

The Effects of Inclusionary Zoning on
Local Housing Markets:
Lessons from the San Francisco,
Washington DC and Suburban
Boston areas

WORKING PAPER 07-05

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November 19, 2007

Abstract

Many local governments in metropolitan areas with high housing costs are adopting inclusionary zoning (IZ) as a means of producing housing that is affordable to low- and moderate-income households without direct public subsidies. Critics charge that IZ ordinances impose additional costs on new development and may lead to reductions in supply and increases in the price of market rate housing. Advocates of IZ argue that any negative effects IZ might have on production can be mitigated through density bonuses or other cost offsets. Rigorous empirical study of the effects of inclusionary zoning ordinances has been hampered by the lack of accurate, timely data describing IZ and the land use regulatory schemes in which IZ programs fit. In this paper, we use panel data on the adoption and characteristics of IZ in the San Francisco and Washington DC metropolitan areas and the Boston-area suburbs to analyze which jurisdictions adopt IZ, how much affordable housing the programs produce and the effects of IZ on the prices and production of market-rate housing. The IZ programs among our sample jurisdictions are complex policies and exhibit considerable variation in their design, particularly across the three regions. We find that larger, more highly educated jurisdictions and those surrounded by more neighbors with IZ are more likely to adopt IZ. Whether and how many affordable units are produced under IZ depends primarily on the length of time IZ has been in place. The results from Boston-area suburbs provide some evidence that IZ has contributed to increased housing prices and lower rates of housing production. There is no evidence that IZ has constrained supply or increased prices among Bay Area jurisdictions. Limitations on the availability and quality of our data suggest that our results should be interpreted cautiously, but also suggest that IZ programs should be designed cautiously to mitigate possible negative impacts on housing supply.

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Acknowledgements

This research was made possible by the financial support of the Center for Housing Policy. We have received invaluable suggestions from Jeffrey Lubell and from the members of our advisory committee, listed below. In addition we would like to thank Ryan Downer, Michele Chirco, Andrew Dansker, Peter Madden, Carissa Mann and Yvonne Martinez for providing excellent research assistance. Joe Gyorko and Raven Saks generously provided historical data on building permits. Participants in the NYU School of Law faculty brownbag also contributed comments and expertise. Any views and opinions expressed are those of the authors and do not necessarily reflect the views of the funders, the Center for Housing Policy, or the advisory panel. All errors or omissions are wholly the responsibility of the authors.

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Section 1: Introduction

Rising housing prices and rents in many metropolitan areas over the past decade have drawn the attention of policymakers, housing advocates, the media and academics alike. Although the causes of price inflation may differ by location, there is considerable evidence that in some parts of the country, restrictive zoning and other land use regulations have contributed to higher housing prices (see, for example, Fischel 1990, Glaeser, Gyourko and Saks 2005, Malpezzi and Green 1996, Malpezzi 1996, Pollakowski and Wachter 1990, Quigley and Rafael 2004). Faced with rapidly rising prices of market-rate housing, stagnant real incomes for many households, and limited availability of federal or state subsidies, local governments are actively seeking new policy tools to help low- and moderate-income households afford housing. One increasingly popular policy is local inclusionary zoning (sometimes called inclusionary housing or incentive zoning). Inclusionary zoning (IZ) programs either require developers to make a certain percentage of the units within their market-rate residential developments (or in some cases, off-site) available at prices or rents that are affordable to specified income groups, or offer incentives to encourage them to do so. Despite the growing popularity of IZ among policymakers, there has been almost no empirical research on effects of these programs, either about how much affordable housing they actually produce, or about their broader impacts on the price and quantity of market-rate housing. This study seeks to fill this gap in the literature by examining IZ programs in three metropolitan areas in which IZ is relatively widespread and of long duration: San Francisco, Washington DC and the Boston-area suburbs.

IZ has become a controversial topic, with avid supporters and critics. Many economists and developers believe that IZ imposes additional costs on new residential development, and as such predict that it will constrain the supply and increase the price of housing in jurisdictions that adopt it. Affordable housing advocates counter that IZ can be an effective means of producing below-market rate units that would not otherwise be produced and that, unlike traditional affordable housing programs, it does not require direct public subsidies and produces affordable units in a geographically dispersed pattern. Due in large part to the paucity of data describing IZ programs, very little objective empirical research has been done to test the validity of any of these claims. Most of the existing studies are descriptive case studies that are not methodologically suited to identify the effects of the policies, and many studies reflect strong ideological biases on the part on the authors. This study attempts to provide unbiased, methodologically rigorous tests of the effects of IZ, using the best data currently available.

In this study, we present both theoretical models and empirical evidence of the effects of IZ on local housing markets. The theoretical models illustrate how characteristics of IZ programs, such as mandatory status and cost offsets, alter the size of the regulatory cost imposed by IZ and thereby change the magnitude of impacts on housing prices and supply, as well as the amount of affordable housing production. For the empirical research, we assemble panel data sets for each of the three metropolitan areas. The data sets include characteristics of IZ programs derived from several surveys of local IZ programs, housing prices, new residential construction permits and standard determinants of housing market supply and demand (such as the demographics of the population). In the Suburban Boston area, we also have data on the adoption of other types of land use regulations. We present descriptive statistics that illustrate the complexity and variation of IZ programs both within and across the three regions. For the Boston suburbs and

San Francisco area, we conduct regression analysis on three research questions: what characteristics of jurisdictions affect the probability that they will adopt IZ, what program and market characteristics affect the production of affordable housing under IZ, and how do IZ programs affect the price and production of market rate housing. Given the small number of jurisdictions in the Washington DC area, we are unable to conduct regression analyses but present descriptive statistics on the same research questions.

