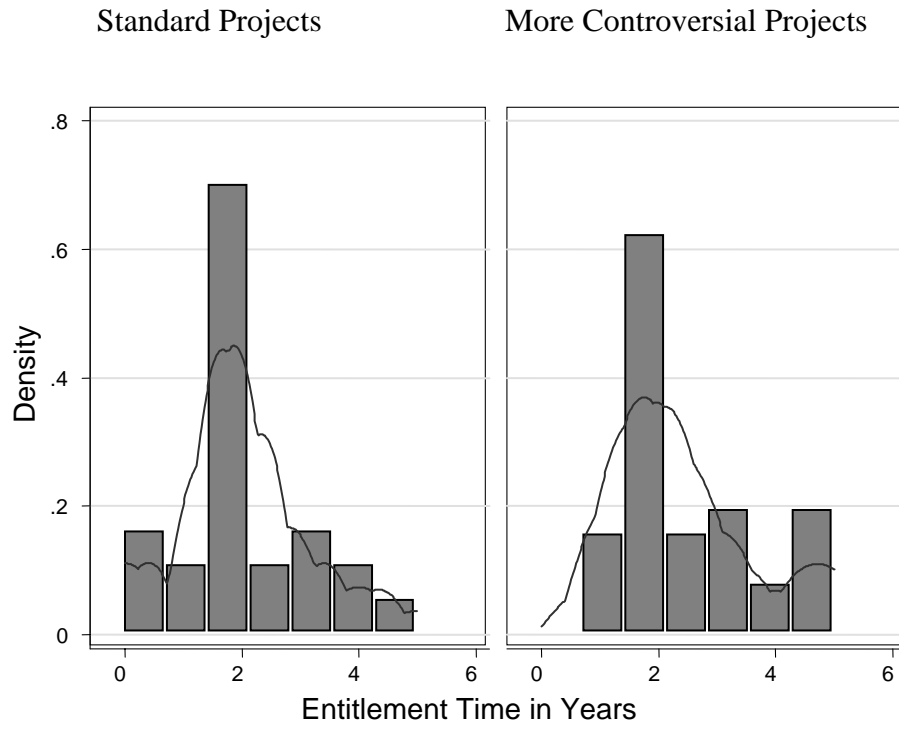


Figure 16
Histogram of Entitlement time, Costs and Accuracy for “Standard” Projects and
More Controversial Projects





required about \$1.4 million in entitlement costs or about \$8,000 per dwelling unit. More controversial projects required about \$1.9 million in out-of-pocket costs or about ten percent more per dwelling unit produced. On average, more controversial projects took twenty five percent longer – a half year – to obtain permission to build.

Again, these averages conceal a wide variation in time and cost. Figure 16 displays the frequency distribution of the out-of-pocket costs associated with the entitlement process, per unit costs, the time to entitlement and the accuracy with which that time was estimated, all for “standard” projects for more controversial projects.

C. The Environmental Professionals Survey

The fifth survey was administered in 2007 to members of the Bay Area Chapter of the National Association of Environmental Professionals (AEP), and was designed and administered with the collaboration of that organization. As with the developer survey, the survey was advertised in emails to AEP members and was administered anonymously through an on-line survey firm.

In a format similar to the developer survey, consultants were asked a series of questions regarding a project that they recently worked on. Responses were obtained regarding 27 projects in 14 jurisdictions of the San Francisco Bay Area. In addition to questions about project characteristics, such as the type of development and the number of units, two sets of questions were asked about the environmental review process. The first set detailed the cost, time, and components of the environmental review process for each successful project. Another set asked consultants to judge the review process according to notions of reasonableness, transparency, and the attitudes of the regulators in

which the project was located towards development. Respondents were asked to rate the level of controversy and ex ante entitlement risk of the project.

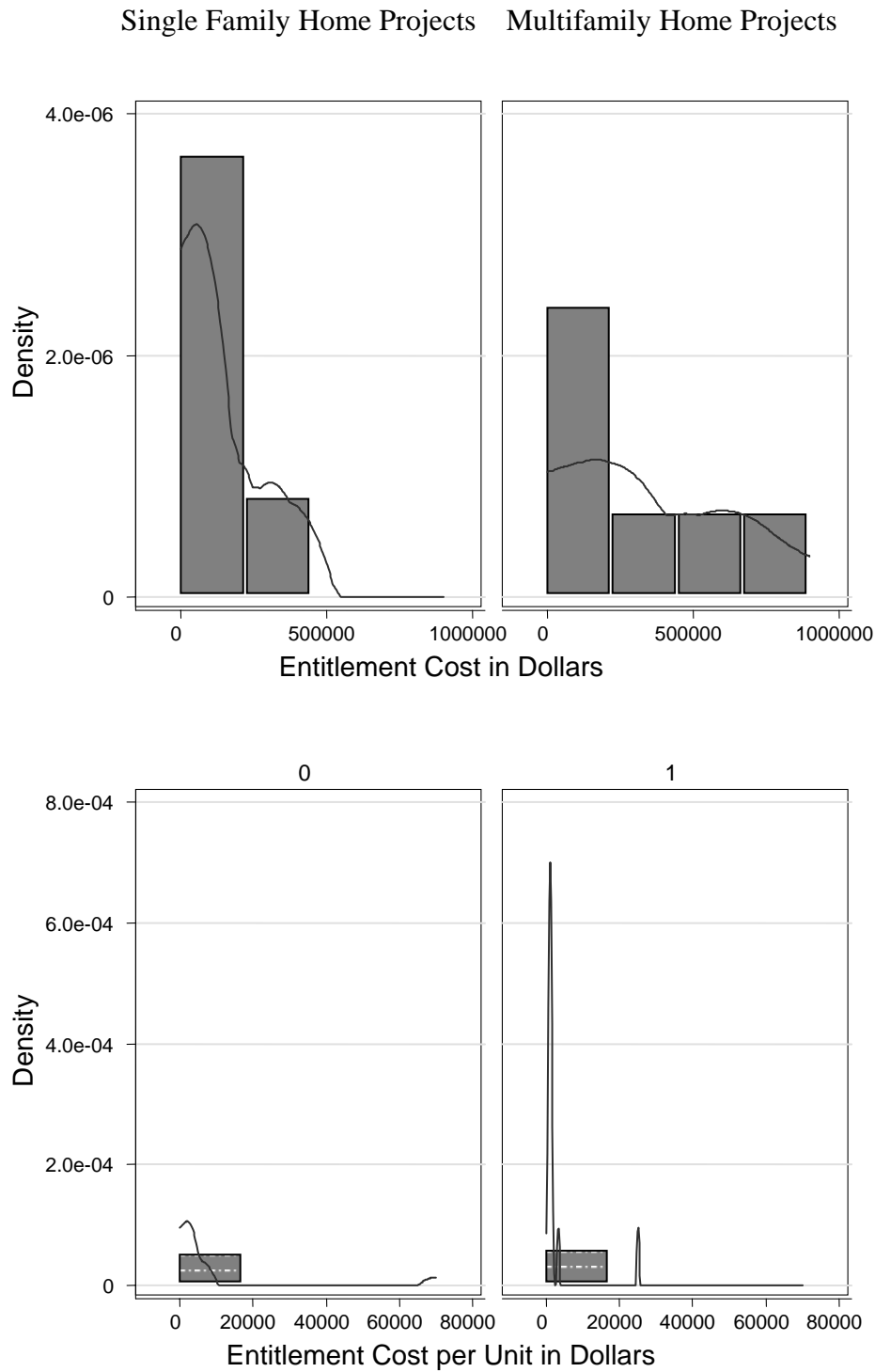
Table 13 displays project level characteristics for single family home developments separately from multifamily and mixed use housing. As with the developer survey, the multifamily and mixed use projects tend to be much larger than those dedicated to single family housing, averaging 271 and 74 units respectively. The level of controversy tends to be lower for single family home projects, averaging 1.69 on the scale of 1 to 3 previously defined. For multifamily housing, the controversy level is 2.14 on average. Similarly, the level of entitlement risk for single family homes is lower, though it is only about five percent less than for multifamily housing.

