A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index

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Executive Summary

The responses from a nationwide survey of residential land use regulation in over 2,600 communities across the U.S. are used to develop a series of indexes that capture the stringency of local regulatory environments. Factor analysis is used to combine the component indexes into a single, aggregate measure of regulatory constraint on development that allows us to rank areas by the degree of control over the residential land use environment. We call this measure the Wharton Residential Land Use Regulation Index (WRLURI).

Key stylized facts arising from the data include that there is a strong positive correlation across the subcomponents that make up our regulation index. Practically speaking, this means that highly (lightly) regulated places tend to be highly (lightly) regulated on virtually all the dimensions by which we measure regulatory stringency. Thus, there is no evidence that communities target specific items or issues to regulate. The stringency of regulation also is strongly positively correlated with measures of community wealth, so that it is the richer and more highly-educated places that have the most highly regulated land use environments. However, the stringency of regulation is weakly negatively correlated with population density. The fact that the densest communities are not the most highly regulated strongly suggests that the motivation for land use controls is not a fundamental scarcity in the sense that these places are 'running out of land'.

We also describe what a typical land use regulatory environment looks like. The community with the average WRLURI value has two distinct entities such as a zoning commission, city council, or environmental review board that must approve any project requiring a zoning change. Some type of density control such as a minimum lot size requirement exists, but it is highly unlikely to be as stringent as a one acre minimum. The typical community now enforces some type of exactions requirements on developers, and there is a six month lag on average between application for a permit and permit issuance on a standard development project for the locality. More highly regulated places have more intense community and political involvement in the land use control process, are likely to have a one-acre lot size minimum in at least one neighborhood and some type of open space requirement, and have much longer permit review times. Many of the most highly regulated places in the country, which often are in New England, also practice some type of direct democracy, as reflected in town meetings at which zoning changes have to be put to a vote by the citizenry. The communities with the least-regulated residential building environments still have some type of controls in place (e.g., exactions now are virtually omnipresent and there is at least one board that must approve zoning changes and new construction), but their density restrictions are much less onerous, open space requirements are unlikely to be imposed, and the time lag between the request for and issuance of a building permit on a standard project is on the order of 90 days.

Geographically, the coastal states have the most highly regulated communities on average. Those in New England and the mid-Atlantic region are the most highly

regulated, followed by those on the west coast (plus Hawaii). Southern and midwestern states in the interior of the country are the least regulated. At the metropolitan area level, communities in the Boston, MA, and Providence, RI, areas are the most highly regulated on average. Towns in the Philadelphia, PA, San Francisco, CA, Seattle, WA, and Monmouth-Ocean, NJ, metropolitan areas also are much more highly regulated than the national average. Communities in the midwestern metropolitan areas of Kansas City, MO, Indianapolis, IN, and St. Louis, MO, have the most lightly regulated residential land use environments in the country, with the Atlanta, GA, and Chicago, IL, areas reflecting the national average in terms of our index.

I. Introduction

Land use regulations in the United States are widespread, largely under local control, and may be a major factor accounting for why land appears to be in inelastic supply in many of our larger coastal markets. Why housing is inelastically supplied is a subject in urgent need of more research because of its potentially large effects both on house prices and the amount of building activity. Unfortunately, we have relatively little direct knowledge of the nature of local regulatory environments pertaining to land use or housing. Naturally, this means we do not fully understand how the regulatory environment might constrain the quantity of housing built or prices in the market or affect social welfare more generally.[1]

To help remedy these shortcomings, we conducted a nationwide survey of local land use control environments. Local regulation can affect building in myriad ways. The most transparent way is to prohibit a project. However, regulation also can affect costs by delay, design restriction, or the ease with which court suits can be used to challenge development rights, all without formally banning construction. The proliferation of barriers and hurdles to development has made the local regulatory environment so complex that it is now virtually impossible to describe or map in its entirely.[2]

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[1] There is a growing literature in the area. Fischel (1985) initially outlined many of the major conceptual issues, and Quigley (2006) provides a valuable update on recent developments. Empirical studies into the links between the stringency of the local regulatory environment and house prices or new construction include Noam (1983), Katz & Rosen (1987), Pollakowski & Wachter (2000), Malpezzi (1996), Levine (1996), Mayer & Somerville (2000), Glaeser & Gyourko (2003), Quigley & Raphael (2004a,b), Glaeser, Gyourko & Saks (2005a,b), Quigley & Rosenthal (2005), Glaeser, Scheutz & Ward (2006), and Saks (2006).

[2] Glaeser, Scheutz, and Ward (2006) come closest to doing so. For a subset of the Boston metropolitan area, they conducted a detailed analysis of local zoning codes, permitting precise calculations of potential housing supply across communities. However, the enormity of that effort prevents it from being replicated in other markets by a single research team.

Consequently, we decided to ask a series of questions that focused on processes and outcomes, not the specifics of constraints, in our survey.[3]

The questions asked can be divided into three categories. The first set elicited information on the general characteristics of the regulatory process. These questions dealt with who is involved in the process (e.g., states, localities, councils, legislatures, courts, etc.) and who has to approve or can veto zoning or rezoning requests. We also asked for an evaluation of the importance of various factors in influencing the regulatory process in each community. Our second set of questions pertained to the rules of local residential land use regulation. These included queries as to whether the community had any binding limits on new constructions, as well as information on the presence of minimum lot size requirements, affordable housing requirements, open space dedications and requirements to pay for infrastructure. Our third and final set of questions asked about outcomes of the regulatory process: What happened to the cost of lot development over the past decade? How did the review time for a standard project change? If the review time increased, by how much?

The information from our national survey was supplemented by two specialized sources of data: (a) a state-level analysis of the legal, legislative, and executive actions regarding land use policies, with each state rated on a common scale in terms of its

[3] Our strategy is closest in nature to Pendall, Puentes, and Martin (2006), who also surveyed a broad cross section of communities across the nation. Their results are from a 2003 survey. There are some similarities and various differences with our results, and we were not aware of their work prior to conducting our own survey. Previous survey efforts include those by Linneman, Summers, Brooks & Buist (1990) and Glickfeld & Levine (1992). See Saks (2006) for a review of these and other efforts. Undoubtedly, there is much to learn from these and, hopefully, other forthcoming efforts. A longer-run goal should be to merge research efforts into a single, well-designed survey that would be institutionalized and conducted at regular intervals. However, it is premature to follow that path, as we first need to determine which survey questions and data best capture the reality of local regulatory environments. That knowledge will come only with follow-on research into the impacts of regulations.

activity (Foster & Summers (2005)); and (b) the development of measures of community pressure using information on environmental and open space-related ballot initiatives.

The data were then used to create a summary measure of the stringency of the local regulatory environment in each community—more formally, the Wharton Residential Land Use Regulation Index (WRLURI, hereafter). This aggregate measure is comprised of eleven subindexes that summarize information on the different aspects of the regulatory environment. Nine pertain to local characteristics, while two reflect state court and state legislative/executive branch behavior. Each index is designed so that a low value indicates a less restrictive or more *laissez faire* approach to regulating the local housing market. Factor analysis is used to create the aggregate index, which then is standardized so that the sample mean is zero and the standard deviation equals one.

A number of noteworthy patterns are evident in the data. Not surprisingly, communities in metropolitan areas tend to be more highly regulated than are those outside of metropolitan areas. As we illustrate below, the mean difference in WRLURI values of over one-half a standard deviation is meaningful empirically. A comparison of the most highly-regulated communities from the top quartile of index values with the most lightly-regulated communities with WRLURI values from the bottom quartile of the distribution finds much more intensely involved local and state pressure groups and political involvement in the more highly-regulated places. There also is a big difference in the nature of density restrictions as reflected in minimum lot size requirements across these two groups. There is a better than 50% chance that the most highly-regulated communities have a one acre minimum lot size rule for at least one of their neighborhoods. This is less than a 1-in-20 chance that such a rule exists in the most lightly regulated places. There also are large differences in the fraction of communities that have open space requirements and formal exactions policies. They are nearly omnipresent among the more highly-regulated communities. Finally, the average delay time between application and approval for a standard project is three times longer in the most highly-regulated places versus the least-regulated places.

Statistically speaking, there is a strong positive correlation across the component indexes that make up the aggregate WRLURI. Practically, this implies that if the community is rated as highly regulated on one of the dimensions by which we measure regulatory stringency, it is very likely to be highly regulated along the other dimensions, too. Naturally, this statement also applies for lightly (and average) regulated communities, too. Thus, there is little evidence of targeted regulation at the local level. The data are more consistent with communities deciding on the degree of regulation they want and then imposing that desire across the board.

Another important stylized fact is that community wealth is strongly positively correlated with the degree of local land use regulation. The higher the median family income, median house value, or the share of adults with college degrees, the greater is the community's WRLURI value. While no causal relationship can be inferred from these simple correlations, other evidence documenting a weakly negative correlation of our regulatory index with population density does provide insight about the likely motivation for stricter land use controls. If a fundamental scarcity associated with communities 'running out of land' were the cause of stringent regulation, one would expect the most highly regulated places to be the most dense. That they are not casts serious doubt on the validity of that hypothesis, and suggests researchers and policy makers should look elsewhere for an explanation. The strong positive correlations with proxies for local wealth are suggestive in this regard, but more data (including changes over time) are needed in order to better understand that relationship.

There is much heterogeneity in land use regulatory environments across geographic regions, too. While Hawaii is the most heavily regulated state in our sample, that is exclusively a Honolulu effect. Among states with relatively large numbers of communities in our sample, the Northeast dominates the most highly regulated slots, with Massachusetts, Rhode Island, and New Hampshire having WRLURI values that are about 1.5 standard deviations above the national average. The communities in the mid-Atlantic states of New Jersey and Maryland are the next most heavily regulated on average according to our overall index measure, with Washington state, Maine, California, and Arizona rounding out the top ten. The bottom ten states with the least regulated communities on average are all from the south or Midwest (plus Alaska).

At the metropolitan area-level, the two New England areas of Providence and Boston are the only ones with WRLURI values at least 1.5 standard deviations above the national mean. Four other metropolitan areas--Monmouth-Ocean in suburban New Jersey, Philadelphia, San Francisco, and Seattle--each have communities that average one standard deviation about the sample mean. Once again, the least-regulated metropolitan areas are in the Midwest and the south. Chicago and Atlanta are typical of markets right near the national average in terms of land use control regulatory environments.

We recognize that people with different political views or economic interests can differ in their opinions about whether a given local regulatory climate is unduly burdensome or lenient. We leave that debate to others, as our purpose here is to provide a new measure of the land use regulatory environment and to document how it varies across places. We hope this spurs future work that analyzes whether prices or quantities in housing markets are materially influenced by the local land use regulatory regime. In turn, those results should serve as the foundation for a broader welfare analysis that can help guide policy recommendations regarding the efficiency of these regulations.