The empirical analysis reveals a number of interesting patterns in the adoption of IZ across the three metropolitan areas. Jurisdictions that adopt IZ are larger and more affluent than those that do not. Those whose neighbors have IZ are more likely to adopt it as well. Results from Suburban Boston, the only region for which data are available on other types of land use regulations, suggest that adopting IZ is positively correlated with the presence of several other regulations, particularly cluster zoning and growth management. The analysis further reveals that, perhaps not surprisingly, the jurisdictions in which IZ has been in place for a longer period of time have produced more affordable housing under their programs. The San Francisco results also suggest that more flexible programs have produced more affordable units. The results regarding the effects IZ programs have on housing permits and prices are somewhat mixed. The results from Boston-area suburbs suggest that IZ may be constraining housing production and that prices tend to be higher in jurisdictions with IZ. The results from San Francisco do not demonstrate significant effects of IZ on production or prices. Limitations on the availability and quality of data suggest that all results should be interpreted cautiously. Unfortunately, the small number of observations, heterogeneity of the counties with IZ and large initial differences between treatment and control groups make it infeasible to test for statistically significant impacts of IZ on DC area housing markets. Despite these constraints, this study makes valuable contributions to the policy community by identifying theoretical models within which to consider the effects of IZ, and by cataloguing the experience of IZ programs in our three study areas.

The remainder of this study is organized as follows. Section 2 lays out theoretical predictions for the impacts of several stylized models of IZ on housing production and prices; Section 3 summarizes previous empirical research; Section 4 reviews the state legal environments for our study areas and presents descriptive statistics on IZ programs in each region; Section 5 examines some of the challenges to the empirical analysis; Section 6 discusses our empirical strategy and describes our data; Section 7 presents findings of regression analysis; and Section 8 offers policy implications and concludes.

Section 2: What are the predicted impacts of IZ on housing supply?

Standard economic analysis treats IZ – like impact fees and various other forms of land use regulation – as essentially a tax on new residential development. This does not mean that mandatory IZ programs are taxes from a legal perspective; most courts and commentators believe that they are not. Moreover, at least in theory mandatory IZ programs could be designed so that compliance does not reduce developers’ profits, relative to the policy environment prior to their adoption; by including strong density bonuses or other cost offsets, IZ policies could result in equal or even greater profits for the developer relative to prior practice. But even in these circumstances, economists would still analyze IZ policies as a “tax” because they impose constraints on property owners’ use of their land in order to advance a public purpose. In this respect, numerous common land use and building regulations, including conventional zoning requirements, environmental regulations and the Uniform Building Code, are analyzed as “taxes.” Economists sometimes refer to the net impact of a tax – for example, the cost of complying with a mandatory IZ policy less the value of the cost offsets – as the “effective tax” level.

Within the economic framework, taxes may either increase or decrease overall social welfare, depending on whether they address externalities or other market failures. For instance, the traditional justification for many land use regulations is that they cause developers and new residents to internalize the costs that new development will impose on neighbors, such as the loss of light caused by a tall building or additional traffic congestion from increased population. Mandatory IZ programs that require a developer to produce units that the developer would not have built in the absence of the policy, or pay a fee in lieu of the additional units, are therefore regarded as a tax on development (Been 1991, Clapp 1981, Ellickson 1981). Voluntary IZ programs that offer incentives for developers to participate would be regarded as an implicit subsidy. Typically, economists seek to answer two main questions about the effects of taxes or subsidies: what is the size of the tax and how are costs distributed among parties. The relative elasticities of housing supply and demand will determine how much of the costs that a tax on housing imposes will be born by developers and landowners compared to homebuyers and renters. Besides the usual determinants of housing markets (such as population characteristics, local amenities and services, land availability and construction costs), these elasticities will reflect the type, stringency and mix of land use regulations, including the presence and structure of inclusionary zoning.

IZ ordinances can be structured in an almost infinite number of ways, but there are four primary dimensions along which they vary. Programs may be mandatory or voluntary; they may grant exemptions to certain projects or types of development; they may offer density bonuses or other cost offsets; and they may provide developers with buyout options (alternatives to building affordable units on site). To illustrate how variation along each of these dimensions can affect the price and quantity of market rate housing, in this section we discuss predicted impacts of several stylized models of IZ, summarized in Table 2.1.¹ We also consider the impact of a few other program characteristics, namely the required share of affordable units, the depth of income

¹ Localities may adopt IZ in expectation of broader economic, political or social impacts, such as encouraging economic development or fulfilling state regulatory obligations. However, analyzing the costs or benefits of IZ beyond the impacts on housing markets is outside the scope of this study.

targeting and the length of affordability restrictions. In Section 4, we describe the actual content of IZ programs in our three study areas and the extent to which they reflect the stylized models presented in this section.

For all of the theoretical models presented, we consider the actions of three parties: households entering the market, developers and landowners. Landowners are assumed to own undeveloped land at a given point in time, and will either sell their property to developers or continue to hold it, based on current and future expectations of land prices. Developers choose whether to purchase and develop a given parcel of land based on the net expected returns of development.² Households choose whether to buy or rent a given housing unit in the jurisdiction. The housing market is assumed to be competitive, so all individual buyers and sellers are price takers and developers earn zero economic profits.³ Housing prices and rents vary across different quality segments (standard and luxury, for instance). Both developers and households can move to other jurisdictions, as in standard open-city models, but incur some transactions costs in doing so. For developers, these costs arise from becoming familiar with any differences in the development process, regulations or municipal staff. On the household side, transaction costs are most relevant for current homeowners who wish to change housing units within the jurisdiction and for renters. At any given time, the costs of non-land components of development (labor and materials) are fixed. Land use and development regulations are assumed to be static with the exception of IZ. We also assume that the maximum density allowed under baseline conventional zoning (without IZ) is less than the profit-maximizing density (this assumption is necessary for density bonuses to have any effect).⁴ Relaxing this assumption for IZ without density bonus should not alter the predictions of the models.