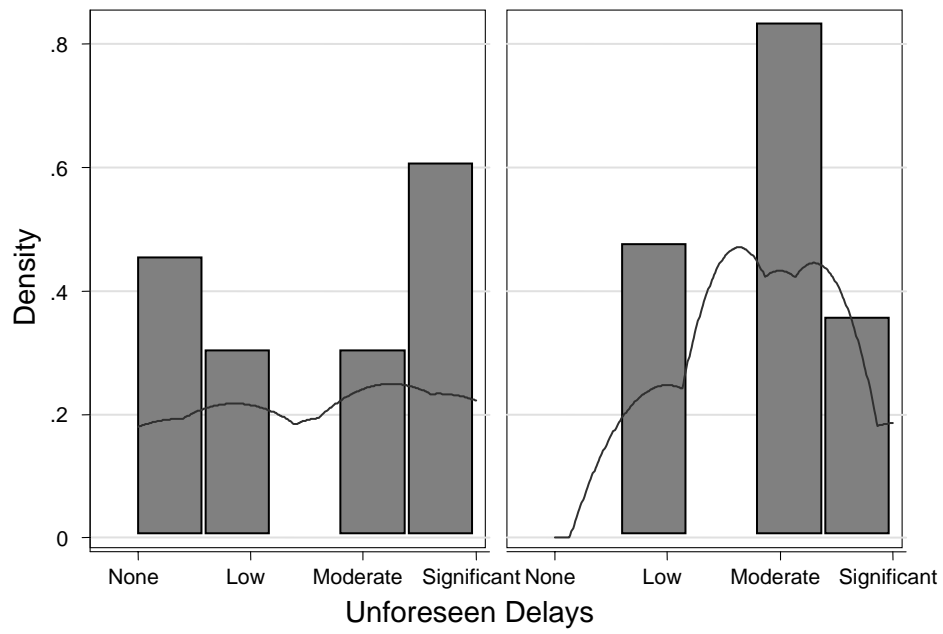
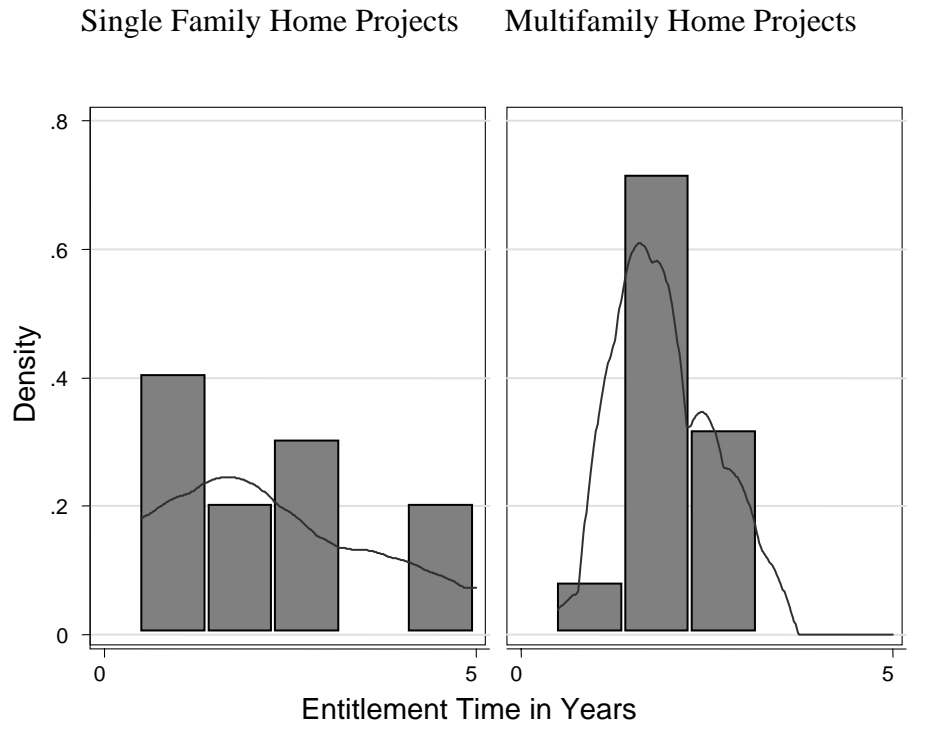
Indicators of delay and mitigation were only slightly lower for single family home developments than for multifamily housing and mixed use, though costs and the length of time for the environmental review process were higher. On a scale of 1 to 4 where 1 is “none” and 4 is “very high” single family homes had an average delay of 2.6 while that of non-single family home projects was 2.9. On the same 1 to 4 scale, single family home projects had to undertake a very similar level of environmental mitigation, rating an average of 2.5 while non-single family home projects were rated 2.6 on average. As with the developer survey, while overall costs were much higher for multifamily and mixed use projects, per unit costs and the time required for completion of the review process was not. On average, single family home projects took 2.3 years while multifamily and mixed use projects took only 1.9 years. Dollar costs for environmental review work were \$8,000 every single family home built, compared to \$3,000 for every unit in multifamily and mixed use unit.

Table 13
Selected Project Level Indicators by Product Type,
Survey of Environmental Professionals

Indicator	<u>Single Family Homes</u> (13 projects)		<u>Apartments, Condominiums, Mixed Use and Other</u> (14 projects)	
	Mean	Std. Dev.	Mean	Std. Dev.
Number of Units	74.46	79.19	270.93	277.88
Controversy Level (1 to 3)	1.69	0.75	2.14	0.66
Entitlement Risk (1 to 5)	2.85	1.14	3.00	0.68
Number of drivers of risk	1.62	1.45	2.79	1.63
Delays (1 to 4)	2.63	1.29	2.93	0.73
Mitigation (1 to 4)	2.50	1.00	2.64	0.84
Time (years)	2.27	1.62	1.93	0.62
Cost (thousands of dollars)	110.30	138.38	301.15	315.06
Cost per Unit (thousands of dollars)	8.14	20.65	2.99	6.65

Figure 17
Histogram of Project Cost, Cost per Unit, Time to Entitlement, and Delays for
Single Family Housing Projects vs. Other Types of Development





Though there is evident difference in the averages of project indicators, there is considerable variation in these variables. Figure 17 displays frequency the distribution of total project entitlement cost, per unit entitlement cost, the time of the entitlement process in years, and the amount of unforeseen delays measured on a 1 to 4 scale, for single family home developments juxtaposed with multifamily projects.

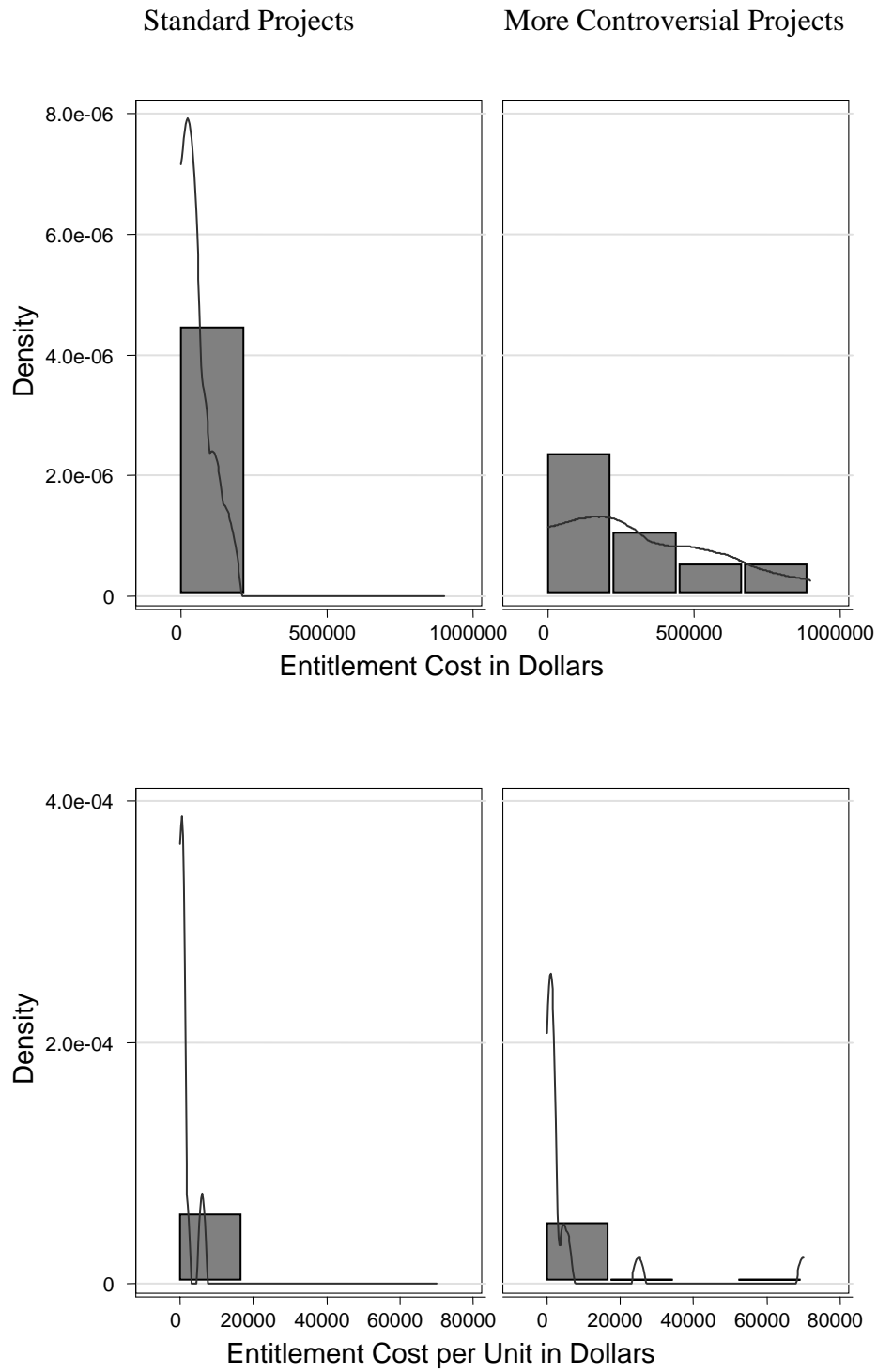
Table 14 compares the average value of project level indicators of standard projects to those that were considered more controversial. As with the projects reported by developers, more controversial projects reported by environmental professionals had more units, took longer to secure entitlements, and had a higher cost overall and per unit. For example, the average mildly controversial or pushing the envelope project took one year longer to entitle than the average standard project. The per unit cost of securing permits for the average standard project was less than one fifth of that for an average more controversial project. Additionally, on the scale of 1 to 4 defined previously, where 1 is “none” and 4 is “very high,” more controversial projects had a higher score on an indicator of delay than standard projects. Similarly, more controversial projects had to undertake more environmental mitigation because of the review process.