The plan of the paper is as follows. In section 2 we describe the sampling process and the survey instrument. Section 3 describes in detail the process of the creation of the subindexes. In section 4, we describe the aggregate Wharton index and provide summary statistics for the index and it components for the full sample and various subsets of communities. Section 5 then reports on how regulatory strictness varies spatially across states and metropolitan areas. There is a brief summary and statement of general conclusions.

II. The Wharton Survey on Residential Land Use Regulation

Fifteen specific questions were asked in the survey, focusing on identifying general characteristics of the land regulatory process, on documenting important rules regarding residential land use regulation, and on measuring specific outcomes such as lot development cost increases and project review time changes. A complete copy of the survey can be found in Appendix 1. Summary statistics and analysis of the responses to the individual questions can be found in Gyourko & Summers (2006a). We use them to create a series of subindexes that summarize different aspects of the diverse landscape characterizing the local regulatory environment. Before getting to those component indexes, we turn first to the sampling procedure and identification of sample selection bias in the response to our questionnaire.

The survey instrument was mailed out to 6,896 municipalities across the country. The mailing list was obtained from the International City Managers Association (ICMA) and, for a detailed survey of the Philadelphia metropolitan statistical area (MSA), from the Delaware Valley Regional Planning Commission. The survey was mailed to the Planning Director, where there was such an office. Where none existed, the survey was sent to the Chief Administrative Officer of the municipality.

The overall response rate was 38%, with 2,649 surveys returned, representing 60% of the population surveyed. Table 1 reports the response rates by size of locality. The response rate is highest in larger cities, but there are large samples available for all but the smallest communities with less than 2,500 residents.[4] While communities with at least 2,500 residents are well-represented in the sample, it still is the case that the typical city in our sample is not the average city in the country.

One reason is that not all localities belong to ICMA, as indicated by the very small number of places with populations below 2,500 in their data file (see column two of the first row in Table 1). Another reason is that the decision to answer the survey was not random. In a truly random sample of (say) K municipalities out of a universe of N, each city would have a K/N probability of making it to the final sample. In that case, all the observations should be weighted identically. In practice, it is likely that certain types of communities have different response rates to our survey. Consequently, logit models of the probability of selection into the survey were estimated to identify the magnitude of the sample selection coefficients.

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[4] Surveys were also mailed to 3,003 counties, 32% of whom responded. Those data are not used here.

To begin this process, we constructed a master file of all U.S. localities from Census-designated place definition files and then created a sample selection dummy variable. A value of one was assigned to each municipality that also was in our ICMA-based sample, with all other localities being assigned a value of zero for this variable. A logit specification regressing the sample selection dummy on a variety of community traits was then estimated, with the results being used to construct sampling weights for use in statistical analyses.

Table 2 reports the results of those estimations for two samples of communities: (a) for all Census-designated places within the United States; and (b) for all such places within metropolitan areas as defined by the Census. Separate results are provided because we suspect that many researchers are more interested in residential land regulation in metropolitan areas because they contain the vast majority (about 4/5ths) of the country's population. Table 2's findings show that the probability of a city being included in the sample increases with the population of the locality, with the share of elderly (those 65 or older) in the community, with the share of children in the community (those 18 or younger), with median house value, and with educational achievement (as defined by the share of those with college degrees); the probability of being in our sample is decreasing in the share of the community made up of owner-occupiers and in the share of non-Hispanic whites.[5]

Estimating this model allows us to calculate sample weights based on the inverse of the probability of selection. Two sets of weights are created. The first, based on the results from column 1 of Table 2, is relevant for making inferences about the universe of

[5] These latter two effects are the result of a very high response rate among larger cities which tend to have a higher fraction of renters and non-white residents.

American cities and towns. The second, based on the results from column 2 of Table 2, should be used to make inferences conditional on being in a metropolitan area. Stated differently, they should be used to help make the sample representative of the universe of localities in metropolitan areas. Figure 1 graphs the distribution of the weights for the metropolitan sample. In practice, our estimated probability weights appear lognormal and are heavily clustered around eight. However, there are observations with significantly larger weights, and those are the small, lower house value communities.

III. The Eleven Subindexes Comprising the WRLURI

III.A. Subindex Descriptions

The Local Political Pressure Index (LPPI)

The first component of the overall index reflects the degree of involvement by various local actors in the development process. The first question in our survey asked respondents to rank the importance of a number of local entities or stakeholders (on a scale of 1 to 5, with one being low and five being high) in affecting residential building activities or the growth management process in general. The local groups listed here include the following: (a) local council, managers, or commissioners; (b) community pressure groups; and (c) county commissions or legislature. Another question (#4) asked about the importance of certain policy matters in affecting the rate of residential development, also on a 1-to-5 scale. The policy or political issues included the following: (a) school crowding concerns; (b) city budget constraints; (c) council opposition to growth; and (d) citizen opposition to growth.[6]

The first component of the LPPI is based on the sum of the individual responses, which was then standardized so that it has a mean of zero and a standard deviation of one.[7] The second component used to create the LPPI is the standardized number of land preservation and conservation-related initiatives put on the ballot by communities from 1996-2005. This variable is based on information provided by the LandVote™ database of The Trust for Public Land.[8]

More formally, the LPPI subindex is the standardized sum of the two components as described below:

(1) LPPI=STD{STD[*localcouncil* + *pressuregroup* + *countyleg* + *(sfubudget+mfubudget)/2* + *(sfucouncil+mfucouncil)/2* + *(sfucitizen+mfucitizen)/2* + *(sfuschool+mfuschool)/2*] + STD[*totinitiatives*]}

where STD refers to a standardardized variable with a mean of zero and standard deviation of one, 'sf' and 'mf' refer to single-family and multifamily housing, respectively, and the different variable abbreviations correspond to the underlying variables from the questionnaire. Appendix 2 provides added detail on each component, as well as the subindex itself.

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[6] Question 4 from our survey also asked about the importance of issues such as school crowding in affecting the rate of both single-family and multifamily development. We always use the average of the responses for single-family and multifamily sectors.

[7] We equally weight each response because we do not have strong priors about which elements are likely to be more important. Moreover, experimentation with factor analysis to determine relative weights for each component yielded very similar results in the sense that the correlation between the simple sum used here and the linear combination obtained using factor analysis weights was 0.94. This pattern holds throughout the data, so we generally report results for the subindexes based on simple sums. We do use factor analysis to construct the main regulation index. See below for more on that, as well as for discussion of its robustness to assuming equal weights for the eleven subindexes.

[8] About 14 percent of the responding communities had at least one such ballot proposal, with less than 1 percent having two or more. See The Trust for Public Land website at http://www.tpl.org/tier2_kad.cfm?content_item_id=0&folder_id=2607 for more detail.

The State Political Involvement Index (SPII)

The State Political Involvement Index also is formed as the standardized sum of two components. The first is based on the fifty state profiles of state-level legislative and executive branch activity pertaining to land use regulation developed by Foster and Summers (2005). Those authors ranked states by the degree to which each state's executive and legislative branches facilitated the adoption of greater statewide land-use restrictions. States were given a ranking of 1, 2, or 3 depending upon how active they had been on this issue over the past decade. A score of 1 indicates that there had been little recent activity towards fostering such restrictions, with a 3 indicating that state government has exhibited a high level of activity, not only studying the issue via commissions and like, but acting on it with laws or executive orders. A score of 2 was achieved if a state was in between dormancy and intense activity on land use issues.[9]

The second component of this subindex is based on the answers to the survey question (#1) on 'how involved is the state legislature in affecting residential building activities and/or growth management procedures'. The answers take on values from 1 to 5, with a higher score indicating a greater role and influence for the state legislature. We average the local responses within each state and then apply that average to each jurisdiction in the state. This is done to make it more compatible with the other component of this subindex and to ensure fuller coverage of the available information on state behavior. For example, survey respondents in declining towns may misperceive a low level of state interest or regulation because it is not binding in their community.

[9] The authors used information from a variety of sources including reviews of executive orders on state websites, analyses by the American Planning Association, case law, journal articles, publications by environmental pressure groups, state commission reports, and telephone conversations with state officials. See Foster & Summers (2005) for the details.

Averaging at the state level helps deal with this problem. In fact, the correlation between the two index components is a relatively strong 0.41. This also suggests that averaging the two helps reduce measurement error that remains in each individual component.

Thus, the SPII subindex is the standardized sum of the two standardized components as reflected in the equation (2)

(2) SPII=STD{STD[*execrating*] + STD[STATE_MEAN{*stateleg*}]},

with lower values of this index implying less activity towards more general state land use control. See Appendix 2 for all underlying variable definitions.

The State Court Involvement Index (SCII)

The State Court Involvement Index (SCII) is based on another fifty-state profile reported in Foster and Summers (2005). The judicial environment was assessed based on the tendency of appellate courts to uphold or restrain four types of municipal land-use regulations -- impact fees and exactions, fair share development requirements, building moratoria, and spot or exclusionary zoning. The state score here reflects the degree of deference to municipal control, with a score of 1 implying that the courts have been highly restrictive regarding its localities' use of these particular municipal land-use tools. A typical example of a state receiving a score of one involves the majority of appellate decisions having invalidated spot zoning and the imposition of impact fees, or having placed a relatively high standard for local governments to meet in implementing these land-use regulations. On the other end of the spectrum, a score of 3 is given if the courts have been strongly supportive of municipal regulation. A score of 2 is given if the courts have been neither highly restrictive nor highly supportive of municipal regulation. A typical example here would be for a state in which the majority of appellate decisions have struck down impact fees, but upheld spot zoning cases.[10]

The formula of the index is straightforward, as described in equation (3)

(3) SCII=*judicialrating.*[11]

Local Zoning Approval Index (LZAI)

The Local Zoning Approval Index, is based on the answers to survey question #2 regarding which organizations or regulatory bodies (denote as *organizationD* in the formula below) have to approve any request for a zoning change. The question listed six groups ranging from a local planning commission to an environmental review board. The LZAI is the simple sum of the number of entities whose approval is required. The more groups with approval rights, the more potential veto points for any given development proposal, so we interpret a larger value for this subindex as reflecting a more stringent, and less *laissez faire* local regulatory environment. The formula used to calculate the LZAI is as follows

(4) LZAI=*commissionD* + *loczoningD* + *councilD* + *cntyboardD* + *cntyzoningD* + *envboardD* + *zonvote.*

Local Project Approval Index (LPAI)

Our survey also asked which local entities had to approve a project that did not require any zoning change (Question #3). As with the zoning approval question, six groups or entities were listed, and this subindex value is the simple sum of the number of

[10] In a very few cases (Alaska, Georgia, Hawaii, and Oklahoma), there was insufficient case law to make a determination. That situation arises either because there is a statutory framework that makes the appeal of trial court decisions unlikely or because there are relatively few municipal land use restrictions in the first place. Such states are coded as a two—neither highly restrictive nor permissive. Our results are not sensitive to these particular assignments of values. See Foster & Summers (2005) for the details.
[11] We do not standardize here (or elsewhere) when there is no need to compare variables measured with different metrics.

organizations that must approve a project that does not need any change to current zoning (*norezD*). Thus, the formula used to calculate the LPAI is as follows:

(5) *LPAI=commission_norezD + council_norezD + cntyboard_norezD + envboard_norezD + publhlth_norezD + dsgnrev_norezD*

As always, precise definitions for the different variables used to construct the subindexes are available in Appendix 2.