Model 1: Most stringent IZ – mandatory, no exemptions, buyout options or offsets

The most stringent form of IZ based on the four dimensions considered is a mandatory program with no exemptions, buyout options or cost offsets.⁵ Any residential development triggers a requirement to produce a specified share of units that will be sold or rented at a set price/rent that

² For simplicity, in our models we assume that developers are also homebuilders; the mechanics may differ if land development and housing production are conducted by separate entities.

³ Vandell (2003) analyzes IZ in the context of a “quasi-competitive” market, acknowledging that market imperfections may occur; however, he does state that for the mainstream market (including the affordable market), prices, rents and profits tend to reflect competitive conditions (see E. Olsen, 1969, “A Competitive Theory of the Housing Market,” *American Economic Review*, 59 (4): 612-621, for a larger discussion of the housing market in a perfectly competitive context). Relaxing the assumption of zero economic profits may imply that developers have a higher threshold for absorbing costs before deciding to relocate to another jurisdiction, but does not fundamentally alter the intuition of the models presented here.

⁴ According to the standard model of residential density, consumers’ willingness to pay for a given housing unit is decreasing in density (FAR), while construction costs increase with FAR, implying that per-unit profits are decreasing in density. However, land values and total profits are increasing in density up to some point, as the revenues from additional units built on a given size parcel offset the decrease in per-unit price; the point at which land values begin to decline is the optimal FAR (Wheaton and DiPasquale 1996).

⁵ Our dataset does not include IZ programs that meet these criteria, perhaps because jurisdictions do not want to litigate whether a mandatory requirement without cost offsets or buyout options would be an unconstitutional taking. This model is presented solely for the purpose of illustrating theoretical impacts. More than 20 mandatory IZ programs in Massachusetts do not offer density bonuses, but most either offer buyout options (see Wellesley for an example), are written to apply in fairly limited circumstances (Beverly applies only to reuse of municipal buildings), or offer other cost offsets (Arlington offers a reduction in the number of required parking spaces). Examples of California programs that do not specify a density bonus include Alameda and Watsonville.

is below the market price/rent for that unit. Affordable units must be of equal quality to market rate units, implying that the per-unit development cost of affordable and market-rate units are identical, and affordability restrictions are assumed to be permanent (in that resale prices or future rent increases are limited to adjustments tied to inflation or other index).⁶ We also assume that IZ imposes no implementation or procedural costs.

Compared to an identical scenario without mandatory IZ, the adoption of this type of IZ policy implies that developers would lose revenues on the affordable units and thus earn lower profits. However, because developers have an exit option and are assumed to be earning zero profits initially, they will presumably choose not to build unless they are able to offset their lost revenues, either by raising prices on market-rate units or paying lower prices for land (the only variable-cost input). The extent to which a developer can raise prices on constant-quality market-rate units will depend on a number of factors, including the relative elasticities of supply and demand (discussed in more detail below) and whether alternatives to the development (other residential or non-residential developments) are taxed. In some cases a developer may choose to build the market-rate units at a higher quality point in order to charge higher prices; this could yield a development combining luxury and below-market-rate units. In either case, because fewer households are willing or able to pay for higher priced units, this implies lower numbers of units produced, both for an individual developer and in the aggregate. Because both developers and households are mobile (although they incur some transaction costs of moving), some of the IZ tax will likely be capitalized into decreased values of residential land. At lower prices, fewer landowners will be willing to sell, so lower land prices also imply lower levels of housing production. In the long run, land may be rezoned from residential to commercial or other use types with lower effective tax rates. By acting as a constraint on new supply, this type of IZ policy is likely to increase the prices of existing housing in the jurisdiction as well the price of new units constructed. If the municipality has been pricing property taxes to cover the marginal cost of additional public services, and the use of public services by residents in the affordable units exceeds the tax revenues generated, it is also possible that the creation of affordable units will result in net fiscal cost to municipality. There could also be impacts on the growth pattern of the regional housing market, if development is diverted away from a jurisdiction with IZ to less regulated municipalities (Shen 1996; Vandell 2003).

Figure 1 shows a simple graph comparing housing market outcomes under this stylized model of a relatively stringent IZ policy to the same market and regulatory regime without IZ; by imposing an implicit tax on housing production, the price paid by consumers for new and existing housing will be higher than the untaxed price ($P_C > P^*$), the price received by developers will be lower than before ($P_P < P^*$), and the number of housing units produced will be lower ($Q_{IZ} < Q^*$).⁷ We also would expect to see lower prices for undeveloped residentially zoned land (not shown). Developers will still earn zero profits, but some firms likely will exit the market. The policy should result in some production of below-market rate units, as long as some level of

⁶ We do not have systematic data on how many jurisdictions allow affordable units to differ in size and quality from market rate units; at least some jurisdictions require close comparability (for instance, Cambridge and Newton in Massachusetts, East Palo Alto and San Mateo in California, and Loudon County, VA). In locations where the price/rent spread between market-rate and affordable units is relatively small, there is less incentive to have large quality differences between the units. In reality the resale restrictions on affordable owner-occupied units under most IZ programs are far more complicated; tying resale prices to general inflation is offered here for simplicity.

⁷ IZ is shown as a nominal tax of supply, but the results will be identical for a tax imposed nominally on demand.

new residential development continues. Because the number of affordable units is set as a share of the total development, the greater the decrease in the number of market-rate units produced as a result of IZ, the fewer affordable units will be developed.