As with the comparison of averages of project indicators between single family home developments and multifamily projects, the apparent differences between “standard” projects and those identified as more controversial conceal considerable variation. Figure 18 displays frequency the distribution of total project entitlement cost, per unit entitlement cost, the time of the entitlement process in years, and the amount of unforeseen delays measured on a 1 to 4 scale, for “standard” and more controversial projects.

Table 14
Selected Project Level Indicators by Level of Controversy,
Survey of Environmental Professionals

Indicator	<u>Standard Projects</u> (8 projects)		<u>Mildly Controversial and Pushing the Envelope</u> (19 projects)	
	Mean	Std. Dev.	Mean	Std. Dev.
Number of Units	135.38	200.46	193.58	240.24
Entitlement Risk (1 to 5)	2.25	0.89	3.21	0.79
Number of drivers of risk	1.25	1.16	2.63	1.64
Delays (1 to 4)	2.33	1.03	2.95	0.97
Mitigation (1 to 4)	1.86	0.69	2.84	0.83
Time (years)	1.33	0.68	2.32	1.18
Cost (thousands of dollars)	40.19	51.14	285.12	283.56
Cost per Unit (thousands of dollars)	1.25	2.16	7.04	17.25

Figure 18
Histogram of Project Cost, Cost per Unit, Time to Entitlement, and Delays for
“Standard” Projects vs. More Controversial Projects



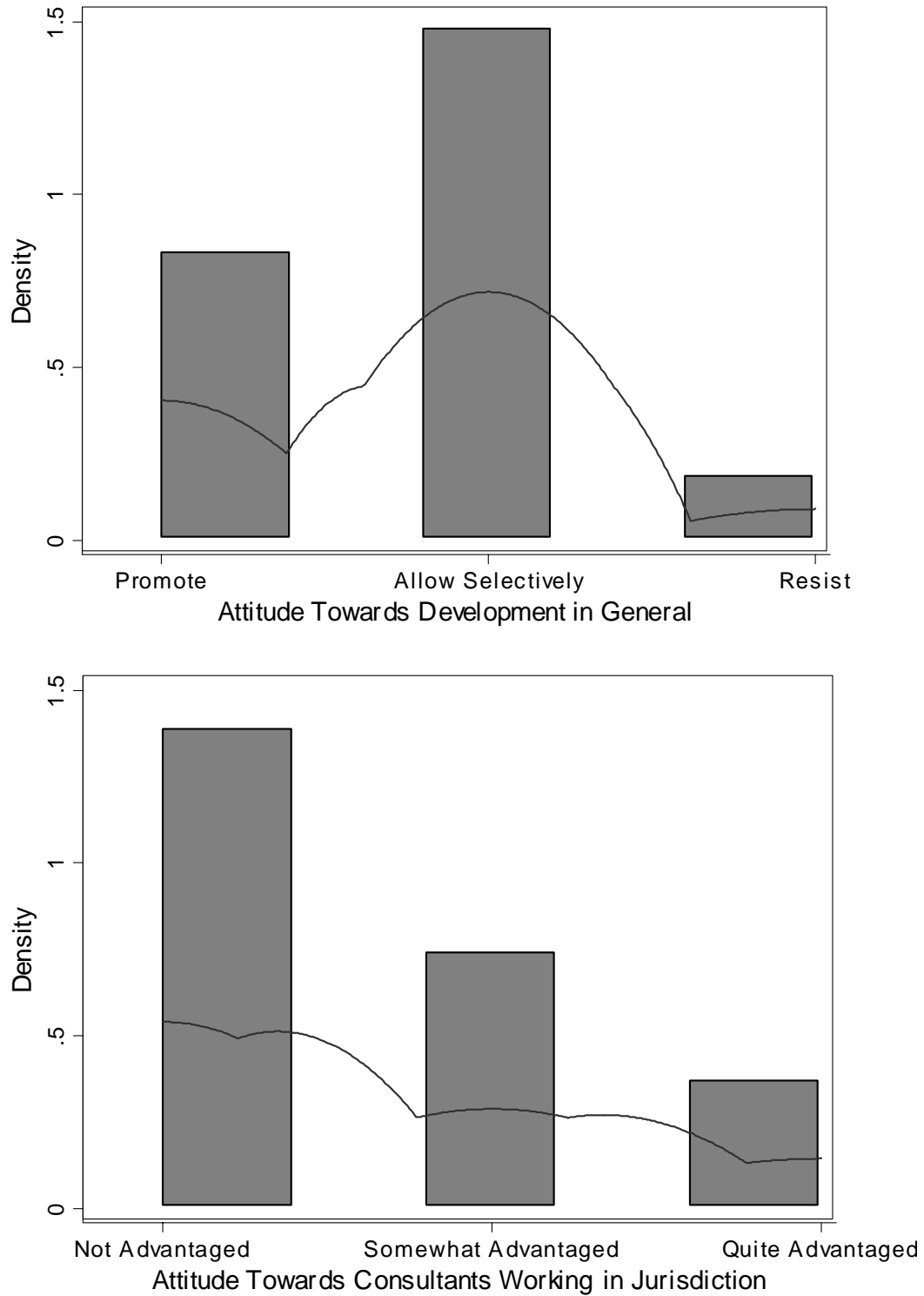


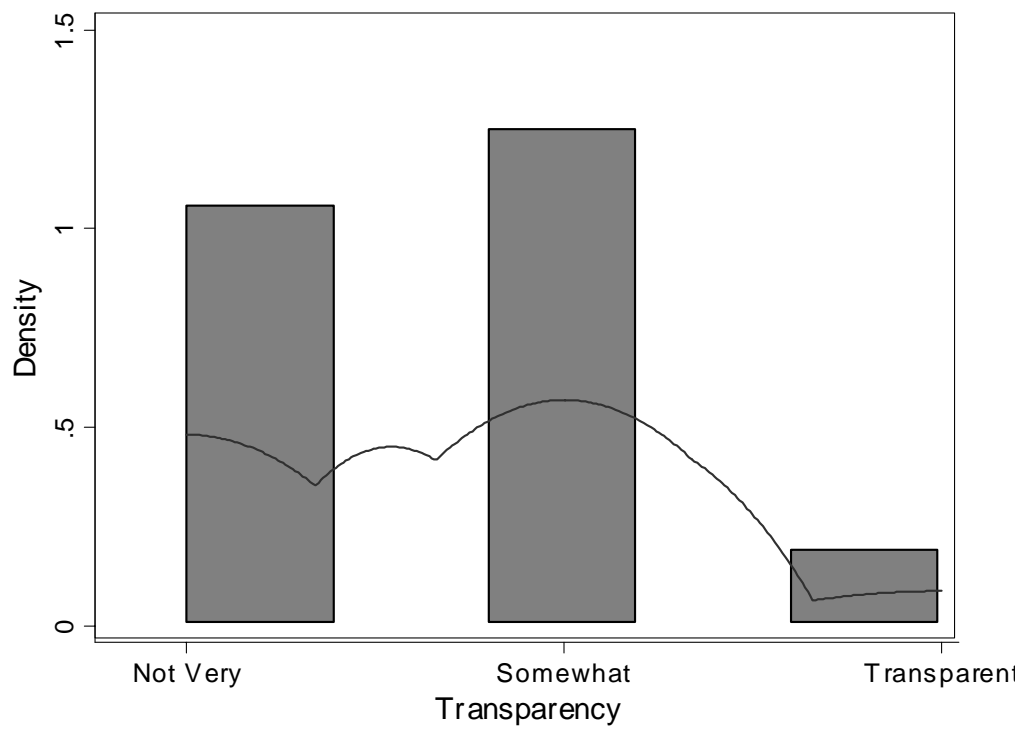
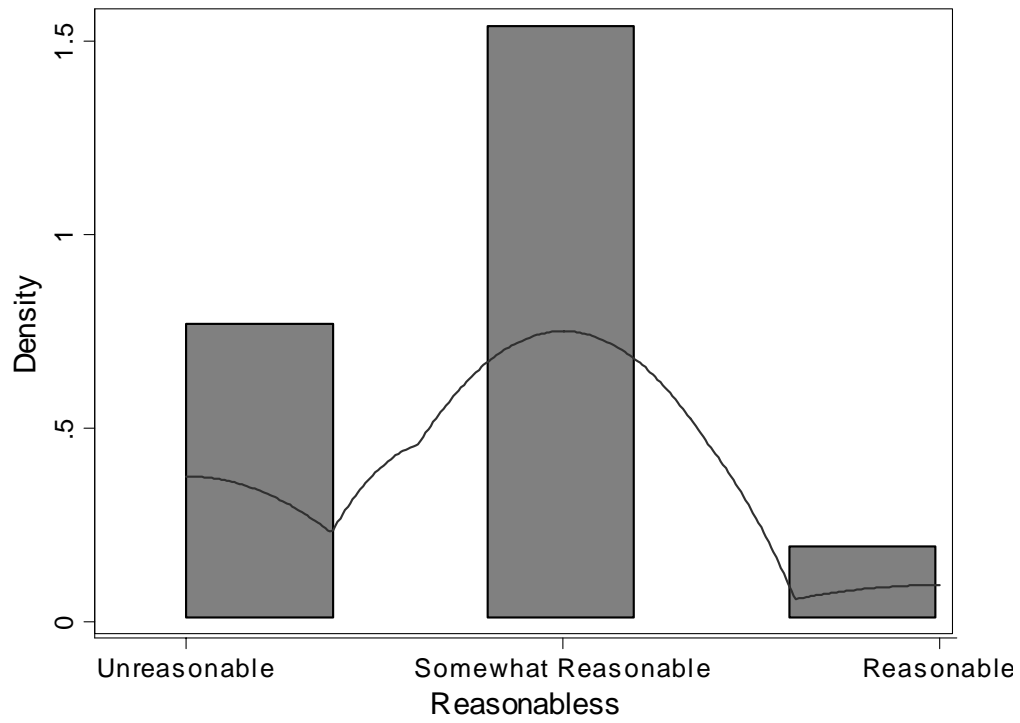
In addition to project level indicators of the regulatory process, environmental professionals were asked to provide information about jurisdiction level indicators of regulation. Two questions were asked about the attitude of regulators in the jurisdiction where the project was located; one regarding the attitude towards consultants with experience and political connections, and the other about attitudes towards growth in general. The other two questions asked the respondents to rate the “reasonableness” and the “transparency” of the entitlement process in that jurisdiction. Figure 19 displays the frequency distribution of these three variables. Most jurisdictions are not seen as resisting development; though neither does the majority of jurisdictions promote it. Furthermore, most jurisdictions are seen as having a somewhat reasonable entitlement process, though more are recorded as being unreasonable than reasonable. Similarly, most jurisdictions are seen as somewhat transparent and more were scored as “not very transparent” than “transparent”. In only a few jurisdictions were consultants with experience and political connections seen as being advantaged.