Local Assembly Index (LAI)

The Local Assembly Index is a measure of direct democracy and captures whether there is a community meeting or assembly before which any zoning or rezoning request must be presented and voted up or down. Such assemblies exist in a number of New England communities that have town meetings. We did not ask about this feature in our survey, but many New England jurisdictions noted it in their survey responses. Consequently, we supplemented that self-reported information by a second smaller survey. Specifically, we called every New England-based jurisdiction in our sample and asked two questions: (1) whether they held town meetings; and (2) whether it was required that any zoning change had to put to a popular vote at an open town meeting. We would expect the true regulatory environment to be stricter in places where all zoning changes must be voted on by the community. This subindex takes on a value of one if the community both has a regular town meeting and a requirement for a popular vote in order to approve changes to zoning regulations, and is zero otherwise.

Supply Restrictions Index (SRI)

The Supply Restrictions Index (SRI) reflects the extent to which there are explicit constraints or caps on supplying new units to the market. Our survey question #5 asked whether there were any statutory limits on the number of building permits for single-family and multifamily product, on the number of single-family or multifamily units authorized for construction in any given year, on the number of multifamily dwellings (not units) permitted in the community, and on the number of units allowed in any given multifamily building (*limit*). The SRI is the simple sum of the number of 'yes' answers to each of these questions. More formally,

(6) *SRI=sfupermitlimit + mfupermitlimit + sfuconstrlimit + mfuconstrlimit + mfudwelllimit + mfuunitlimit*,

with all variables described in Appendix II.

Density Restrictions Index (DRI)

Our survey also asked a series of questions about density restrictions in the form of minimum lot size requirements. The data show that over 4/5th of all communities have a mandated minimum in at least some of its neighborhoods, with many communities reporting different minimums in different parts of their jurisdictions. We transformed the responses to create a dichotomous dummy variable that takes on a value of 1 if the locality has at least a one acre minimum lot size requirement somewhere within its jurisdiction and a zero if it has no minimums or a less restrictive one.[12] We do this because communities with a one acre minimum clearly care about (low) density. Thus, the DRI is defined as in equation (7),

(7) *DRI=1 if minlotsize_oneacre==1 or minlotsize_twoacres==1; and DRI=0 otherwise.*

Open Space Index (OSI)

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[12] Thirty-six percent of the respondents reporting some type of minimum lot size restriction have a half-acre minimum. Of this group, about 90% have at least some part of their community with a one acre or more minimum. Thus, one acre minimums are not the norm, but if a community is going to have a binding restriction of at least a half acre, it is highly likely to have even more stringent constraints of one acre or more.

A separate subindex reflects whether home builders in the community are subject to open space requirements or have to pay fees in lieu of such dedications. Over half (54 percent) of the communities in our sample report such a requirement. This subindex is a standard dummy variable that takes on a value of one if such requirements are in place and is zero otherwise. Thus, OSI=1 if the community imposes such regulation and equals zero otherwise.

Exactions Index (EI)

Another potentially important facet of the local regulatory environment involves requiring developers to pay their allocable share of costs of any infrastructure improvement associated with new development. This so-called exaction forms the basis of the Exactions Index. This index is a dummy variable that takes on a value of one if exactions for associated infrastructure improvements are mandated by the locality and is zero otherwise. Thus, EI=1 if developers must pay allocable shares of infrastructure improvement costs and is zero otherwise.

Approval Delay Index (ADI)

Our survey asked respondents about the average duration of the review process (Question #10), the typical amount of time between application for rezoning and issuance of a building permit for hypothetical projects (Question #12), and the typical amount of time between application for subdivision approval and the issuance of a building permit conditional on proper zoning being in place (Question #13, again for hypothetical projects). More specifically, respondents were asked to reply to the first of these three questions with the number of months for the review process. The latter two questions provided ranges of possible answers (also in months) and we use the midpoint of the relevant interval to reflect the expected delay. In addition, we averaged the answers across the three hypothetical projects described in the questions: a relatively small, single-family project involving fewer than 50 units; a larger single-family development with more than 50 units, and a multifamily project of indeterminate size.

This subindex can be interpreted as the average time lag in months and is calculated as follows:

(8) *ADI=[(time_sfu+time_mfu)/2 +(time1_l50sfu+time1_m50sfu+time1_mfu)/3 + (time2_l50sfu+ time2_m50sfu+time2_mfu)/3]/3,*

where time_sfu is the number of months specified in the answer to Question 10 about the typical review time for single family projects, time_mfu is the typical review time for a multifamily project, time1_l50sfu is the number of months between application for rezoning and building permit issuance for development of a single-family project with less than 50 units, time1_m50sfu is the analogous number of months for a larger single-family project with more than fifty units, time1_mfu is the lag for a multifamily project, time2_l50sfu is the number of months between application for subdivision approval and building permit issuance (assuming proper zoning in place) for the relatively small single family project, time2_m50sfu is the analogous time delay for the larger single-family development, and time2_mfu represents the multifamily project for which zoning is already in place.

III.B. Other Data Issues

Dealing with Missing Data

It is not particularly uncommon for a municipality to have complete data for most survey questions, but missing data for one or two variables. In those cases where there is missing information for one of the nearly fifty variables used to create the different subindexes, we had to decide whether to drop the city from the sample or try to impute the missing data point. To keep the sample as large as possible, we decided to impute some of the missing values using predictions with maximum likelihood techniques based on other variables used in the indexes.

The ADI and LPPI subindexes were most affected by missing data because they are comprised of the most underlying component variables. For example, if the LPPI index for a given locality was missing information on one of its twelve component variables, dropping that observation also eliminates the valuable information contained in the other eleven variables included in the subindex. One potential solution is to replace the missing variable with its average value, but a better approach is to calculate the expected value of the variable conditional on the values of the other components of the subindex under consideration. We used the program ICE (Royston (2005)) to make the data imputation.[13]

A good heuristic check on the quality of the imputations is to compare the correlations between the indexes in the case of imputed observations with the correlations in the case of the observations that did not require imputations.[14] The results from that exercise are displayed in Table 3. The correlations between the imputed indexes in the cases where we do not have complete observations are similar to the correlations whenever we did not have to impute the ADI or LPPI component variables.

Given that this process is successful in generating indexes that are consistent with the underlying information in the sample data, the benefits of imputation clearly outweigh the costs because a much larger and broader data base is available to

[13] We iterate ICE's imputation procedure 10 times.
[14] Note that this is a true out-of-sample test, because we did not use the component variables in the other indexes to impute the values of the LPPI and ADI indexes.

researchers. Table 4 documents the importance of the imputation mechanism in terms of the final data sample size. If no imputations are made, 27 percent of the sample's observations would be lost. Given that the missing variables typically represent a very small fraction of the information contained in the index, and that many of the component variables are strongly correlated, we use our imputation procedure on LPPI and ADI to reduce the loss factor to 4.3 percent of the initial sample.[15]

Correlations Across the Subindexes

Table 5 reports simple correlations across the eleven subindexes. Seventy-five percent (41/55) of the cross correlations are positive, which suggests that localities which are restrictive in one aspect of the regulatory process tend not to be lenient in another. This is an important stylized fact about the nature of the local regulatory environment that will be examined and confirmed in more detail below. Another interesting feature of the table is the weak negative correlations between the two state indexes. Thus, there is no evidence from these data that the state court system functions to support the activities of the executive or legislative branches. In fact, the different branches of government appear independent in terms of their activities with respect to local land use regulation.

IV. Creation and Analysis of the Wharton Residential Land Use Regulatory Index

Factor Analysis

Factor analysis of the subindexes is employed to create the Wharton Residential Land Use Regulatory Index (WRLURI), and we select the first factor as the WRLURI.[16]

[15] We recognized that other researchers could come to a different conclusion. Hence, in the data that will be made available, an allocation flag will be included in all instances in which a variable has been imputed.
[16] Version 9.1 of the statistical program Stata is used to perform the factor analysis. Factors are not rotated in our analysis.

This strategy is adopted because we wish to capture a single dimension of the data and rank localities according to whether they have a more or less restrictive regulatory environment regarding housing development. Moreover, there seems little need to create additional factors given that the subindexes already condense the survey information into a limited number of regulatory dimensions.[17]

In practical terms, the outcome of the factor analysis is not all that dissimilar to the results obtained from simply adding the standardized sum of the component indexes. Figure 2 illustrates this by plotting the actual WRLURI against the sum of the subindexes. The correlation between the WRLURI and the sum of the standardized components indexes is 0.82, suggesting that the final index value is not particularly sensitive to the factor analysis weights of the component indexes.

The factor loadings for each standardized component indexes as well as the correlation of the WRLURI with its component indexes are reported in Table 6. The factor loadings are the weights that are used when multiplying by each of the standardized component indexes to obtain the WRLURI as a linear combination of the subindexes. The aggregate index loads positively on nine of the eleven subindexes. It loads most heavily on the Average Delay Index (ADI), and has very small (and sometimes negative) factor loadings on the Supply Restrictions Index (SRI), the State Courts Involvement Index (SCII), and the Local Zoning Approval Index (LZAI). The correlations of WRLURI with the component indexes provide a sense of what information contained in the subindexes did or did not 'make it through' to the WRLURI.

[17] That said, researchers certainly can utilize the subindexes to explore the impacts of different dimensions of the regulatory space.

The WRLRI is very highly correlated with the Average Delay Index (ADI), but also clearly is being influenced by many other components.

The distribution of the index, which is standardized to have a mean of zero and standard deviation of one, looks distinctively Gausian as the kernel density graph in Figure 3 illustrates. However, we do reject normality due to the presence of skewness and kurtosis in a standard test.

Analysis of the WRLURI: What Does It Mean to Be Below Average, Average, and Above Average in Terms of the Local Regulatory Environment?

Table 7 reports summary statistics on the distribution of the WRLURI. The first column uses the full national, unweighted sample. There are 2,610 communities in this sample, 73 percent (or 1,903) of which are in metropolitan areas as defined by the Bureau of the Census. By construction, the mean of this index is zero and the standard deviation is one. The second column uses the national weights, created as described in Section II. The impact of weighting is fairly modest, but the mean now is slightly negative, indicating that the less regulated places are underweighted in our sample. Overall, the distribution is not much affected, as a quick comparison of the WRLURI values for the 10th and 90th percentile communities shows.