The size and incidence of these impacts will depend on a variety of factors, particularly the size of the IZ tax, relative elasticities of housing supply and demand, and the prevalence of IZ (or other affordable housing production programs) in neighboring jurisdictions. The ways in which IZ programs are structured affect the size of the IZ tax; three common components defined by many IZ programs are the share of units that must be designated as affordable, the income of targeted populations and the length of affordability restrictions. The effective size of the tax will increase as the required share of affordable units increases. The lower the income of the target population, the larger the difference will be between prevailing market prices and specified affordable prices, also increasing the size of the tax. The length of affordability restrictions may have somewhat different impacts depending on whether the program primarily affects rental or owner-occupied units. For rental units, longer restrictions reduce the expected value of future income and so increase the size of the tax. For owner-occupied units, the effect is more complicated, since it depends further on the type of restrictions placed on resale prices and the degree to which owners are allowed to retain profits. In general, we assume that longer periods of cost restrictions are more restrictive. As can be inferred from Figure 1, the larger the size of the IZ tax (the larger the shift between S_{IZ} and S_0), the greater the impact will be on housing prices and production.

As with all taxes, the incidence will depend on the relative elasticities of supply and demand. The elasticity of supply depends on standard supply-side variables, such as physical or regulatory constraints on developable land, the relative cost of non-residential development, including relative land costs, zoning, and the appropriateness of location (Clapp 1981, Katz & Rosen 1987). Any factors that reduce the relative cost of non-residential development will increase the likelihood that an IZ program will cause landowners and developers to shift away from residential uses, so that the burden of IZ will fall more on homebuyers (or renters). The elasticity of demand will depend on income and preferences of new households, particularly their willingness to pay to live in a particular jurisdiction. Location-specific amenities or institutions may increase willingness to pay the higher taxes imposed by IZ (Ellickson 1981). For instance, two of the jurisdictions in our sample with mandatory IZ programs are Palo Alto and Cambridge; the presence of relatively immobile academic institutions whose students and faculty place a premium on proximity to the university, along with closely related private-sector firms, may result in relatively inelastic demand for those jurisdictions. Figure 2 illustrates the effect of imposing this type of IZ policy on housing markets with inelastic demand. The size of the IZ tax is the same as in Figure 1, but the decrease in quantity ($Q^* - Q_{IZ}$) is much smaller than in the previous graph. From the same initial price (P^*), the price paid by consumers rises by more than in the previous graph, and the price increase to consumers is much larger than the price decrease to developers. That is, if demand is relatively inelastic, developers can pass along cost increases to consumers and decrease production by relatively little. It is unclear how many jurisdictions, beyond the examples given, have such inelastic demand that they can absorb IZ with little decrease in production. In general, anything that decreases the price or increases the attractiveness of nearby jurisdictions will decrease households' willingness to bear taxes and shift the burden towards landowners and developers. Conversely, if supply is relatively inelastic

(for instance, developers would face high barriers to transferring business to other locations), then more of the costs of IZ will be borne by developers than consumers.

IZ could have a direct impact on buyer willingness to pay, if the policy decreases or increases the relative attractiveness of the jurisdiction (Dietderich 1997). This could include changing the level of congestion, altering the social or economic mix of households, or shifting the overall reputation of the community. The direction of these effects is likely to vary across jurisdictions; some communities may resent a perceived decline in exclusivity while others may cherish their reputations as politically or socially progressive areas. Moreover, there are likely to be spillover effects from surrounding jurisdictions; the prevalence of IZ (or other affordable housing production programs) in neighboring jurisdictions will affect the ability of both developers and households to substitute away from jurisdictions with IZ.

Model 2: Mandatory with exemptions

A less stringent form of IZ is a mandatory program that contains exemptions for certain projects (but no cost offsets or buyout options). The most common exemption is based on the size of the development; nearly all IZ programs exclude very small projects (such as those under 10 units, although the baseline size varies considerably across jurisdictions). Sometimes other exemptions are available for owner-occupied housing, or for developments in areas with surplus capacity in existing infrastructure (Brown 2001). Ordinances provide a variety of rationales for these exemptions; exemptions for small projects generally reflect a perception that because the costs of IZ would be spread across a small number of units, the requirement could make the entire development financially infeasible. Some ordinances do not set specific criteria for exemptions, but contain language that provides for exceptions if including affordable units would make the project “financially or physically infeasible” (Brown 2001).

The greater the number of residential projects that are exempted from IZ, the less stringent the program will be, and the smaller the size of the effective tax, compared to a program with no exemptions. This implies both that the negative effects of IZ described under the most stringent model (increased housing prices for new and existing housing, reduced residential land values, reduced or displaced market-rate construction) will be mitigated and that fewer affordable units will be produced. Some types of exemptions are likely to encourage gaming by developers (or rent-seeking by landowners). For instance, if the minimum project size is set at 50 units, we would expect to see clusters of proposals for 49 unit developments. Such gaming may be welfare-decreasing if the ineligible projects are less efficient (for instance, have higher per-unit costs) than eligible projects. Or if owner-occupied units are exempt, we might expect to see more development of owner-occupied housing (and less development of rental housing). Exempting some classes of developments from IZ, particularly based on underlying zoning or infrastructure, may also result in greater spatial concentration of affordable units than those produced under IZ programs without such exemptions.

Model 3: Mandatory with cost offsets

Another alternative model for IZ that is less stringent than Model 1 is a mandatory program that offers some type of cost offset to the developer, in exchange for the developer’s building below-

market rate units⁸. Two of the most common cost offsets are density bonuses and fast-track permitting.