V. Land Use Regulation and Housing Outcomes

This section presents an analysis of the complementarities and consistency of the various measures of land use regulation described in the preceding sections. It also presents a preliminary analysis of the behavioral relationship between these measures of government restrictions and their potential consequences for the housing market. We observe the linkage between the measures of regulatory restrictiveness derived from these surveys, and the association between the indexes and housing outcomes during the 1990 - 2000.

Figure 19
Histograms of Jurisdiction Attitude towards Development and Consultants, and
Reasonableness and Transparency of Entitlement Process





A. Complementarities and Consistency among Measures of Land Use Regulation

As indicated above, our 2006-2007 did not attempt to replicate the questions or format of the surveys undertaken in California in the 1990s. Instead, our survey was modeled on the survey designed by Anita Summers and her colleagues at Wharton, and administered in Philadelphia in 2005. The earlier surveys more narrowly measured local government rules about growth regulation and management. Our more recent survey was considerably broader and somewhat more detailed. We asked about political influence, and the project approval process, as well as delay, inclusionary housing, and open space.

Table 15 reports the simple correlations among our two composite indexes and those produced from the 1992 and 1998 surveys. As noted previously, the simple correlation between our two measures derived in 2006-2007 is 0.79. The correlation between the earlier measures and our BLURI indexes is, however, quite low, with simple correlations in the order of 0.2. Figure 20 illustrates these relationships in simple scatter diagrams. There is hardly a close fit between the index measures.³

In part, the relationship may be observed by the process of aggregating the sub indexes. Table 16 reports the correlation between the components of the BLURI index and the two earlier indexes: the Restrictiveness Index and the Hospitality Index. Some of the simple correlations between the earlier measures and the components of the BLURI are considerably larger.

The correlations between the aggregate BLURI indexes and the developers' and environmental consultants' surveys are considerably higher, especially for the BLURI II,

³ These bivariate results are confirmed by multivariate analysis. A regression of BLURI I (or BLURI II) on the prior indexes; the Restrictiveness Index for 1992 and/or 1998, and the Hospitality Index yields insignificant coefficients with an explained variance of about zero.

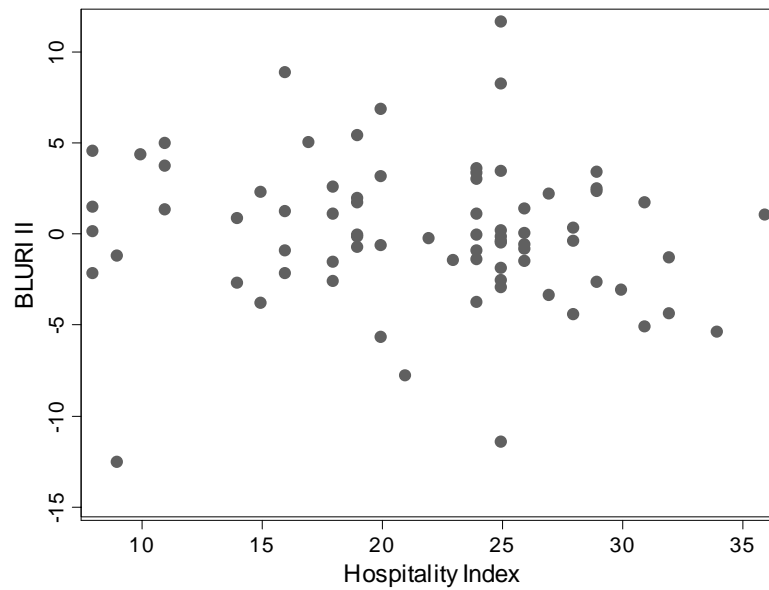
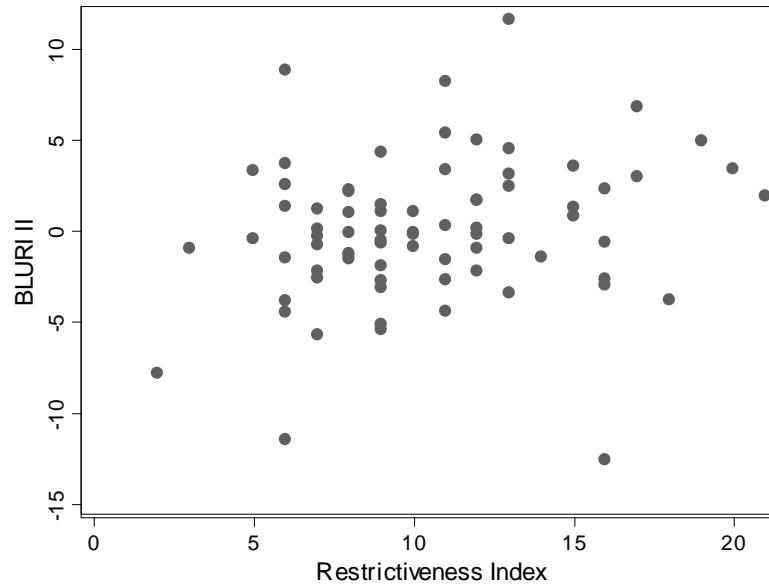
Table 15
Correlation between BLURI Indexes and Summaries of Previous Surveys

Index	BLURI I	BLURI II	Restrictiveness	Hospitality
BLURI I	1.00			
BLURI II	0.79	1.00		
Restrictiveness	0.26	0.21	1.00	
Hospitality	-0.07	-0.12	-0.02	1.00

Table 16
Correlation between BLURI Sub Indexes and Summaries of Previous Surveys

Sub Index	Restrictiveness	Hospitality
Political Influence	0.34	-0.03
Project Approvals	0.18	-0.16
Zoning Changes	0.16	-0.08
Development Caps	0.19	-0.01
Density Restrictions	-0.06	-0.13
Open Space	-0.01	0.03
Infrastructure Improvement	-0.05	-0.04
Inclusionary Housing	0.24	0.17
Approval Delays	0.11	0.04
Rate of Approval	-0.30	-0.26

Figure 20
Scatter Diagram between BLURI Index and Summaries of Earlier Surveys



which is the simple sum of the ten sub indexes. Table 17 summarizes the statistical relationship between our summary measure of regulatory restrictiveness and three key measures derived from the developers' and environmental consultants' surveys. The first four columns present the relationship between BLURI II and the responses to the developers' survey. Results are reported separately for developer projects that are single family dwellings, and for multifamily and mixed use projects. The regressions relate the values of the BLURI index to the developers' estimates of the monetary costs imposed by the approval process, the time costs of the delays involved and the variability of the delays involved. The estimated coefficients have the anticipated signs and the t ratios are large. Similarly, when the projects are divided into "standard" projects and more controversial projects, the key variables measured in the survey of developers are closely aligned with the index of regulatory restrictiveness.

The next four columns in Table 17 present the relationships between BLURI II and the results of the environmental consultants' survey. The table reports the regressions relating the BLURI score and the three key variables measured in the survey: the dollar costs, the time losses, and the unforeseen delays imposed by the entitlement process. In virtually all cases the coefficients have the expected sign and the t ratios are large.

Of course the results reported in Table 17 are merely suggestive – the sample sizes for these statistical analyses are not large. Nevertheless, the consistency is striking. We conclude that the underlying attributes measured in the 2006-2007 surveys differ from those measured in the two earlier surveys (or else there has been a substantial change in attributes in the space of a decade). We also conclude that the results of the

Table 17
Regression Relationship between BLURI II Index, Developer Survey and Environmental Consultants' Survey

Project Characteristics	<u>Developer Survey</u>				<u>Environmental Consultant Survey</u>			
	Single Family Homes	Multifamily and Mixed Use	Standard Projects	More Controversial Projects	Single Family Homes	Multifamily and Mixed Use	Standard Projects	More Controversial Projects
Cost per Unit (thousands of dollars)	-0.04 (-0.89)	0.02 (0.31)	-0.01 (-0.55)	-0.02 (-0.39)	0.11 (2.60)	-0.35 (-2.47)	1.52 (3.27)	0.002 (-0.04)
Time (years)	2.44 (2.94)	2.53 (3.13)	1.50 (2.31)	2.64 (3.17)	-4.31 (-4.02)	5.65 (2.65)	-2.90 (-1.25)	0.013 (0.01)
Accuracy of Time Estimate (years)	-2.34 (-2.52)	-2.51 (-2.30)	-1.43 (-1.87)	-2.91 (-2.89)	5.72 (4.13)	-2.51 (-1.25)	2.32 (1.52)	1.403 (0.64)
Constant	-3.84 (-2.61)	-3.47 (-2.54)	-3.00 (-3.18)	-3.35 (-2.14)	-1.16 (-0.81)	-5.36 (-1.70)	-0.87 (-0.51)	-3.779 (-1.24)
N	28	22	21	29	8	12	5	15
F	3.08	3.37	1.86	3.73	6.95	5.09	22.49	0.36
Adj. R squared	0.19	0.25	0.11	0.23	0.72	0.53	0.94	-0.16

2006-2007 survey of building officials is consistent with the results reported in our survey of developers and environmental consultants.