Much of our description below focuses on the responses from the 1,903 communities in metropolitan areas because they are where the bulk of the population lives. These places are spread across all fifty states and 293 distinct metropolitan areas.[18] The third and fourth columns of Table 7 report index values at the mean and across the distribution of communities within metropolitan areas, both with and without

[18] Metropolitan areas are defined based on 1999 boundaries, and primary metropolitan statistical areas (PMSAs) within a consolidated metropolitan statistical area (CMSA) are considered distinct areas. There were 337 PMSAs and MSAs combined in 1999, so our sample includes communities in 87 percent of such areas. Tables below provide information on the number of observations by metro area and state.

weighting.[19] Weighting itself has little impact on the distribution of WRLURI values, but the average community within a metropolitan area is between 1/10th and 2/10th of a standard deviation more regulated than the average community in the nation. This suggests there could be fairly large gap in the degree of regulation between places in metropolitan areas and those outside them. The fifth and final column of Table 7 confirms this. Less than one-quarter of the 707 jurisdictions outside of metropolitan areas have measures of regulatory strictness that are greater than the national average. The mean index value of -0.46 for this group implies that that the typical community within a metropolitan area is about 6/10ths of a standard deviation less regulated than the typical community not located in a metropolitan area (0.15-(-.046)~0.61). As the analysis below shows, this is a meaningfully large gap.

Before getting to that material, we first analyze what it means to be average in terms of local land use regulation. To do so, we look at the 202 communities with WRLURI values within 1/10th of a standard deviation of the metropolitan area mean of 0.15 (i.e., 0.005<WRLURI<0.25, given the weighted mean of WRLURI=0.15 in the metropolitan area sample; see column 4 of Table 7). These places are not concentrated in a few states or areas. Rather, they span 36 of the 50 states, and 106 of the 293 metropolitan areas in our sample. Given the narrowness of our definition of average, this strikes us a lot of geographic variation, and emphasizes the point that ‘average’ places in terms of land use regulatory strictness are spread throughout much of the nation.

Table 8 then reports the values of the eleven component indexes for these 202 places (column 1), and allows us to compare them to the average values for the

[19] Whenever the sample is restricted to places within metropolitan areas, we use the metropolitan area-specific weights which make the sample representative of metropolitan America.

metropolitan area sample (column 2). It is noteworthy that these places tend to be average on almost all the dimensions by which we gauge the regulatory environment. That is, for the various subindexes comprising the WRLURI, the mean for the 202 average communities tends to be quite close to the mean for the metropolitan area sample. Thus, it generally is not the case that a place is 'average' because it is highly regulated in one component and lightly regulated in another. The differences in income, house value, and demographic terms reported in the bottom panel of Table 8 tend to be wider. The biggest difference is in population and is due to a handful of larger central cities being in the group of 202 places. If we restricted this comparison only to suburbs, there would be very little difference in community sizes across the samples.[20]

While our measure is constructed to rank localities in terms of the degree or strictness of the land use regulatory environment, these data also allow us to say something about what it means to be 'average' in absolute terms. The community with the typical land use regulatory environment in our sample has the following traits: (a) two entities, be they a zoning commission, city council, or environmental review board, are required to approve any project requiring a zoning change; (b) more than one entity also is required to approve any project, even if it does not involve a zoning change; (c) it is highly unlikely that any form of direct democracy is practiced in which land use issues and projects must be put to a popular vote; (d) there probably is no onerous density restriction such as a one acre lot size minimum anywhere in the community, although some less stringent minimum constraint generally is in place; (e) some type of exactions

[20]It is interesting that the regulatory climate in central cities tends to be less strict according to our data. The mean WRLURI value for central cities in our sample is -0.14, with the median being -0.25. There is considerable heterogeneity across central cities, but they have a less restrictive land use regulatory environment on average than their suburbs. The gap between their mean and that for the suburbs is about one-third of a standard deviation. See Gyourko & Summers (2006a) for more detail.

and open space requirement probably exist, even though they are not as omnipresent as is the case in the more highly-regulated places; and (f) there is about a six month lag (on average) between the submission of an application for a permit and permit issuance for a standard project.

If being average means a place is average on most dimensions by which the regulatory environment is measured, does being above (below) average analogously imply that a place is consistently more (less) strict in terms of regulation? The results reported in Table 9 suggest that is the case in general. Here, we divide the sample into three groups of lightly, modestly, and heavily regulated places within metropolitan areas. Lightly-regulated places are those in the bottom quartile of the distribution of WRLURI values (WRLURI<-0.53 in this case); modestly-regulated places are those spanning the interquartile range of the data (-0.53<WRLURI<0.75); and highly-regulated places are defined as those with WRLURI index values above 0.75 which is the boundary for the top quartile of jurisdictions in our metropolitan area sample. The top panel of Table 9 lists the average subindex values for each group, with the bottom panel providing community income, house value and demographic descriptors.

The differences between lightly- and highly-regulated places are fairly large for most of the subindexes making up the WRLURI. The only exceptions are the State Court Involvement Index (SCII) and the Local Zoning Approval Index (LZAI). For the Local Political Pressure Index (LPPI), there is a 1.5 standard deviation difference between the means of the places in the top and bottom quartiles of the WRLURI distribution (0.92-(-0.47)~1.5). There is similarly large 1.4 standard deviation gap for the State Political Involvement Index (SPII) in row 2 of Table 9 (0.75-(-0.67)~1.4). The results for the

Local Project Approval Index (LPAI, row 5) indicate that highly-regulated places tend to have about one more entity that is required to approve a project, even if that project does not require a zoning change (2.01-1.16~0.85). Having multiple approval (and, thus, rejection) points must make the regulatory environment more burdensome for those wanting to supply new product to the market.

There literally are no lightly-regulated places with direct democracy requirements that zoning changes have to approved by popular vote at an announced meeting (LAI=0.00; see column 1, row 6 of Table 9). While this type of requirement is relatively rare throughout the sample, 12 percent of the highly regulated places have it, and they are concentrated in three states—Massachusetts, Maine, and New Hampshire. We would expect it to be easier to block projects in such situations.[21] There also are very few explicit restrictions on new supply in our communities, but those who have them are much more likely to be in the top quartile of the WRLURI distribution as indicated by the results in the next row for the Supply Restrictions Index (SRI). Density restrictions as reflected in one acre minimum lot sizes are more widespread, but they still are much more heavily concentrated in places that are highly restrictive on average. The data in row 8 show that 57 percent of the most highly regulated places have a one acre minimum lot size requirement in at least one neighborhood, while only 4 percent of the most lightly regulated places have such a minimum.

Open space requirements are even more omnipresent, but there still is a meaningful gap between highly- and lightly-regulated places. Seventy-seven percent of the top quartile of the WRLURI distribution has an open space requirement (i.e., OSI=1)

[21] The standard economic reasoning pertaining to concentrated benefits and dispersed costs underpins this point.

versus only 25 percent of the bottom quartile of the WRLURI distribution. Even with respect to exactions, which are the most widespread local regulatory feature, there is a difference across highly- versus lightly-regulated places. Seventy-six percent of the former have some type of exactions requirement (i.e., EI=1) versus only 65 percent for the bottom quartile of the most lightly-regulated communities. Finally, the average project delay time is more than three times longer in the highly-regulated places versus the most lightly-regulated places. More specifically, the Approval Delay Index (ADI) indicates a mean delay of 10.3 months in the more regulated areas versus 3.2 months in the less regulated areas.

In sum, highly regulated places tend to be so almost across the board. The top quartile of places in terms of WRLURI values tends to be communities with more intensely involved local political environments relating to land use regulation. They also tend to be in states whose executive and legislative branches are facilitating the adoption of statewide land use rules. However, their courts may or may not be adding to this process. Highly regulated places also tend to have multiple veto points for project approval, although there is no apparent difference in this dimension for project-level zoning approval. Direct democracy in terms of requiring a popular vote for zoning changes is almost exclusively a characteristic of highly-regulated places. And, the most highly-regulated quarter of the metropolitan sample is disproportionately likely to have some type of formal restriction on new supply, a relatively onerous one acre lot size minimum, as well as open space and exaction requirements. Finally, these places have by far the highest average project delay times.

The bottom panel of Table 9 documents that highly-regulated places also are richer, much more highly educated, and have substantially higher house values than the most lightly-regulated places in terms the WRLURI distribution. Median family income is more than $20,000 greater in the most highly-regulated prices and has a simple correlation coefficient of 0.33 with our regulation index. Median house value in highly-regulated places is nearly double that in lightly-regulated places and has a 0.32 correlation with WRLURI. The 12 percentage point gap in the fraction of households headed by college graduates is quite large considering the sample average is 28 percent. Its simple correlation with the degree of local land use regulation is 27 percent. The most highly-regulated areas by our measure have a greater fraction of white households, but the difference with the most lightly-regulated areas is modest. The same holds for average population across these places. However, the most highly-regulated areas are physically larger and they are a 25 percent less dense.

While nothing causal about income, education, or house value determining the degree of local land use regulation can be inferred from the data presented in the bottom of Table 9, the density result is strongly suggestive. If regulation were being driven by the fact that places literally were running out of land, then we would expect the most highly regulated places to be the most dense. That the reverse is true strongly suggests that this is not a primary motivation for more intense regulation in most places.[22]

V. Analysis of the WRLURI: Variation Across States and Metropolitan Areas

Table 10 reports average WRLURI values by state in descending order. Hawaii is the most intensely regulated state by our measure, being 2.34 standard deviations above

[22] See Gyourko & Summers (2006a) for more analysis of this issue.

the national mean. However, this is based on a single response from the city of Honolulu for that state. The other states in the top ten are dominated by those on the coasts, especially those in the east. The 2nd, 3rd, and 4th slots are occupied by Rhode Island, Massachusetts, and New Hampshire, respectively, with each being well over one standard deviation more highly regulated than the average. New Jersey and Maryland from the Mid-Atlantic region occupy the 5th and 6th places, each being over 4/5ths of a standard deviation more high regulated than the national average. Washington (state), Maine, California, and Arizona round out the top ten, and bring the coastal western states into the picture.

Moving down the rankings, the 11th and 12th places (Colorado and Delaware, respectively) are about one-half standard deviation more heavily regulated than the mean. The communities in the next four states of Florida, Pennsylvania, Connecticut, and Vermont have WRLURI values that average about one-third of a standard deviation higher than the national mean.

There are then ten states ranging from Minnesota (#17) to Georgia (#26), whose community's index values average within 0.2 standard deviations of the national mean. In this sense, these states are the most typical of local land use regulation in the nation.

This leaves 24 states with average community WRLURI scores that are at least one-third of a standard deviation below the national mean, with three quarters of these having mean index values more than one-half standard deviation below the national mean. These are primarily southern and Midwestern states, with South Dakota, Alaska, Indiana, Missouri, Montana, Louisiana, and Kansas each being a full standard deviation below the national mean. These results emphasize that local land use regulation is not uniform across space, nor uniformly high. Moreover, there are at least a few fast growing states (e.g., North Carolina, South Carolina, and Texas) that were lightly regulated on average at the time of our survey.

It is also the case that there always is some heterogeneity across communities even in the most highly or lightly regulated state. For example, in Massachusetts which has a state average that is 1.52 standard deviations above the national mean, ten percent of the communities (8 out of 79) still have WRLURI values below zero and thus are more lightly regulated than the average place in the country. On the other end of the spectrum, 9 percent of the 67 communities in Missouri are more highly regulated than average (one place is 0.90 standard deviations above the mean) even though the average across all places in the state is a standard deviation below the national mean. In addition, there is substantial variation across places in an 'average' state such as Michigan (mean WRLURI value of 0.03). The distribution in that state is symmetric, with the 10^{th} percentile community having a WRLURI value of -0.75 and the 90^{th} percentile community having a WRLURI value of 0.79.