Density bonuses are the cost offset most frequently used in conjunction with inclusionary zoning. Developers are allowed to build a larger number of units on a given parcel than would be allowed under conventional zoning.⁹ The bonus essentially lowers the average development costs by allowing developers to spread a constant amount of land costs over a larger number of units. It also allows the developer to sell, and potentially earn profit on, a larger number of units. The larger the number of additional units allowed under the density bonus, the greater the offsetting profit for the developer and the smaller the effective tax imposed by IZ, compared to a program with no density bonus. Indeed, it is possible for the effective tax to be zero or even negative, if the extra profits provided by the offsets equals or exceeds the lost revenues on the affordable units. The size of the tax reduction implied by a density bonus depends on the share of total development costs comprised by land costs and the marginal price of the additional units. The value of a density bonus will be greater in locations with relatively expensive land or with relatively low-density conventional zoning, or if the additional units command a high marginal price (because, for instance, they are higher penthouse units with more desirable views).

Another cost offset sometimes included in IZ ordinances is fast-track permitting, or an assurance that projects subject to affordable requirements will face reduced time or costs of permitting, compared to other development proposals (non-residential projects, or ineligible residential ones if IZ includes exemptions). Fast-track permitting reduces the transactions costs of obtaining necessary permits, including labor and carrying costs, and so reduces the size of the IZ tax. The extent to which fast-tracking reduces the size of the IZ tax depends on the cost of conventional permitting and the relative reduction in those costs; in jurisdictions with relatively quick and straightforward permitting, fast-tracking is presumably less valuable to developers.

In a closely related form of cost offset, jurisdictions that grant permits through competitive bidding systems may grant preferences to developments subject to IZ. Such bidding systems are common in jurisdictions with building permit caps or other growth controls. The extent to which such a preference will reduce the size of the IZ tax will depend upon how much faster projects with the preference are granted permits, and how much cost saving results from those faster approvals.

Besides density bonuses or fast-tracking, municipalities theoretically can offset any cost of development that is within their control. Possibilities include reducing or waiving out-of-pocket development fees or charges to hook up units to public sewer or water systems, reducing the required number of parking spaces per unit, or waiving landscaping or open space requirements.

⁸ Cost offsets may be used instead of, or in addition to, the exemptions described in model 2. Since the stringency of IZ with exemptions and with cost offsets varies greatly depending on the details of the program, it is impossible to determine in the abstract the relative stringency of models 2 and 3. Rather, the discussion of predicted impacts is in comparison to the most stringent version presented in model 1.

⁹ For a density bonus to be relevant, we assume that the maximum density allowed under conventional zoning is less than the profit-maximizing density under aggregate demand and individual cost functions; that is, conventional zoning is a binding constraint. For the moment, we also assume that developers can actually build the bonus units granted without restriction by other regulations, such as height caps. In Section 5 we discuss whether this assumption is realistic.

The implications to the municipality of granting these cost offsets vary depending on whether the conventional fees are efficiently priced or whether the regulation at issue is efficiently designed and implemented. For instance, if municipalities have priced water and sewer hook-up fees at the marginal cost of providing services to those units, then waiving the fees implies that either the quality of those services will decline or the municipality will have to raise the lost revenues through alternate means. Alternatively, if the standard costs of development exceed marginal costs – for instance, development fees are set artificially high to discourage development – then the costs offset may not represent an efficiency loss, although they will still be a net fiscal loss to the municipality. In general, the higher the costs of conventional development, the greater the potential that the cost of IZ can be reduced by offering cost offsets.

Providing cost offsets to developers who provide affordable housing will reduce the size of the IZ tax, relative to the most stringent model of IZ. The amount of the reduction will depend on the stringency of the IZ program, discussed above, and the value to developers of the offset granted. If the cost offsets granted under IZ are less than costs to developers of producing affordable units, then there may still be an increase in prices for new and existing market-rate housing, decrease in residential land values and decrease in production of market-rate units, relative to no IZ. A jurisdiction could offer cost offsets equal in value to the additional costs imposed on developers by IZ; in this case, the effect on production would be minimal or non-existent (Clapp 1981, Dietderich 1997). Larger cost offsets imply a smaller reduction in the production of market-rate housing and greater production of affordable units, relative to Model 1. However, depending on the nature of the offset, it is possible that even if the cost offsets exactly equal the costs of IZ to the developer, the subsidy to the developer would impose costs on other parties, for instance requiring an increase in other municipal revenues or reduction in the quality of public services.

Model 4: Mandatory with buyout options

A third variation on IZ that is less stringent than Model 1 is a mandatory program that provides developers with alternatives to building affordable units on site. The most commonly granted alternatives are permission to produce the required affordable units at a different location within the jurisdiction, paying cash in lieu of development, or donating land intended for future affordable housing. We assume that if developers pay cash or donate land, they simply pay into a fund rather than having to find a recipient organization or developer. Buyout options may be allowed instead of or in addition to exemptions and cost offsets; for simplicity, this discussion assumes that no exemptions or cost offsets are allowed and compares outcomes to Model 1.