B. Land Use Restrictiveness and Housing Outcomes

1. The BLURI Index and Outcomes

We investigate the relationship between these measures of regulation and several measures of housing and demographic conditions in the cities and unincorporated county areas of the San Francisco Bay Area. We concentrate on housing permits awarded, house values, household income and ethnic composition. To conserve space, and to focus on differences, we combine the presentation of the most recent index to BLURI II, the simple sum of the ten sub indexes.

Figure 21 reports scatter diagrams of the relationship between the Restrictiveness Index, the Hospitality Index, BLURI II, and building permits issued. There is only a weak relationship between new permits issued and any of these indexes. Again, the evidence of a systematic bivariate relationship is weak.

Figure 22 presents the bivariate relationship between these measures and two measures of city income: median household income and the fraction of households living below the poverty line. The scatter diagrams show only a weak relationship and there is little evidence of a simple but powerful relationship in the data. There is, however, much stronger evidence of a multivariate relationship between these two measures of outcomes and the measures of regulation. Figure 23, for example, presents the values of building permits, median income, and percent poverty, as well as the values of these variables predicted from a multivariate regression including all of the regulatory measures. It is

Figure 21

Regulatory Indexes and Building Permits Issued between 1990 and 2005

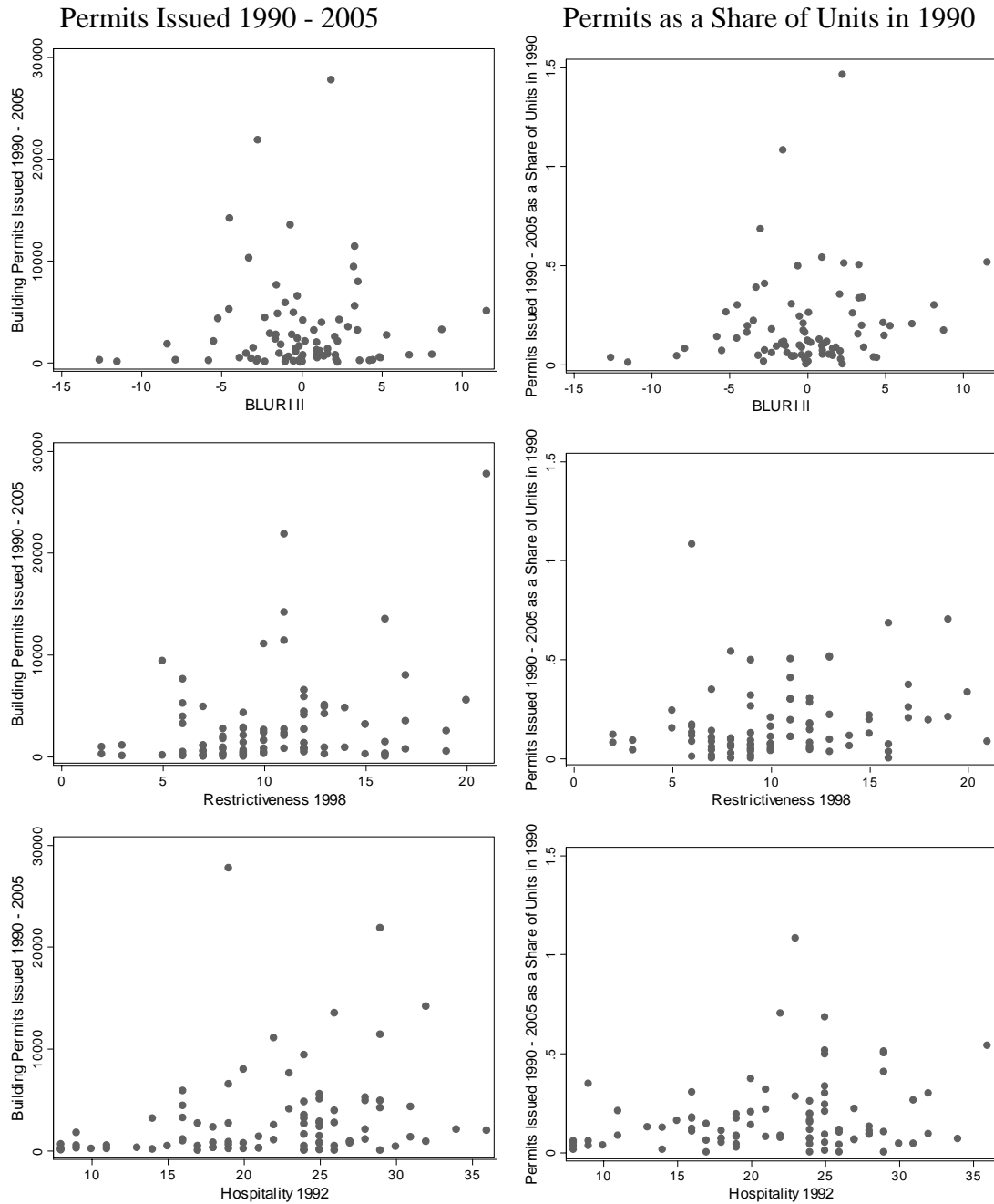


Figure 22
Regulatory Indexes and Household Incomes, 2000

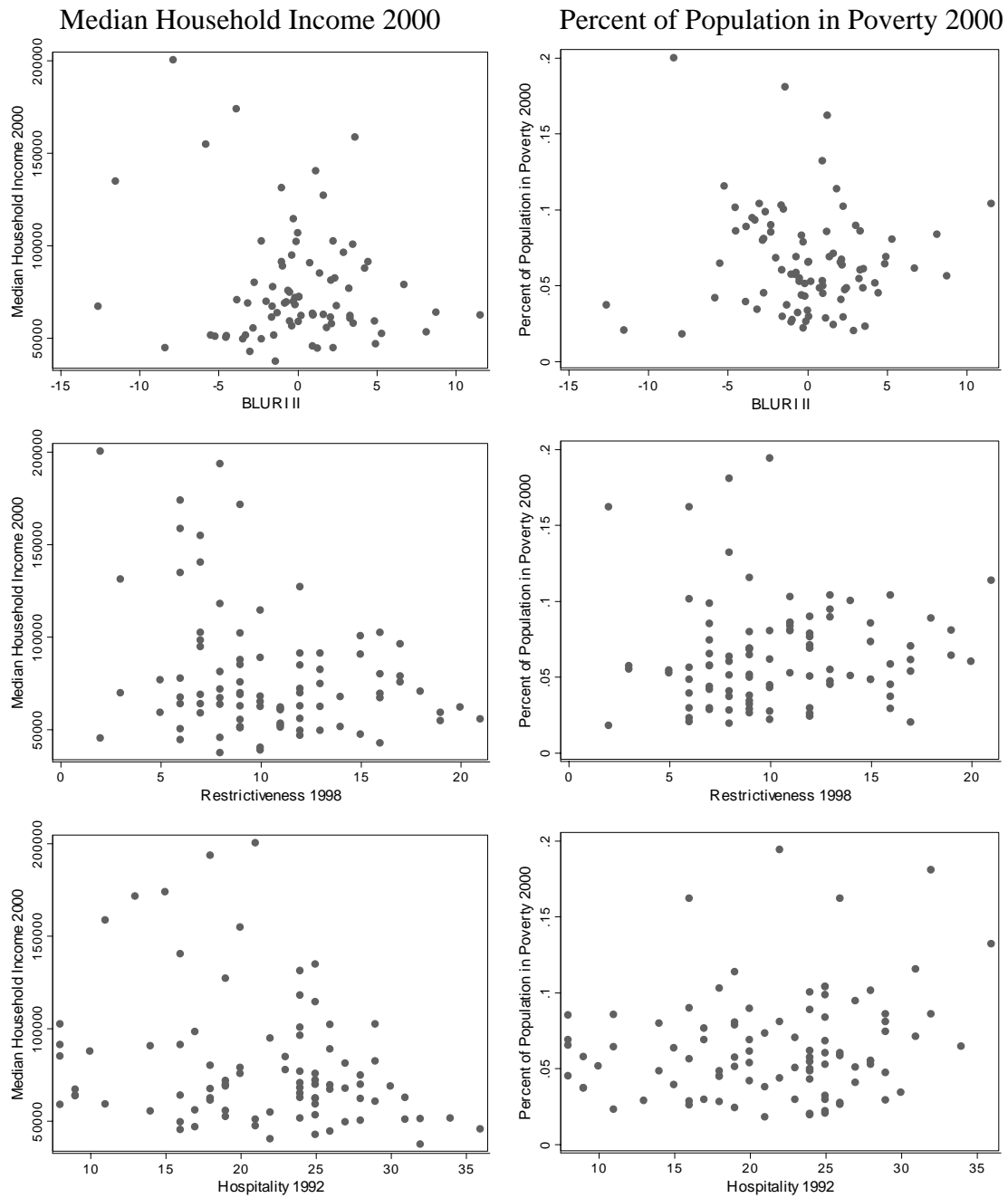
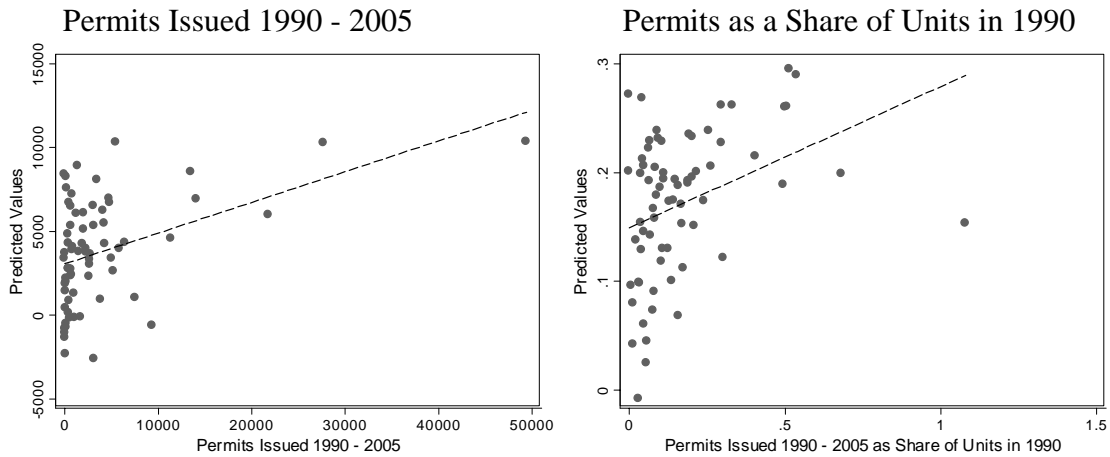
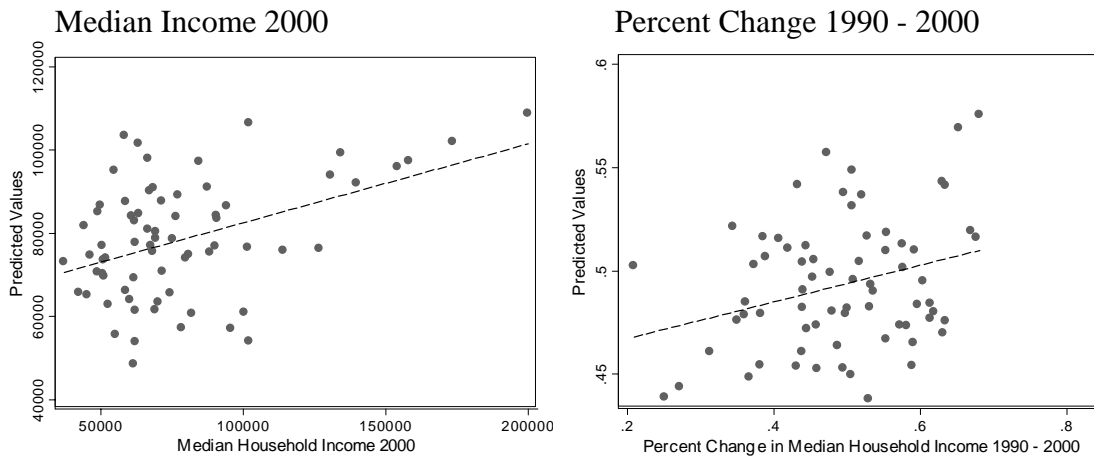