This type of variation naturally leads us to look across metropolitan areas, although we do so only for those labor market areas for which we have more than ten responses to our survey. There are 47 such areas and they are listed in descending order of the WRLURI in Table 11. Like the state-level distribution, this one is skewed, with the most highly regulated metro areas having WRLURI values more in excess of the mean than the index values of the most lightly regulated areas are below the mean.

Given the state-level data just presented, it is no surprise to see two New England-based metropolitan areas, Providence, RI, and Boston, MA, at the top of the list. These areas are 1.5 times more heavily regulated than the average place in the U.S. Part of the reason they rank so highly is that some of their smaller communities have the requirement that zoning changes be put to a popular vote, but as the previous discussion implies, that is not the only reason. The communities in these metropolitan areas tend to be relatively more intensely regulated on almost all the dimensions we measure.

Four other areas have average WRLURI values that are about one standard deviation above the national mean. These include Monmouth-Ocean, NJ, Philadelphia, PA, San Francisco, CA, and Seattle, WA. Philadelphia's presence in this group is another indicator of the heterogeneity across places within states, as its mean is significantly higher than that for Pennsylvania as a whole.[23] Another 13 metropolitan areas have WRLURI values that are about one-half to three-quarters of a standard deviation about the national average. This is a wide-ranging group that includes many of the most expensive and highest growth markets in the country. Some of these markets such as Phoenix have been associated with fairly easy supply conditions in the past that allowed plentiful new supply. How the present local regulatory environment affects the supply side of that market in the future is an interesting issue to watch.

The Chicago, IL, and Atlanta, GA, markets stand out among the average group with WRLURI values near zero. The bottom ten markets with index values of at least one quarter of a standard deviation below average are dominated by relatively slowly growing Midwestern metropolitan areas such as Kansas City, Indianapolis, and St. Louis, but they also include the burgeoning Texas markets of Houston and Fort Worth.

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[23] The Philadelphia metropolitan area sample used here is a 20 percent random draw from a special data set that included 271 communities—virtually every jurisdiction with that metropolitan area. The results are not materially different if we use every observation from that special survey. However, we did not want to distort the national sample by including so many observations from one area. See Gyourko & Summers (2006b) for more on the Philadelphia area analysis.

VI. Summary and Conclusions

We developed a new measure, the Wharton Residential Land Use Regulatory Index, of differences in the local land use regulatory climate across more than 2,600 communities nationwide based on the results of a 2005 survey and a separate study of state executive, legislative, and court activity. The WRLURI is based on a single factor extracted from eleven subindexes that measure various facets of the local regulatory environment. Our focus in this paper is on that single factor, with other work (see Gyourko & Summers (2006a)) delving in more detail into the subcomponents of the index.

Our results confirm some of the popular wisdom and implications of previous research that there are some very highly regulated markets. However, the broader picture is one of spatial heterogeneity, with substantial variation across metropolitan areas, and somewhat less variability across communities within a given market area. At the state level, the northeast dominates the top slots (after Hawaii), with Massachusetts, Rhode Island, and New Hampshire having WRLURI values that are about 1.5 standard deviations above the national average. The practice of direct democracy in the form of town meetings that require land use issues to be put to popular vote, especially in their smaller communities, appears to be an important part of the explanation of why such a large fraction of localities in these states are measured as heavily regulated. The communities in the mid-Atlantic states of New Jersey and Maryland are the next most heavily regulated according to our measure, followed by Washington state, Maine, California, and Arizona to round out the top ten. The bottom ten states with the least regulated communities on average are all from the south or Midwest (plus Alaska).

At the metropolitan area-level, the two New England areas of Providence and Boston are the only ones with WRLURI values at least 1.5 standard deviations above the national mean. Monmouth-Ocean in suburban New Jersey, Philadelphia, San Francisco, and Seattle each have communities that average one standard deviation about the sample mean. Once again, the least regulated metropolitan areas are in the Midwest and the south. Chicago and Atlanta are typical of markets right near the national average in terms of land use control regulatory environments.

Another noteworthy stylized fact is that the most highly (lightly) regulated communities tend to be relatively more (less) restrictive on most of the dimensions we measure. Thus, heavily regulated places with high WRLURI values well above the sample mean are those with multiple local pressure groups interested in land use control or growth management, with stringent density restrictions as reflected in a one acre lot size minimum somewhere within the community, a high probability of exactions and open space requirements on new development, and a relatively slow project application and approval process. The converse holds for the less regulated places with negative WRLURI values well below zero. They have relatively few groups interested in the growth management process, there is a low probability that a density restriction along the lines of a one acre minimum exists, open space and exactions regulations are less prevalent, and the project approval process is a speedy one. Statistically, this means there is a fairly strong positive average correlation across the different components comprising the WRLURI.

Community wealth is strongly positively correlated with the degree of local land use regulation. That is, the higher is median family income, median house value, or the share of adults with college degrees, the greater is the community's WRLURI value. While causality cannot be inferred from this correlation, more telling about the likely motivation for stricter land use controls is the weak, slightly negative, correlation of our regulatory measure with density. If a fundamental scarcity associated with communities 'running out of land' were causing the implementation of more regulation, one would expect the most highly regulated places to be the most dense. That they are not casts serious doubt on the validity of that hypothesis and suggests researchers and policy makers should look elsewhere for an explanation.

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Table 1: Response Rate by Size of Locality

Population	Response Rate	Number in ICMA List
Less than 2,500	29.4%	17
2,500 to 5,000	28.3%	1,952
5,000 to 10,000	35.3%	1,840
10,000 to 50,000	41.7%	2,557
50,000 to 100,000	49.5%	402
100,000 and over	62.2%	241

Table 2: Logit Estimation Results—Probability of Selection for the National and Metropolitan Area Samples

	All	Metropolitan Areas
	(1)	**(2)**
Population±	0.222	0.154
	(0.029)***	(0.025)***
Share Owner-Occupied Households	-4.191	-3.366
	(0.139)***	(0.170)***
Share Ages 65 and Above	1.79	2.051
	(0.349)***	(0.457)***
Share Ages 18 and below	2.426	3.562
	(0.414)***	(0.586)***
Share Non-Hispanic White	-0.308	-0.045
	(0.102)***	(0.129)
Log median house value	0.686	0.195
	(0.046)***	(0.064)***
Share with Bachelor's Degree	2.601	2.7
	(0.180)***	(0.220)***
Constant	-8.937	-3.951
	(0.548)***	(0.752)***
Observations	55,397	20,945

Standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
± population divided by 100,000 for better result exposition

Table 3: Correlations—Imputed and Non-Imputed Approval Delay Index (ADI) and Local Political Presssure Index (LPPI) Values

	ADI	IMPUTED ADI	LPPI	IMPUTED LPPI
ADI	1.00	1.00	0.29	0.27
LPPI	0.26	0.31	1.00	1.00
SPII	0.30	0.24	0.31	0.11
SCII	-0.04	0.09	-0.12	-0.08
LZAI	-0.13	-0.05	-0.13	0.06
LPAI	0.12	0.15	0.17	0.19
SRI	0.11	0.07	0.03	0.13
DRI	0.15	0.21	0.26	0.11
OSI	0.19	0.15	0.15	0.17
EI	0.05	0.05	-0.02	0.09
	2077	535	2453	159

Table 4: The Impact of Imputations on Sample Size

	Observations	Loss Factor
Municipalities in the Sample	2,729	0%
Available Wharton Index (imputations)	2,612	**4.3%**
Available Wharton Index (no imputations)	2,002	**26.6%**

Table 5: Subindex Correlation Matrix

	LPPI	SPII	SCII	LZAI	LPAI	LAI	DRI	OSI	EI	SRI
LPPI	1									
SPII	0.12	1								
	0.00									
SCII	-0.08	-0.07	1							
	0.00	0.00								
LZAI	0.07	-0.16	0.05	1						
	0.00	0.00	0.01							
LPAI	0.19	0.03	-0.06	0.28	1					
	0.00	0.18	0.00	0.00						
LAI	0.04	0.20	0.12	-0.04	0.01	1				
	0.06	0.00	0.00	0.04	0.71					
DRI	0.13	0.14	-0.03	-0.03	0.15	0.23	1			
	0.00	0.00	0.14	0.13	0.00	0.00				
OSI	0.17	0.09	0.01	0.02	0.14	-0.06	0.09	1		
	0.00	0.00	0.66	0.34	0.00	0.00	0.00			
EI	0.08	-0.03	0.09	0.10	0.07	-0.14	-0.07	0.26	1	
	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00		
SRI	0.12	0.05	0.04	-0.01	0.05	0.12	0.04	0.02	0.00	1
	0.00	0.01	0.06	0.57	0.01	0.00	0.04	0.31	0.97	
ADI	0.27	0.29	-0.02	-0.12	0.12	0.10	0.17	0.17	0.04	0.09
	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.07	0.00

p-values in *italics for null of zero correlation*

Table 6: The WRLURI and Its Components

	Factor Loadings	Correlation with WRLRI
ADI	0.29	0.71
LPPI	0.22	0.57
SPII	0.22	0.56
OSI	0.18	0.39
EI	0.15	0.07
LPAI	0.15	0.38
LAI	0.14	0.35
DRI	0.09	0.49
SRI	0.02	0.26
SCII	-0.03	-0.09
LZAI	-0.04	-0.10

Table 7: Summary Statistics for the WRLURI for Different Samples

	Full Sample	Full Sample	Metro Area Sample	Metro Area Sample	Non-Metro Area Sample
Mean	0.00	-0.12	0.17	0.15	-0.46
Standard Deviation	1.00	0.98	1.00	1.00	0.86
10th percentile	-1.20	-1.25	-1.03	-1.05	-1.42
25th percentile	-0.73	-0.84	-0.53	-0.56	-1.10
50th percentile	-0.09	-0.25	0.06	0.03	-0.55
75th percentile	0.59	0.44	0.75	0.71	-0.01
90th percentile	1.29	1.20	1.48	1.48	0.68
Number of Observations	2,610	2,610	1,903	1,903	707
Weighting	No	Yes - National Weights	No	Yes - Metro Weights	No

Table 8: What Does It Mean To Be Average?		
	Means	
	202 Communities with 0.005 < WRLURI < 0.025	Full Metro Sample (n= 1,903)
Subindexes		
Local Political Pressure Index (LPPI)	-0.02	0.11
State Political Involvement Index (SPII)	0.31	0.05
State Court Involvement Index (SCII)	2.11	2.04
Local Zoning Approval Index (LZAI)	1.94	2.04
Local Project Approval Index (LPAI)	1.66	1.64
Local Assembly Index (LAI)	0.00	0.03
Supply Restrictions Index (SRI)	0.17	0.22
Density Restrictions Index (DRI)	0.15	0.26
Open Space Index (OSI)	0.72	0.60
Exactions Index (EI)	0.78	0.75
Approval Delay Index (ADI)	5.82	6.04
Local Traits		
Median Family Income (2000)	$58,292	$57,570
Median House Value (2000)	$155,208	$136,534
Percent College Graduates (2000)	26.4%	24.3%
Percent Poverty (2000)	6.9%	6.5%
Percent White (2000)	75.9%	81.0%
Population (2000)	82,501	27,878
Land Area in Square Miles (2000)	19.7	17.9
Density, Population per Square Mile (2000)	3,168	2,210

Notes: All community trait data are from the 2000 Census. All monetary variables are reported in $2000.