With a mandatory IZ program that offers buyouts, developers will choose one of the alternatives to onsite production if the alternatives are lower cost or more efficient than constructing affordable units onsite. For instance, developers may choose to donate land or build off-site because land or development costs for an equivalent-sized parcel are lower elsewhere in the jurisdiction (because these off-site properties are in less desirable locations, have fewer amenities or lower quality of public services, or are physically or politically less complicated to develop). Developers could choose to donate cash or land in lieu of developing affordable units themselves if another entity can develop the same number of affordable units more efficiently. For instance, public or non-profit agencies may have more experience working with low-income populations or may be more familiar with federal or state subsidy programs that could help offset the costs of

the affordable units. Conceptually, a mandatory IZ program with cash-in-lieu option is equivalent to imposing an impact fee designated for affordable housing production (Been 1991). However, impact fees for affordable housing may have different price effects than impact fees for infrastructure provision. While fees used for infrastructure provide benefits to all new residents (at least in theory), and potentially lower the overall tax burden for both new and existing homeowners (Bruckner 1997, Ihlanfeldt and Burge 2006, Ihlanfeldt and Shaughnessy 2004), the benefits of affordable housing accrue primarily to a small number of residents, and could be considered a disamenity to residents in the non-affordable units, particularly in light of possible net fiscal losses discussed in model 3. Depending on how the jurisdiction determines the amount of cash or land in lieu of housing, or the flexibility in off-site construction, a mandatory program with buyout options could have a similar effect to relaxing the assumption that affordable units must be of constant quality to market-rate units. That is, if affordable units can be built on cheaper, less desirable land, or of lower construction quality than market-rate units, the size of the IZ tax will be less than if affordable units must be strictly comparable.

Offering buyout alternatives can reduce the size of the IZ tax (relative to Model 1) while producing the same number of affordable units, if and only if the buyout options are lower cost or more efficient than on-site construction. Such a program would thus have smaller negative impacts on market-rate housing supply than Model 1. The larger the cost differential between on-site development and buyout options, the more likely developers will choose off-site options. In practice, jurisdictions often set the buy-out price – the amount of cash-in-lieu required per affordable unit – well below the actual cost of developing new units (California Coalition 2003, Brown 2001, Rubin et al 1990, Hughes and McGuire 1991). Lowering the price should reduce the negative impacts of IZ but has an ambiguous effect on the number of units of affordable housing that are produced, and may result in greater spatial concentration of affordable units.

Model 5: Voluntary with cost offset

The least stringent forms of IZ are voluntary programs that offer developers some cost offset as an incentive to build affordable housing. The most common offset for voluntary programs are density bonuses, as described in Model 3.¹⁰ Under a voluntary program, developers will only choose to build affordable units if the size of the cost offsets exceeds the actual cost to them of producing affordable units. Compared to mandatory programs, voluntary programs should be less likely to lead to increased prices and decreased production of market-rate units. The net difference in number of affordable units produced is theoretically ambiguous, though many IZ advocates claim that voluntary programs are seldom used and result in few affordable units being produced. In theory, however, very attractive cost offsets could encourage substantial development of affordable units under a voluntary program, while a highly stringent mandatory program that severely reduces market-rate construction might result in relatively few affordable units produced. If voluntary programs contain sufficiently large density bonuses and/or other incentives, they may encourage higher rates of production of both affordable and market-rate units (and correspondingly lower prices in a general equilibrium outcome), relative to the same jurisdiction without a voluntary IZ program. Whether in practice voluntary IZ programs result in higher levels of affordable housing production than mandatory ones is an empirical question.¹¹

¹⁰ Voluntary programs may allow buyout options, although this unusual and the use of buyouts is often discouraged.

¹¹ Massachusetts is the only one of our three study areas that has a significant number of both voluntary and mandatory IZ programs. Among the 26 jurisdictions that have had IZ programs in place for at least two years and

Although the stylized models discussed in this section allow us to draw some inferences about the relative stringency of IZ programs based on fairly broad characteristics, a complete assessment of stringency (and thus the effects of the program on housing supply) will require more information on the details of the programs than is available, particularly the breadth of exemptions, the value of cost offsets and relative prices of buyout options. Given these questions, and the fact that the relative effectiveness of various programs at producing affordable units implied by the models is ambiguous, empirical analysis is necessary to determine the impacts of IZ on the supply of both market-rate and affordable housing.

that reported whether IZ had produced any affordable units, half of the purely optional programs (7 of 14) had produced some affordable housing, as had half the purely mandatory programs (4 of 8). Three of the four California jurisdictions with voluntary IZ (Cupertino, Morgan Hill and Santa Clara) reported having produced at least 200 units of affordable housing each (compared to a median of 78 units for mandatory programs), Richmond's voluntary program has been in place only since 2001 and did not report how many units have been built.

Table 2.1 Components of variation among model IZ programs

	Mandatory?	Exemptions?	Cost offsets?	Buyout options?
Model 1	Yes	No	No	No
Model 2	Yes	Yes	No	No
Model 3	Yes	No	Yes	No
Model 4	Yes	No	No	Yes
Model 5	No	No	Yes	No

Figure 1: Illustration of the effects of IZ Model 1 on housing prices and quantities