Figure 23
Multivariate Relationship between Regulatory Indexes and Selected Outcomes*

Building Permits



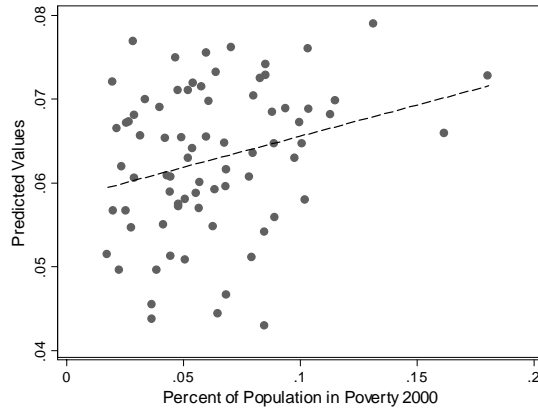
Median Income



* Predicted Values are based upon a multivariate regression including all three measures of regulation simultaneously.

Percent Poverty

Percent of Population in Poverty 2000

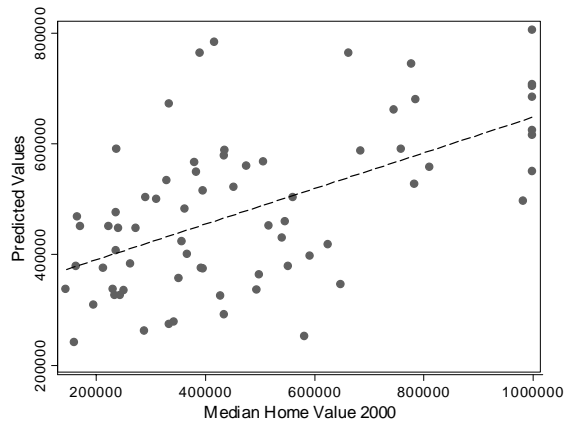


Percent Change 1990 - 2000

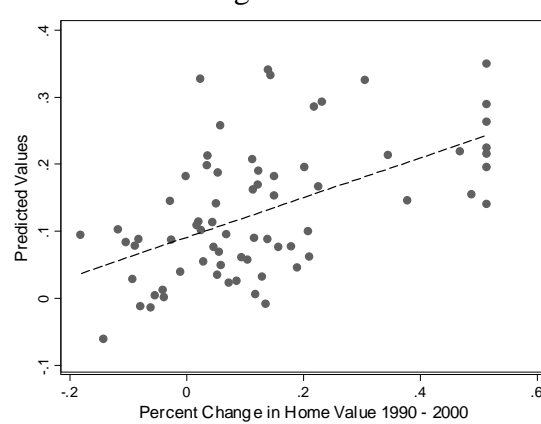


Home Values

Median Home Value 2000



Percent Change 1990 - 2000



quite clear that the fit is much better. The correlation between the actual and predicted levels of these outcomes is much higher when they are considered together. This result holds up equally when the percent changes in the outcome variables are considered.

The same qualitative results obtain for a variety of other demographic outcomes, not reported here, including the percent of white households in a given jurisdiction, and the educational level of adults.

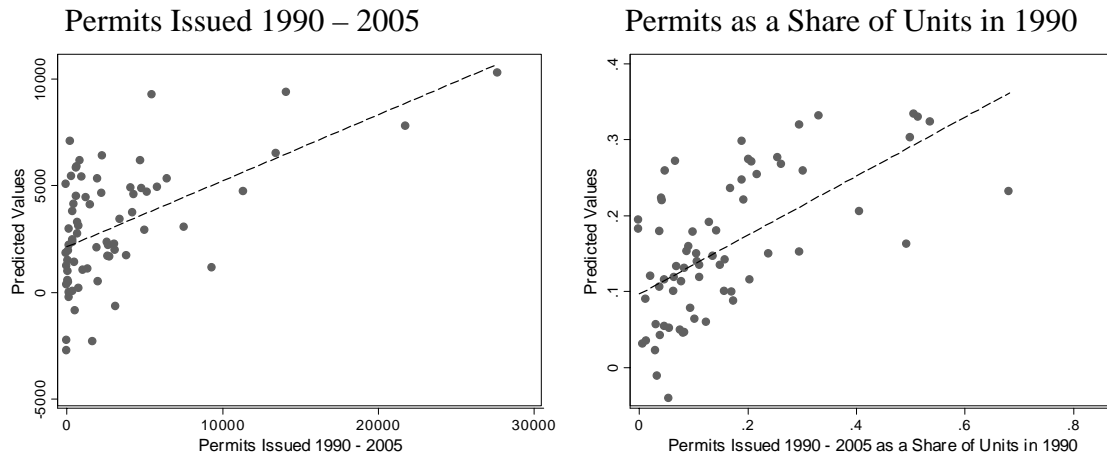
2. The BLURI Sub Indexes and Outcomes

All of the analysis of outcomes presented so far makes use of the aggregate BLURI Index (either the factor score or the simple sum of the sub indexes) together with the earlier Restrictiveness and Hospitality Indexes. We now explore briefly the desegregation of the BLURI Index into its ten components.