Table 9: Comparing Communities with Different Degrees of Local Land Use Regulation			
	Means		
	Lightly-Regulated Bottom Quartile of WRLURI Distribution WRLURI < -0.53 (n=476)	*Average-Regulated* Interquartile Range of WRLURI Distribution -0.53 < WRLURI < 0.75 (n=952)	*Highly-Regulated* Top Quartile of WRLURI Distribution WRLURI > 0.75 (n=475)
The Eleven Subindexes			
Local Political Pressure Index (LPPI)	-0.47	0.07	0.92
State Political Involvement Index (SPII)	-0.67	0.16	0.75
State Court Involvement Index (SCII)	2.14	2.04	2.04
Local Zoning Approval Index (LZAI)	2.12	1.99	1.91
Local Project Approval Index (LPAI)	1.16	1.66	2.01
Local Assembly Index (LAI)	0.00	0.002	0.12
Supply Restrictions Index (SRI)	0.03	0.17	0.50
Density Restrictions Index (DRI)	0.04	0.17	0.57
Open Space Index (OSI)	0.25	0.68	0.77
Exactions Index (EI)	0.65	0.79	0.76
Approval Delay Index (ADI)	3.2	5.7	10.3
Local Traits			
Median Family Income (2000)	$50,619	$58,967	$71,868
Median House Value (2000)	$109,674	$151,887	$213,998
Percent College Graduates (2000)	23.7%	27.1%	35.1%
Percent Poverty (2000)	8.5%	7.0%	4.9%
Percent White (2000)	78.8%	76.8%	81.1%
Population (2000)	46,380	51,914	50,956
Land Area in Square Miles (2000)	20.5	18.7	31.1
Density, Population per Square Mile (2000)	2,593	2,904	2,033

Notes: All community trait data are from the 2000 Census. All monetary variables are reported in $2000.

Table 10: Average WRLURI Values by State

State	WRLURI	Number of Observations	State	WRLURI	Number of Observations
1. Hawaii	2.34	1	26. Georgia	-0.20	56
2. Rhode Island	1.56	17	27. North Carolina	-0.33	64
3. Massachusetts	1.52	79	28. Montana	-0.33	6
4. New Hampshire	1.37	32	29. Ohio	-0.37	135
5. New Jersey	0.89	104	30. Wyoming	-0.43	7
6. Maryland	0.81	18	31. Texas	-0.45	165
7. Washington	0.71	49	32. Nevada	-0.45	7
8. Maine	0.64	44	33. North Dakota	-0.55	8
9. California	0.62	182	34. Kentucky	-0.58	28
10. Arizona	0.60	40	35. Idaho	-0.62	19
11. Colorado	0.51	48	36. Tennessee	-0.67	41
12. Delaware	0.51	5	37. Nebraska	-0.67	22
13. Florida	0.38	97	38. Oklahoma	-0.70	36
14. Pennsylvania	0.36	182	39. South Carolina	-0.75	30
15. Connecticut	0.35	65	40. Mississippi	-0.83	21
16. Vermont	0.33	24	41. Arkansas	-0.87	23
17. Minnesota	0.10	80	42. West Virginia	-0.93	15
18. Oregon	0.09	42	43. Alabama	-0.94	37
19. Wisconsin	0.09	93	44. Iowa	-0.99	59
20. Michigan	0.03	111	45. South Dakota	-1.01	11
21. Utah	-0.05	41	46. Alaska	-1.01	7
22. New Mexico	-0.08	16	47. Indiana	-1.02	47
23. New York	-0.12	92	48. Missouri	-1.02	67
24. Illinois	-0.17	139	49. Louisiana	-1.07	19
25. Virginia	-0.20	35	50. Kansas	-1.11	46

Table 11: Average WRLURI Values by Metropolitan Areas with Ten or More Observations

Metropolitan Area	WRLURI	Number of Observations	Metropolitan Area	WRLURI	Number of Observations
1. Providence-Fall River-Warwick, RI-MA	1.76	16	25. Detroit, MI	0.11	46
2. Boston, MA-NH	1.50	41	26. Allentown-Bethlehem-Easton, PA	0.10	14
3. Monmouth-Ocean, NJ	1.17	15	27. Chicago, IL	0.08	95
4. Philadelphia, PA	1.04	55	28. Akron, OH	0.08	11
5. San Francisco, CA	1.01	13	29. Pittsburgh, PA	0.05	44
6. Seattle-Bellevue-Everett, WA	0.96	21	30. Nassau-Suffolk, NY	0.05	13
7. Denver, CO	0.85	13	31. Atlanta, GA	0.05	26
8. Bergen-Passaic, NJ	0.74	21	32. Scranton-Wilkes-Barre-Hazelton, PA	0.04	11
9. Phoenix-Mesa, AZ	0.73	18	33. Salt Lake City-Ogden, UT	-0.09	19
10. Fort Lauderdale, FL	0.71	16	34. Grand Rapids-Muskegon-Holland, MI	-0.12	16
11. New York, NY	0.68	19	35. Tampa-St. Petersburg-Clearwater, FL	-0.17	12
12. Riverside-San Bernardino, CA	0.62	20	36. Cleveland-Lorain-Elyria, OH	-0.18	31
13. Newark, NJ	0.58	25	37. San Antonio, TX	-0.23	12
14. Harrisburg-Lebanon-Carlisle, PA	0.54	15	38. Port Worth-Arlington, TX	-0.24	15
15. Los Angeles-Long Beach, CA	0.54	32	39. Houston, TX	-0.26	13
16. Springfield, MA	0.54	13	40. Rochester, NY	-0.30	13
17. Oakland, CA	0.52	12	41. Dallas, TX	-0.33	31
18. San Diego, CA	0.50	11	42. Oklahoma City, OK	-0.40	12
19. Hartford, CO	0.47	28	43. Dayton-Springfield, OH	-0.50	17
20. Orange County, CA	0.41	14	44. Cincinnati, OH-KY-IN	-0.56	27
21. Washington, DC-MD-VA-WV	0.38	12	45. St. Louis, MO-IL	-0.71	27
22. Minneapolis-St. Paul, MN-WI	0.35	48	46. Indianapolis, IN	-0.75	12
23. Portland-Vancouver, OR-WA	0.30	20	47. Kansas City, MO-KS	-0.79	29
24. Milwaukee-Waukesha, WI	0.29	21			

Notes: Metropolitan area definitions are based on 1999 boundaries. Consolidated Metropolitan Statistical Areas (CMSAs) are disaggregated into Primary Metropolitan Statistical Areas wherever relevant.

Figure 1: Distribution of Sample Weights (kernel density)