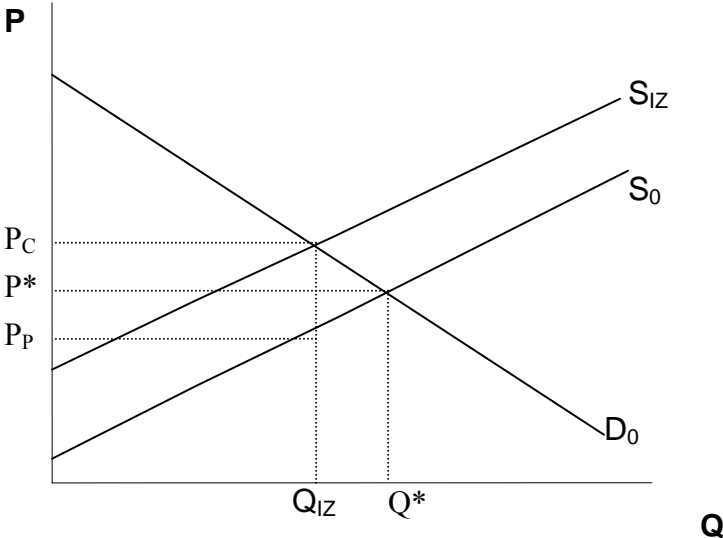
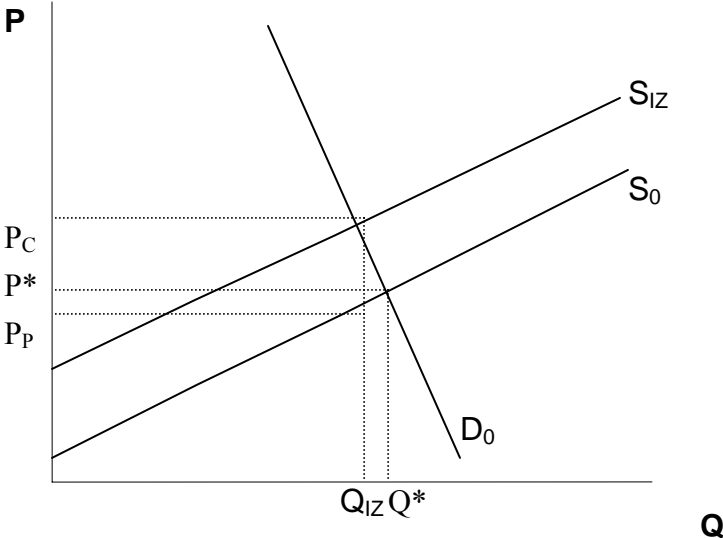


Figure 2: Effects of IZ Model 1 with inelastic demand



Section 3: Previous empirical research

Although there is a fairly extensive literature on the economic and legal theory of inclusionary zoning, to date there has been essentially no rigorous empirical analysis of the effects of inclusionary zoning on housing supply. The most widely cited attempts to determine the effects of IZ are a pair of studies of California cities and counties by Powell and Stringham for the Reason Foundation (2004a and 2004b). They define the “cost” of each affordable unit as the difference between the market price and the maximum affordable price allowed under IZ; by their calculations, the median cost across all cities was \$346,212 per unit. Powell and Stringham also assess the impact of IZ on production levels by comparing the average number of housing permits issued in cities with IZ over several time intervals before and after the adoption of the ordinance; on average, permits declined by 31 percent in the seven years after IZ was adopted. However, as critics have pointed out (Basolo and Calavita 2004), their work relies on several questionable assumptions and is not methodologically sophisticated. For instance, the cost differential assumes that in the absence of IZ policies, the same total number of units would have been constructed and all units would have sold for the market price. Moreover, they provide no evidence on changes in housing prices and new permits in California jurisdictions without inclusionary zoning over the same time period, so it is unclear whether the decline in permitting is due to IZ or to exogenous contemporary changes that affect all jurisdictions. In short, the results of the two studies should be interpreted only as descriptive, not as proof of a causal relationship between IZ and housing market outcomes.

The paucity of rigorous empirical research on the effects of IZ is due in large part to the difficulty of obtaining accurate data on the presence and characteristics of inclusionary zoning programs across jurisdictions and over time, as well as units produced under such programs. However, we can draw upon some findings from empirical studies of similar forms of land use regulation, although with some caveats about the comparability of the programs. Below we review empirical research on the effects of related land use regulations, specifically impact fees and statewide “fair share” housing requirements.

The most recent empirical studies of the effects of impact fees find that housing prices rise with the imposition of impact fees. Delaney and Smith (1989a, 1989b) were the first to empirically measure the effect of impact fees on the prices of existing and new housing. They look specifically at one jurisdiction, Dunedin, FL, over a period of 12 years and find significantly higher housing prices in Dunedin relative to two of three non-fee control communities. These differences, however, disappear after about seven years into the study period. A series of studies followed, many of which do find empirically sound evidence of price increases (see, for instance, Baden and Coursey 1999; Mathur, Waddell and Blanco 2004 and reviews of other studies summarized by Evans-Cowley and Lawhon 2003 and Been 2005). However, it is unclear what drives housing prices to increase: the added value from infrastructure/public services made possible by the fees, or a possible supply constraint due to the tax. How land prices are affected is less definitive in the literature (Nelson and Lillydahl 1992; Skaburskis and Qadeer 1992); however a more recent study by Ihlanfeldt and Shaugnessy (2004) improves upon many of the limitations of previous investigations and finds significant reductions in land prices. With regard to housing production, the empirical results are also mixed. Skidmore and Peddle (1998) found a significant negative correlation between impact fees and the number of new homes built. On the

other hand, Burge and Ihlanfeldt (2006) find no discernable effect of impact fees on number of single-family home completions, consistent with their ambiguous theoretical predictions; impact fees increase developer costs and may also increase rates of project approval by local governments (see also Mayer and Somerville 2000). Given the theoretical differences between impact fees and IZ – impact fees (in theory) are used to pay for services enjoyed by new homeowners who pay the fees, while most new residents under IZ do not live in the affordable units – and the jurisdiction-specific evidence it is unclear how much can be extrapolated from these findings.