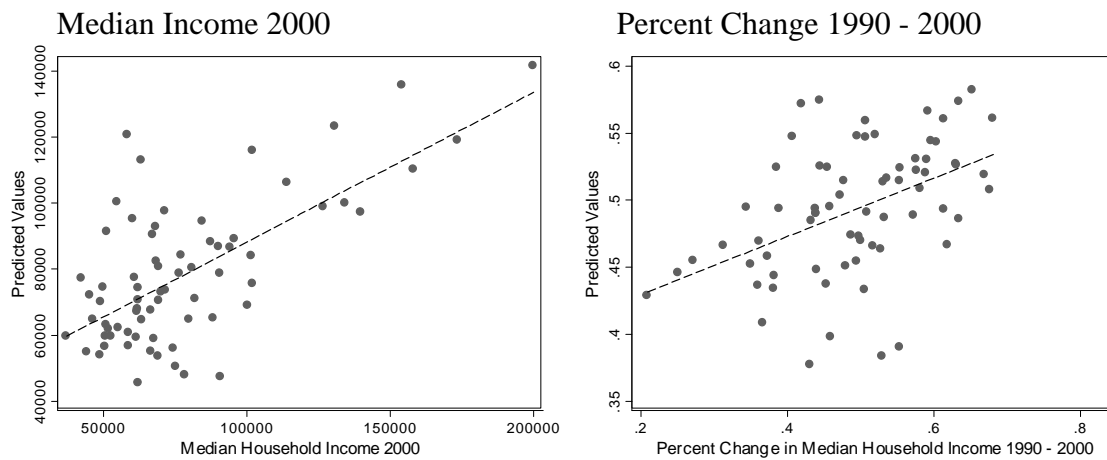
Figure 24 presents the results of reanalyzing the same set of outcomes reported in Figure 23 - permits issued, incomes, and poverty, along with their percent change from 1990 - 2000. In this analysis, however, we replace the single BLURI Index with its ten components in conducting an analogous multivariate analysis. A comparison of the scatter diagrams in Figure 23 and 24 reveals the dramatic difference. The scatter diagrams are much closer to linear relations in Figure 24. Indeed the multivariate regressions have levels of explained variance above 0.4. Almost half of the variation in these outcomes is associated with the variation in the components of regulation identified and measured in this analysis.

Figure 24
Multivariate Relationship between BLURI Sub Indexes and Selected Outcomes*

Building Permits



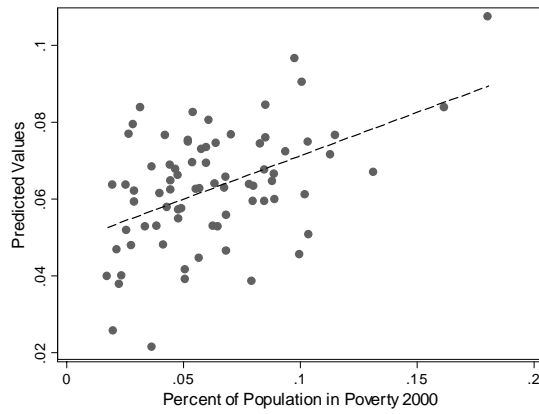
Median Income



*Predicted values are based upon a multivariate regression including all ten BLURI sub indexes as well as Restrictiveness and Hospitality Indexes.

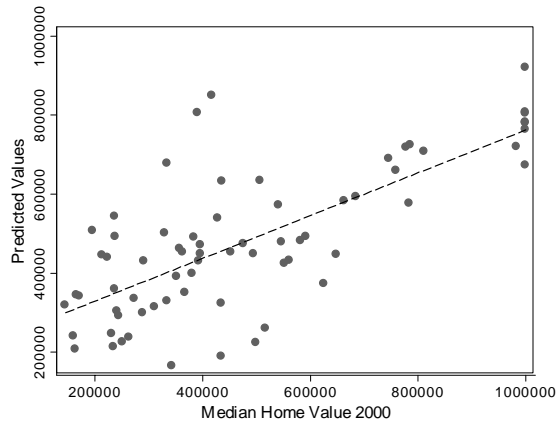
Percent Poverty

Percent of Population in Poverty 2000

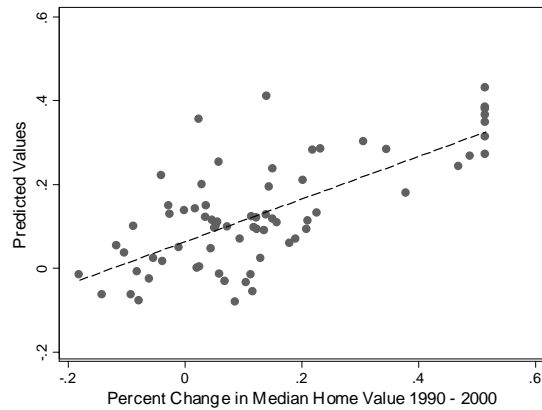


Home Values

Median Home Value 2000



Percent Change 1990 – 2000



VI. Conclusion

This paper assembles and reports the results of five separate and complementary surveys of local regulation for the governments of one large metropolitan area, the San Francisco Bay Area. We have compared measures of regulation derived from surveys of public officials conducted in 1992, 1998, and 2006-2007, as well as surveys of developers and land use intermediaries conducted in the recent period.

The results reveal a complex pattern of local regulation. We have compared the consistency and complementarities of measures, and we have defined an aggregate index of regulatory restrictiveness for the Bay Area, the BLURI. Our analysis suggests that the values of this index across the Bay Area land use jurisdictions are consistent with the survey results obtained from the Northern California home builders as well as environmental professionals who mediate the development process.

In general, we find that the values of the BLURI index are associated with housing outcomes - permits issued, house price increases, and demographic change across the Bay Area cities. In the most revealing analyses, we consider the components of this index separately - the ten sub indexes of the BLURI Index we constructed. We find that the components of the aggregate index have different - but quite powerful - effects upon housing market outcomes.

The components of regulation we have identified are associated with almost half of the variation in housing and demographic changes observed in the Bay Area during the decade of the 1990s.

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Appendix A

Components of Growth Control and Management Indexes for Bay Area Jurisdictions,
1992 and 1998

Appendix Table 1
Restrictions Index

Measure	<u>Proportion of Cities</u>	
	1992	1998
<i>Residential</i>		
Identification of phased development areas	8	NA
Restriction on sub-divisions	6	NA
Floor area ratio restriction	46	65
Restriction on building permits	15	18
Restriction on population growth	14	NA
Adequate services requirement	39	47
Redesignation of residential to open space or agricultural use	16	22
Density reduction via general plan or rezoning	33	40
Referendum requirement for density increases	13	17
Legislative supermajority requirement for density increases	2	3
<i>Commercial</i>		
Adequate services requirement	36	41
Square footage cap (commercial)	9	9
Square footage cap (industrial)	7	NA
Rezoning to less intense use	25	NA
Reduction in allowable height	25	NA
<i>Growth Control</i>		
Adoption of growth Management element for general plan	22	33
Adoption of urban growth boundary	23	33
Other development restrictions	13	15
Restrictions on Annexation	NA	2
Annexation Act	NA	21
Increases in impact fees	NA	7

Appendix Table 2
Components of the Hospitality Index

Measure	Mean Value	Std. Dev.
<i>Encouragement via planning</i>		
General plan capacity and accommodation	3.2	1.2
Rezoning to higher density	3.0	1.2
<i>Encouragement via Incentives</i>		
Regulatory fast tracking	3.3	1.1
Financial incentives	2.4	1.0
Reduced exactions	2.4	1.1
Direct infrastructure subsidies	2.1	1.0
Redevelopment incentives	2.9	1.5
Economic development policy	3.0	1.3

Note: Computations of Indexes from raw data are reported in Quigley and Raphael (2005), Quigley, Raphael and Rosenthal (2004) and Rosenthal (2000).

Appendix B

This appendix summarizes responses to the Berkeley Survey of Land Use Practices administered in 2006-2007. A total of 86 Bay Area jurisdictions responded out of 109 jurisdictions surveyed, giving a response rate of 79%.

1. Some New Development in Past Decade

Type of Development	Percent of Jurisdictions
Single Family Residential	77
1 to 4 units	77
5 to 49 units	71
50 or more units	59
Multifamily Residential	78
Retail	78
Office	72
Industrial	50
Mixed Use	71

2. Involvement in Development Process

Actor	N	Percent of Jurisdictions		
		Not Involved (1-2)	Involved (3)	Very Involved (4-5)
Local Elected Officials	86	3	10	87
Neighbors/community pressure	84	6	26	69
State legislature	83	72	20	7
Courts and litigation	82	79	15	6
Ballot measures	83	71	17	12
Organized labor	81	83	10	7
Planning/zoning staff	86	0	7	93
Environmental advocates	85	35	40	25

3. Factors Affecting the Rate of Development

A. Single Family Housing

Factor	N	<u>Percent of Jurisdictions</u>		
		Not Important (1-2)	Important (3)	Very Important (4-5)
Supply of developable land	85	4	7	89
Density restrictions	84	29	27	44
Infrastructure requirements	84	45	26	29
Local fiscal conditions	83	57	28	16
Inclusionary hsg. ordinances	83	61	24	14
Parking requirements	83	61	17	22
School crowding	83	82	7	11
CEQA review	82	46	29	24
Density bonuses	82	84	13	2
Citizens' attitudes on growth	85	21	34	45
Elected officials' positions	84	14	31	55
Mixed-use requirements	83	66	23	11
Impact fees/exactions	85	58	21	21
Duration of entitlement process	83	46	30	24

B. MultiFamily Housing

Factor	N	<u>Percent of Jurisdictions</u>		
		Not Important (1-2)	Important (3)	Very Important (4-5)
Supply of developable land	82	4	12	84
Density restrictions	81	26	25	49
Infrastructure requirements	81	38	31	31
Local fiscal conditions	79	57	29	14
Inclusionary hsg. ordinances	80	55	18	28
Parking requirements	79	46	22	33
School crowding	81	79	14	7
CEQA review	80	40	35	25
Density bonuses	79	68	19	13
Citizens' attitudes on growth	81	21	25	54
Elected officials' positions	82	13	24	62
Mixed-use requirements	80	49	23	29
Impact fees/exactions	79	52	19	29
Duration of entitlement process	78	42	29	28