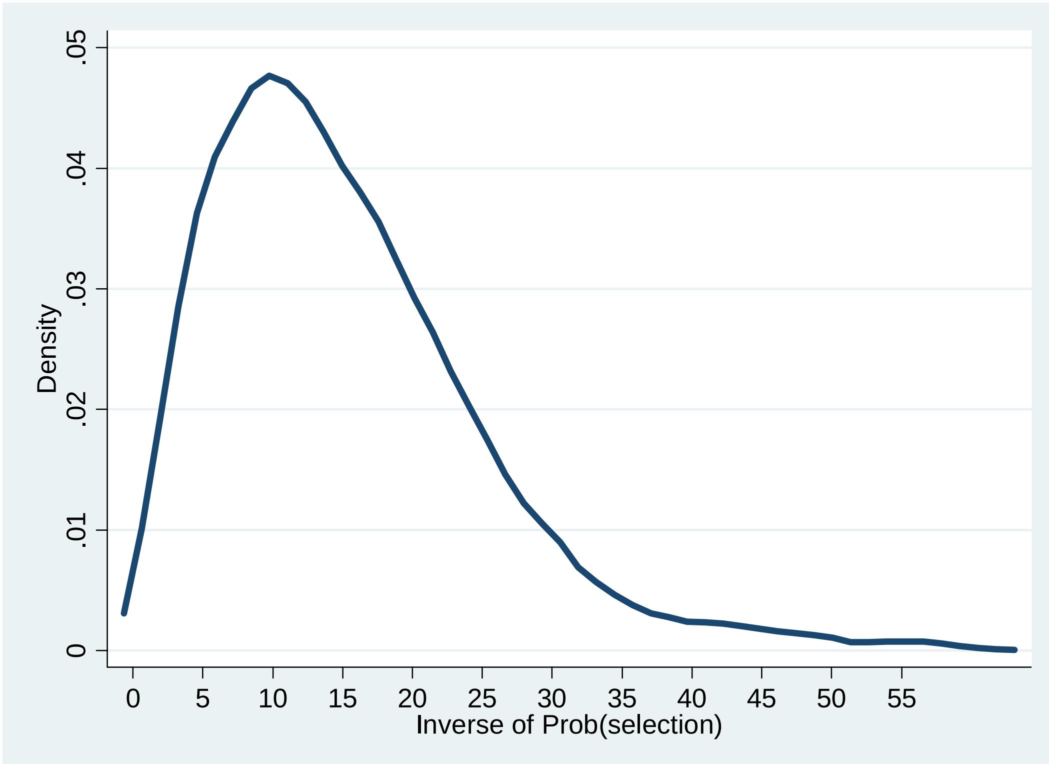


Figure 2: Factor Analysis Weights Are Less Critical

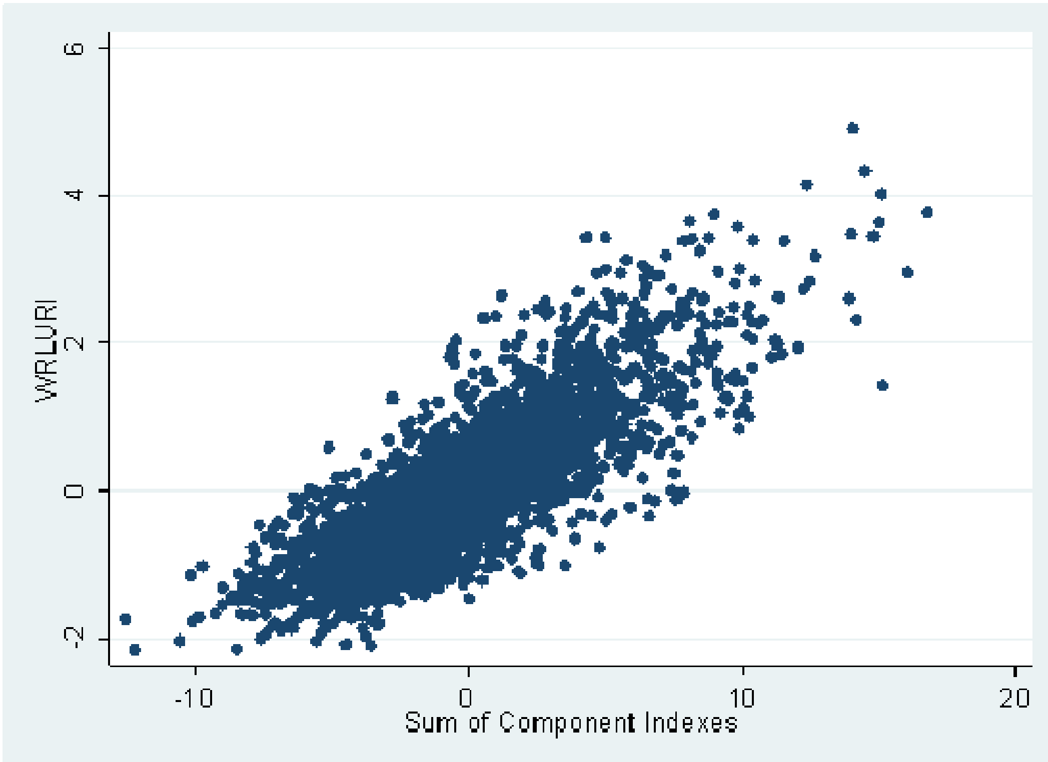
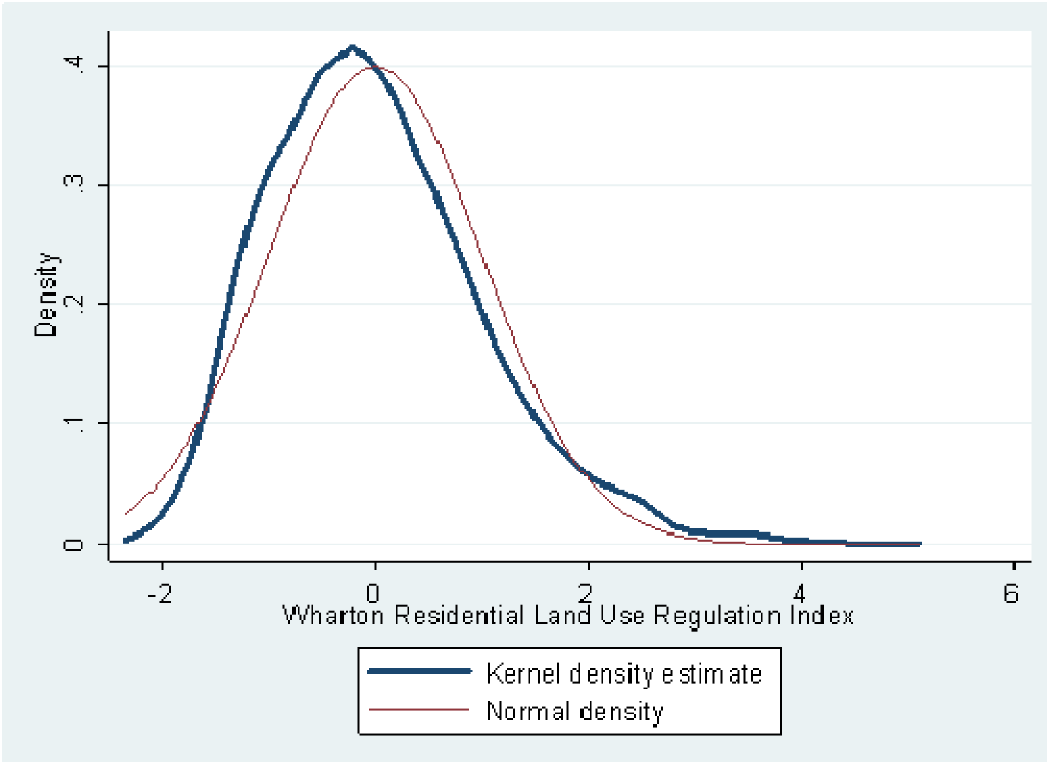


Figure 3: WRLURI Looks Approximately Gausian (kernel density)



APPENDIX 1 – THE SURVEY INSTRUMENT

Zell/Lurie Real Estate Center
Wharton School, University of Pennsylvania

SURVEY ON RESIDENTIAL LAND-USE REGULATION

JURISDICTION

Name of Jurisdiction ____ Zip Code___________

Type of Jurisdiction ____
(City, County, Township, Town, Village, Borough)

Size of Jurisdiction ________________ square miles

Population
Current population estimate ____________________
Population growth: Past 5 years __________ % Projected next 5 years __________ %

GENERAL CHARACTERISTICS OF LAND REGULATORY PROCESS

1. In your community, how involved are the following organizations in affecting residential building activities and/or growth management procedures? Please rate the importance of each on a scale of 1 to 5 by circling the appropiate number (1 = not at all involved; 5 = very involved).

- Local Council, Managers, Commissioners	1	2	3	4	5
- Community pressure	1	2	3	4	5
- County legislature	1	2	3	4	5
- State legislature	1	2	3	4	5
- Local courts	1	2	3	4	5
- State courts	1	2	3	4	5

2. Which of the following are required to approve zoning changes, and by what vote?

	Yes	Yes, by simple majority	Yes, by more than simple majority	No
- Local Planning commission				
- Local Zoning Board				
- Local Council, Managers, Commissioners				
- County Board of Commissioners				
- County Zoning Board				
- Environmental Review Board				

3. Which of the following are required to approve a new project that does not need rezoning, and by what vote?

	Yes	Yes, by simple majority	Yes, by more than simple majority	No
- Planning Commission				
- Local Council, Managers, Commissioners				
- County Board				
- Environmental Review Board				
- Public Health Office				
- Design Review Board				

4. On a scale of 1 to 5, please rate the importance of each of the following factors in regulating the rate of residential development in your community (1 = not at all important; 5 = very important). Please circle the appropriate number.

	Single Family Units						Multi Family Units				
- Supply of land	1	2	3	4	5		1	2	3	4	5
- Cost of new infrastructure	1	2	3	4	5		1	2	3	4	5
- Density restrictions	1	2	3	4	5		1	2	3	4	5
- Impact fees/exactions	1	2	3	4	5		1	2	3	4	5
- City budget constriants	1	2	3	4	5		1	2	3	4	5
- City Council opposition to growth	1	2	3	4	5		1	2	3	4	5
- Citizen opposition to growth	1	2	3	4	5		1	2	3	4	5
- School crowding	1	2	3	4	5		1	2	3	4	5
- Length of review process for zoning	1	2	3	4	5		1	2	3	4	5
- Length of review process for building permits	1	2	3	4	5		1	2	3	4	5
- Length of review process for land development plan	1	2	3	4	5		1	2	3	4	5

RULES OF RESIDENTIAL LAND USE REGULATION

5. Does your community place annual limits on the total allowable:

	Yes	No
- No. of building permits – single family?		
- No. of building permits – multi-family?		
- No. of residential units authorized for construction – single family?		
- No. of residential units authorized for construction – multi-family?		
- No. of multi-family dwellings?		
- No. of units in multi-family dwellings?		

6. To build, do developers have to meet these requirements?

	Yes	No
- Meet the minimum lot size requirement? If yes: ½ acre or more________ ½ acre or less _______ 1 acre or more ________ 2 acres or more _______		
- Include "affordable housing" (however defined)?		
- Supply mandatory dedication of space or open space (or fee in lieu of dedication)?		
- Pay allocable share of costs of infrastructure improvement?		

SPECIFIC CHARACTERISTICS

7. How does the acreage of land zoned for the following land uses compare to demand?

	Far more than demanded	More than demanded	About right	Less than demanded	Far less than demanded
- Single-family					
- Multi-family					
- Commercial					
- Industrial					

8. How much has the cost of lot development, including subdivisions, increased in the last 10 years? Please circle the appropriate category.

0-20% 21-40% 41-60% 61-80% 81-100% >100%

9. How much has the cost of a single family lot increased in the last 10 years? Please circle the appropriate category.

0-20% 21-40% 41-60% 61-80% 81-100% >100%

10. What is the current length of time required to complete the review of residential projects in your community?

For single-family units: _______ months For multi-family units: _______ months

11. Over the last 10 years, how did the length of time required to complete the review and approval of residential projects in your community change?

	no change	somewhat longer	considerably longer
- Single-family units			
- Multi-family units			

12. What is the typical amount of time between application for rezoning and issuance of a building permit for development of:

	Less than 3 mos.	3 to 6 mos.	7 to 12 mos.	13 to 24 mos.	If above 24, How long?
- Less than 50 single family units					
- 50 or more single family units					
- Multi-family units					

13. What is the typical amount of time between application for subdivision approval and the issuance of a building permit (assume proper zoning is already in place) for the development of:

	Less than 3 mos.	3 to 6 mos.	7 to 12 mos.	13 to 24 mos.	If above 24, How long?
- Less than 50 single family units					
- 50 or more single family units					
- Multi-family units					

14. How many applications for zoning changes were submitted in your community in the last 12 months?

____

15. How many applications for zoning changes were approved in your community in the last 12 months?

____

In the event we might need to clarify any of the answers to the above questions, we would appreciate the following information, which will be held in total confidence.

Name ____
Title ____
Organization ______________________________________
Address __________________________________
____
Phone____________________________
Fax _____________________________
E-mail ___________________________

Please check this box if you would like to receive the results of this survey. ☐

Thank you very much for taking the time to complete this survey.

June 2004

APPENDIX 2 – INDEX CONSTRUCTION DETAILS

INDEX	COMPONENT	VARIABLE LONG NAME	DEFINITION	CODE	SOURCE
LPPI	local	Local Council, Managers, Commissioners Involvement	The degree of involvement of the local council, managers, and commissioners in affecting the residential building activities and/or growth management procedures of a jurisdiction.	1 = not at all involved; 5 = very involved	Line item 1 of survey question 1
LPPI	pressure	Community Pressure Involvement	The degree of involvement of community pressure in affecting the residential building activities and/or growth management procedures of a jurisdiction.	1 = not at all involved; 5 = very involved	Line item 2 of survey question 1
LPPI	sfubudget	Importance of City Budget Constraints, Single Family	The importance placed on how a jurisdiction's budget constraints affect the rate of single family residential development.	1 = not at all important; 5 = very important	Line item 5 of survey question 4
LPPI	mfubudget	Importance of City Budget Constraints, Multi Family	The Importance placed on how a jurisdiction's budget constraints affect the rate of multi family residential development.	1 = not at all important; 5 = very important	Line item 5 of survey question 4
LPPI	sfucouncil	City Council Opposition to Growth Important, Single Family	The importance of a jurisdiction's city council opposing growth, to the amount that it affects the rate of single family residential development in that jurisdiction.	1 = not at all important; 5 = very important	Line item 6 of survey question 4
LPPI	mfucouncil	Importance of City Council Opposition to Growth, Multi Family	The importance of a jurisdiction's city council opposing growth, to the amount that it affects the rate of multi family residential development in that jurisdiction.	1 = not at all important; 5 = very important	Line item 6 of survey question 4
LPPI	sfucitizen	Importance of Citizen Opposition to Growth, Single Family	The importance placed on how citizen opposition to growth affects the rate of single family residential development in each jurisdiction.	1 = not at all important; 5 = very important	Line item 7 of survey question 4
LPPI	mfucitizen	Importance of Citizen Opposition to Growth, Multi Family	The importance placed on how citizen opposition to growth affects the rate of multi family residential development in each jurisdiction.	1 = not at all important; 5 = very important	Line item 7 of survey question 4

LPPI	sfuschool	Importance of School Crowding, Single Family	The importance of a jurisdiction's school crowding in regulating the rate of single family residential development.	1 = not at all important; 5 = very important	Line item 8 of survey question 4
LPPI	mfuschool	Importance of School Crowding, Multi Family	The importance of a jurisdiction's school crowding in regulating the rate of multi family residential development.	1 = not at all important; 5 = very important	Line item 8 of survey question 4
LPPI	totinitiatives	Total # of Conservation Initiatives Approved	Number of ballot initiative passed by the jurisdiction from 1996 to 2005.		Trust for the Public Land, Landvote database http://www.tpl.org/tier2_kad.cfm?content_item_id=0&folder_id=2607 Accessed on July 26, 2005
LPPI=STANDARDIZED{STANDARDIZED[*local+pressure+countyleg+(sfubudget+mfubudget)/2+(sfucouncil+mfucouncil)/2+(sfucitizen+mfucitizen)/2+(sfuschool+mfuschool)/2*]+STANDARDIZED[*totinitiatives*]}					
SPII	stateleg	State Legislature Involvement (STATE AVERAGE)	The degree of involvement of the state legislature in affecting the residential building activities and/or growth management procedures of a jurisdiction.	1 = not at all involved; 5 = very involved	Line item 4 of survey question 1
SPII	execrating	Executive and Legislative Rating	The level of activity in the Executive and Legislative branches over the past ten years that is directed toward enacting greater statewide land use restrictions.	Code: 1 = little recent activity, 2 = moderate activity, 3 = high level of activity	Foster and Summers (2005)
SII=STANDARDIZED{STANDARDIZED[STATE AVERAGE{*stateleg*}]+STANDARDIZED[*execrating*]}					
CII	judicialrating	Judicial Rating	The tendency of appellate courts to uphold or restrain municipal land use regulation.	1 = restricts local regulation, 2 = neutral, 3 = supports local regulation	Foster, and Summers (2005)

LZAI	commissionD	Local Planning Commission Required to Approve Zoning Changes	The requirement that a local planning commission review and approve a new project that entails rezoning.	0 = not required, 1 = required	Line item 1 of survey question 2
LZAI	loczoningD	Local Zoning Board Required to Approve Zoning Changes	The requirement that a local zoning board review and approve a new project that entails rezoning.	0 = not required, 1 = required	Line item 2 of survey question 2
LZAI	councilD	Local Council, Managers, Commissioners Required to Approve Zoning Changes	The requirement that local council, managers, or commissioners review and approve a new project that entails rezoning.	0 = not required, 1 = required	Line item 3 of survey question 2
LZAI	cntyboarD	County Board of Commissioners Required to Approve Zoning Changes	The requirement that the county board of commissioners review and approve a new project that entails rezoning.	0 = not required, 1 = required	Line item 4 of survey question 2
LZAI	cntyzoning	County Zoning Board Required to Approve Zoning Changes	The requirement that the county zoning board review and approve a new project that entails rezoning.	0 = not required, 1 = required	Line item 5 of survey question 2
LZAI	envboarD	Environmental Review Board Required to Approve Zoning Changes	The requirement that an environmental review board approve a new project that entails rezoning.	0 = not required, 1 = required	Line item 6 of survey question 2
LZAI	zonevote	Town Meeting Vote Required to Approve Zoning Changes	The requirement that all new projects that entail rezoning be voted on at a meeting of the jurisdiction's citizens	0 = not required, 1 = required	Survey response write-in for question 2
LZAI=*commissionD+loczoningD+councilD+cntyboardD+cntyzoningD+envboardD+zonevote*					
LPAI	commission_norezD	Local Planning Commission Required to Approve New Projects	The requirement that a local planning commission review and approve a new project that does not need rezoning.	0 = not required, 1 = required	Line item 1 of survey question 3
LPAI	council_norezD	Local Council, Managers, Commissioners Required to Approve New Projects	The requirement that local council, managers, or commissioners review and approve a new project that does not need rezoning.	0 = not required, 1 = required	Line item 2 of survey question 3
LPAI	cntyboard_norezD	County Board of Commissioners Required to Approve New Projects	The requirement that the county board review and approve a new project that does not need rezoning.	0 = not required, 1 = required	Line item 3 of survey question 3

LPAI	envboard_norezD	Environmental Review Board Required to Approve New Projects	The requirement that an environmental review board approve a new project that does not need rezoning.	0 = not required, 1 = required	Line item 4 of survey question 3
LPAI	publhlth_norezD	Public Health Office Required to Approve New Projects	The requirement that the public health office review and approve a new project that does not need rezoning.	0 = not required, 1 = required	Line item 5 of survey question 3
LPAI	dsgnrev_norezD	Design Review Board Required to Approve New Projects	The requirement that a design review board approve a new project that does not need rezoning.	0 = not required, 1 = required	Line item 6 of survey question 3
LPAI=*commission_norezD+council_norezD+cntyboard_norezD+envboard_norezD+publhlth_norezD+dsgnrev_norezD*					
SRI	sfupermitlimit	Limits on Building Permits, Single Family	Annual limit on the total allowable number of building permits for single family homes.	0 = no, 1 = yes	Line item 1 of survey question 5
SRI	mfupermitlimit	Limits on Building Permits, Multi Family	Annual limit on the total allowable number of building permits for multi family homes.	0 = no, 1 = yes	Line item 2 of survey question 5
SRI	sfuconstrlimit	Limits on Residential Units for Construction, Single Family	Annual limit on the total allowable number of single family residential units authorized for construction.	0 = no, 1 = yes	Line item 3 of survey question 5
SRI	mfuconstrlimit	Limits on Residential Units for Construction, Multi Family	Annual limit on the total allowable number of multi family residential units authorized for construction.	0 = no, 1 = yes	Line item 4 of survey question 5
SRI	sfudwelllimit	Limits on Number of Units in Multi Family Dwellings	Annual limit on the number of single family dwellings.	0 = no, 1 = yes	Line item 5 of survey question 5
SRI	mfudwelllimit	Limits on Multi Family Dwellings	Annual limit on the number of multi family dwellings.	0 = no, 1 = yes	Line item 6 of survey question 5
SRI=*sfupermitlimit+mfupermitlimit+sfuconstrlimit+mfuconstrlimit+mfudwelllimit+mfudwellunitlimit*					
DRI	minlotsize_oneacre	Minimum Lot Size 1 Acre or More	The requirement that developers build on lots no smaller than an area of 1 acre to 2 acres.	0 = no, 1 = yes	Line item 1 of survey question 6

DRI	minlotsize_twoacres	Minimum Lot Size 2 Acres or More	The requirement that developers build on lots no smaller than an area of 2 acres or more.	0 = no, 1 = yes	Line item 1 of survey question 6
DRI=*1 if minlotsize_oneacre=1 or minlotsize_twoacres==1*					
DRI=*0 otherwise*					
LAI	LAI	Local Assembly Index	Dummy variable indicating if a local assembly (Town Meeting) is involved in land regulation process	1= Town Meeting required to approve zoning changes, 0= otherwise	Post-survey phone interviews to all municipalities in our sample located in New England
OSI	OSI	Supply Open Space	Response indicating that developers are required to supply mandatory dedication of open space, or open space, or a fee in lieu of dedication in order to build.	0 = no, 1 = yes	Line item 3 of survey question 6
EI	EI	Pay Costs of Improvement	Response indicating that developers are required to pay allocable share of costs of infrastructure improvement in order to build.	0 = no, 1 = yes	Line item 4 of survey question 6
ADI	time_sfu	Length of Residential Review, Single Family	The average length of time required to complete the review of single family residential projects in a jurisdiction.		Line item 1 of survey question 11
ADI	time_mfu	Length of Residential Review, Multi Family	The average length of time required to complete the review of multi family residential projects in a jurisdiction.		Line item 2 of survey question 11
ADI	time1_150sfu	Rezoning Application Time, Less Than 50 Single Family Units	The typical amount of time between application for rezoning and issuance of a building permit for a project with less than 50 single family units.	1.5 = less than 3 months, 4.5 = 3 to 6 months, 9.5 = 7 to 12 months, 18.5 = 13 to 24 months, 24 = more than 24 months	Line item 1 of survey question 12

ADI	time1_m50sfu	Rezoning Application Time, More Than 50 Single Family Units	The typical amount of time between application for rezoning and issuance of a building permit for a project with more than 50 single family units.	1.5 = less than 3 months, 4.5 = 3 to 6 months, 9.5 = 7 to 12 months, 18.5 = 13 to 24 months, 24 = more than 24 months	Line item 2 of survey question 12
ADI	time1_mfu	Rezoning Application Time, Multi Family Units	The typical amount of time between application for rezoning and issuance of a building permit for a project with multi family units.	1.5 = less than 3 months, 4.5 = 3 to 6 months, 9.5 = 7 to 12 months, 18.5 = 13 to 24 months, 24 = more than 24 months	Line item 3 of survey question 12
ADI	time2_150sfu	Subdivision Approval Time, Less Than 50 Single Family Units	The typical amount of time between application for subdivision approval and the issuance of a building permit for a project with less than 50 single family units.	1.5 = less than 3 months, 4.5 = 3 to 6 months, 9.5 = 7 to 12 months, 18.5 = 13 to 24 months, 24 = more than 24 months	Line item 1 of survey question 13
ADI	time2_m50sfu	Subdivision Approval Time, More Than 50 Single Family Units	The typical amount of time between application for subdivision approval and the issuance of a building permit for a project with more than 50 single family units.	1.5 = less than 3 months, 4.5 = 3 to 6 months, 9.5 = 7 to 12 months, 18.5 = 13 to 24 months, 24 = more than 24 months	Line item 2 of survey question 13
ADI	time2_mfu	Subdivision Approval Time, Multi Family Units	The typical amount of time between application for subdivision approval and the issuance of a building permit for a project with multi family units.	1.5 = less than 3 months, 4.5 = 3 to 6 months, 9.5 = 7 to 12 months, 18.5 = 13 to 24 months, 24 = more than 24 months	Line item 3 of survey question 13
ADI=*[(time_sfu+time_mfu)/2+(time1_l50sfu+time1_m50sfu+time1_mfu)/3+(time2_l50sfu+ time2_m50sfu+time2_mfu)/3]/3*					