4. Zoning and Use of Land

Land Use	<u>Percent of Jurisdictions</u>	
	Zoned	Actual Use
Single Family Residential	100	100
Multifamily Residential	93	92
Retail	97	97
Office	95	95
Industrial	80	79
Mixed Use	90	95

5. Land Supply and Demand

Land Use	N	<u>Percent of Jurisdictions</u>		
		Much less than demanded (1-2)	Meets demand (3)	Much more than demanded (4-5)
Single Family Residential	83	61	27	12
Multifamily Residential	80	63	30	8
Retail	79	20	59	20
Office	80	19	55	26
Industrial	74	28	45	27
Mixed Use	77	30	53	17

6. Required Approvals/Reviews

Approval/Review	<u>Percent of Jurisdictions</u>	
	A. No zoning change	B. Zoning change
Planning Commission	76	93
City Council (or Board of Supervisors)	22	95
Landmarks/Historical Commission	16	01
Architectural/Design Review	59	12
Building Department	84	52
Fire Department	83	73
Health Department	27	76
Parking/Transportation	27	28
CEQA Review	79	30
Growth management analysis	14	85
Other	23	20

7. Duration of Review

A. Time in General

Project Type	N	<u>Percent of Jurisdictions</u>		
		Less than 6 months	6 months to 1 year	More than 1 year
Single Family Residential	86	59	21	20
1 to 4 units	86	20	31	49
5 to 49 units	86	10	29	60
50 or more units	85	18	41	41
Multifamily Residential	86	59	21	20

B. Time Change

Project Type	N	<u>Percent of Jurisdictions</u>		
		Much shorter (1-2)	No change (3)	Much longer (4-5)
Single Family Residential	80	19	49	33
1 to 4 units	69	10	41	49
5 to 49 units	60	10	45	45
50 or more units	72	13	44	43
Multifamily Residential	80	19	49	33

C. Projects Requiring Zoning Changes

Project Type	N	<u>Percent of Jurisdictions</u>		
		Less than 6 months	6 months to 1 year	More than 1 year
Single Family Residential				
1 to 4 units	85	28	39	33
5 to 49 units	85	14	33	53
50 or more units	85	7	27	66
Multifamily Residential	85	12	40	48

D. Subdivision Approvals

Project Type	N	<u>Percent of Jurisdictions</u>		
		Less than 6 months	6 months to 1 year	More than 1 year
Single Family Residential				
5 to 49 units	84	18	37	45
50 or more units	84	8	27	64
Multifamily Residential	84	13	37	50

8. Development Caps

Type of Development	Percent of Jurisdictions
Single family building permits granted	16
Multifamily building permits granted	15
New single family units	12
New multifamily units	12
Population Growth	5

9. Minimum Lot-Size

Size Restriction*	Percent of Jurisdictions
Less than ½ acre	84
½ acre up to 1 acre	37
1 acre to 2 acres	31
More than 2 acres	22

*These size categories are not exclusive

10. Inclusionary Housing

	Percent of Jurisdictions
Inclusionary housing requirement	83
In lieu fee option	60

11. Open Space

	Percent of Jurisdictions
Open space requirement	86
In lieu fee option	53

12. Infrastructure Requirements

	Percent of Jurisdictions
Infrastructure requirement	94
In lieu fee option	63

13. Cost Increases for Single-family Development

		<u>Percent Increase</u>		
	N	Less than 100	100	More than 100
A. Land Cost	34	18	32	50
B. Project Cost	33	42	18	39

14. Zoning Change Applications and Approvals

	<u>Percent of Jurisdictions</u>			
	N	Less than 10	10 to 25	More than 25
Filed	66	39	20	41
Approved	65	51	18	31

15 Subdivision Application and Approvals

	<u>Percent of Jurisdictions</u>			
	N	3 or less	4 to 9	10 or more
Filed	71	48	23	30
Approved	81	62	21	17

Appendix C

This appendix summarizes responses to the Berkeley Developer Survey administered anonymously in 2006-2007. Information was reported on a total of 62 projects in 33 Bay Area jurisdictions.

1. Project Type

	N	Percent of Total
Single Family Homes	37	60
Apartments	2	3
Condominiums	12	19
Mixed Use	10	16
Master Plan	1	2

2. Number of Units

	<u>Number of Units</u>		
Projects	Less than 20	21 to 150	More than 150
Percent	27	35	37
Number	17	22	23

3. Controversy Level

	<u>Controversy Level</u>		
Projects	Standard	Mild Controversy	Pushing the Envelope
Percent	42	40	18
Number	26	25	11

4. Entitlement Risk at the Onset of Project

	<u>Level of Entitlement Risk</u>		
Projects	Low (1-2)	Average (3)	High (4-5)
Percent	37	39	24
Number	23	24	15

5. Permits Required

	<u>Projects Requiring Permit</u>	
Permit Type	N	Percent of Total
General Plan Amendment	25	40
Environmental Impact Report	31	50
Development Agreement	27	44
Affordable Housing	26	42
Legal Action	9	15
Local Referendum	4	6

6. Project Cancellation

2 projects were canceled: one in Santa Rosa and one in San Jose.

7. Dollar Cost of Entitlement Process

<u>Dollar Cost</u>				
Projects	\$200,000 or less	\$200,001 to \$1 million	Between 1 and 2 million dollars	More than \$ 2 million
Percent	26	30	25	20
Number	16	18	15	12

8. Time in Years

<u>Number of Years</u>			
Projects	Less than 2	Between 2 and 3	More than 3
Percent	37	47	16
Number	23	29	10

9. Time Accuracy

<u>Number of Years</u>			
Projects	Less than 1	1 to 2	More than 2
Percent	48	31	21
Number	30	19	13

Appendix D

This appendix summarizes responses to the Berkeley Survey of Environmental Professionals administered in 2007. Information was reported on a total of 27 projects in 14 Bay Area jurisdictions.

1. Product Type:

Product type	Number of Projects	Percent of all Projects
Single family homes	15	56
Apartments	2	7
Condominiums	3	11
Mixed Use (Condos + Retail)	9	33
Other	1	4

2. CEQA related documentation completed for the project:

CEQA related documentation	Number of Projects	Percent of all Projects
Environmental Impact Report (EIR)	14	52
Negative Declaration/Mitigated Negative Declaration	7	26
Petition for Exemption	2	7
Initial Study	4	15
Other	3	11

3. Number of Units:

Number of Units	Number of Projects	Percent of all Projects
1 – 10	6	22
10 - 25	3	11
25-50	4	15
50-100	3	11
100-200	4	15
200-500	2	8
600+	5	19

4. Jurisdiction in which project is located:

Jurisdiction	Number of Projects	Percent of all Projects
Berkeley	2	7
Contra Costa	3	11
Cotati	1	4
El Cerrito	1	4
Fairfield	1	4
Hercules	1	4
Lafayette	1	4
Los Gatos	1	4
Napa	2	7
Oakland	3	11
Richmond	1	4
Rohnert Park	1	4
San Francisco	6	22
San Jose	1	4
Santa Rosa	2	7

5. Attitude of local regulators in the jurisdiction towards development:

Attitude	Number of Projects	Percent of all Projects
Promote residential development	9	33
Allow selective residential development	16	59
Resist residential development	2	7

6. Attitude of jurisdiction's officials towards consultants:

Attitude	Number of Projects	Percent of all Projects
Not significantly advantaged	4	15
Somewhat advantaged	8	30
Quite advantaged	15	56

7. Controversy of project:

Controversy Level	Number of Projects	Percent of all projects
Standard	8	30
Mildly controversial	13	48
Pushing the envelope	6	22

8. Entitlement risk of project:

Risk Level	Number of Projects	Percent of all projects
Low risk (1-2)	9	33
Medium risk (3)	11	41
High risk (4-5)	7	26

9. Key drivers of entitlement risk:

Driver	Number of Projects	Percent of all projects
NIMBY	15	56
Environmental Impact Report (EIR)	3	11
Environmental Impact Statement (EIS)	0	0
Extensive state agency review, e.g. Water Board	5	19
General Plan Amendment (GPA)	7	26
Development Agreement	4	15
Affordable housing requirements	8	30
Legal action brought against the project	7	26
Local referendum against the project	1	4
Other	10	37

Note: 15 projects had more than one driver of entitlement risk.

10. Reasonableness of entitlement process:

Reasonableness	Number of Projects	Percent of all projects
Reasonable process	8	30
Somewhat Reasonable process	8	30
Somewhat Unreasonable process	8	30
Unreasonable process	2	7

Note: N=26 for this question.

11. Transparency of entitlement process:

Transparency	Number of Projects	Percent of all projects
Not very transparent	11	41
Somewhat transparent	13	48
Transparent	2	7

Note: N=26 for this question.

12. Unforeseen delays or cost overruns:

Extent of delay or cost overruns	Number of Projects	Percent of all projects
None	3	11
Minor	6	22
Moderate	9	33
Significant	7	26

Note: N=25 for this question.

13. Extent of environmental mitigation required of developer:

Extent of environmental mitigation	Number of Projects	Percent of all projects
None	4	0.15
Minor	6	0.22
Moderate	13	0.48
Extensive	3	0.11

Note: N=26 for this question.

14. Time required for entitlement process:

Time in Years	Number of Projects	Percent of all projects
0.5	2	7
1	3	11
1.5	7	26
2	4	15
2.5	3	11
3	4	15
5 +	2	7

Note: N=25 for this question.

15. Cost of consulting services:

Price in Dollars	Number of Projects	Percent of all projects
0 - 49,999	11	41
50,000 – 99,999	3	11
100,000 – 499,999	6	22
500,000 +	7	26

Note: N=24 for this question.