Another conceptually similar set of policies, albeit on the state level, are regional “fair share” arrangements, under which each locality is required to provide some predetermined proportion of the region’s low-income housing. The state with the oldest and best known such policy is New Jersey (under the series of Mount Laurel court decisions). In New Jersey, communities must develop a state-certified plan to reach their fair share obligation through one or more of the following tools: building or rehabilitating low-income housing directly, paying other communities within the region to provide up to 50 percent of their housing obligation, or allowing developers to build at higher densities in exchange for developing affordable units. A study conducted approximately 5 years after the state law went into effect showed that over half of the 59 municipalities with certified housing plans had some density bonus provision, and nearly 60 percent of the units built were through density bonus (Rubin et al 1990). Assuming that municipalities adopt plans that minimize the cost of meeting their obligations, this can be viewed as indirect evidence that voluntary density bonuses are more efficient means of producing affordable units than the other two. However there are significant differences in choice of tools across municipalities, reflecting variation in resident preferences and/or development costs; places that had higher initial housing densities were less likely to adopt density bonuses, and more affluent communities were more likely to pay other jurisdictions to provide their allotment. Thus the adoption of inclusionary zoning ordinances is clearly endogenous and must be treated accordingly in empirical analysis.

Section 4: Structure of IZ in San Francisco, Washington DC and Suburban Boston Areas

The structure and details of inclusionary zoning programs vary widely across jurisdictions, reflecting local differences in policy goals, housing market conditions and political circumstances. The ways in which IZ programs are structured and implemented are also likely to vary systematically across states, in response to the amount and type of authority over land use policy granted to local governments by the states, as well as differences in the states' land use programs and initiatives to produce affordable housing. In Section 2, we discussed four of the key dimensions along which IZ may vary: mandatory status, exemptions, cost offsets and buyout options (alternatives to on-site construction). In this section we describe the characteristics of IZ programs adopted by jurisdictions in the San Francisco and Washington DC metropolitan areas and the Boston-area suburbs,¹² including how widespread and long-standing such programs are, and how their various components affect their stringency. We also report estimates of the amount of affordable housing produced as a result of IZ in the various jurisdictions.¹³

In addition to presenting descriptive statistics of IZ programs, in this section we provide a brief overview of two elements of each state's regulatory environment that are particularly relevant to the adoption and implementation of IZ programs: the degree of authority over land use policies granted to the local governments by the state and the presence of statewide laws or programs that affect affordable housing development. States in which courts interpret local government authority narrowly may be more cautious in adopting strict IZ policies, for fear they will be considered beyond the local governments' authority and subsequently struck down. If the degree of local control is correlated with other factors that affect housing market outcomes, then states that are more restrictive of local governments may have systematically different housing market outcomes. Similarly, the presence and strength of state laws that encourage or restrict development of affordable housing through other means may alter the incentives for localities to adopt IZ, and may change the level of affordable housing production or outcomes of market-rate housing even among communities without local IZ programs. We briefly discuss the most relevant elements of each state's regulatory environment to provide context for observed variations in the structure of local IZ programs.

4.1 San Francisco Bay Area

California is considered a pioneer in land use policies, having instituted some of the earliest forms of growth management, inclusionary zoning and environmental regulations. It is also consistently identified as one of the most expensive and most highly regulated housing markets in the country (Gyourko, Saiz and Summers 2006). Many communities in the San Francisco Bay Area also are known for their progressive political stances and redistributive policies, such as local programs for the homeless and those with physical disabilities and AIDS. In addition to

¹² For the purposes of this study, we use the 2000 census definitions of the San Francisco-Oakland-San Jose and Washington-Baltimore CMSAs. The study area used for the Boston region includes all the cities and towns within a 50-mile radius of the city of Boston but excludes Boston itself; this area is chosen based on the availability of regulatory data for those jurisdictions.

¹³ For San Francisco and Washington, we present estimated number of units built, while for Boston-area suburbs data are only available on whether any affordable units have been developed.

government agencies, the Bay Area is home to a number of well-established not-for-profit organizations that develop and manage affordable housing. IZ is widely prevalent in the Bay Area, and although the ordinances differ some in the details, IZ is more generally consistent across jurisdictions within the San Francisco metropolitan area than in the Washington DC or Suburban Boston regions.

State regulatory environment

Local governments, specifically counties and cities, are granted quite broad authority over land use regulation in California by the California Constitution, and by statute.¹⁴ Past rulings by the state courts, see, e.g., *Home Builders Ass'n of Northern California v. City of Napa*, 90 Cal. App. 4th 188 (2001), have generally upheld the rights of local governments to adopt and enforce IZ, as well as many other tools of land use regulation.¹⁵ As will be discussed in more detail below, in keeping with the relatively high degree of local authority, local IZ programs are quite widespread in the Bay Area, and the programs are quite stringent along several of the dimensions examined.

California has several state laws or policies that may impact the incentives for or effectiveness of local inclusionary zoning. The California Coastal Commission has had in place an affordable housing requirement for any coastal property since the 1960's (Vandell 2003). However, most directly, since 1979 state law has required that each city or county provide density bonuses and incentives to developers seeking to build affordable or age-restricted housing, unless the local government issues a written finding that incentives (other than the zoning bonus) are not necessary to offset the cost of creating the low-income housing.¹⁶ The state mandate essentially creates a voluntary IZ program in jurisdictions that have not adopted a local IZ ordinance. Interviews with local officials suggest that the state law is not widely understood and is infrequently invoked by developers.¹⁷ A second backdoor form of IZ stems from the state's mandate that counties, general law cities, and charter cities submit a general plan for the long-term physical development of the city or county.¹⁸ The general plan must contain a housing element,¹⁹ to be reviewed at least every five years,²⁰ which outlines a plan to provide "decent" housing for "people of all economic means".²¹ A third mechanism for providing affordable housing under the state's legal framework is the designation of Redevelopment Agencies to oversee construction in blighted areas.²² These agencies receive a portion of the incremental

¹⁴ Cal. Const. Art. 11, §7; Cal. Gov. Code §65850 (originally adopted in 1965, most recently amended 2007); see also Cal. Gov. Code §65800 (declaring the state legislatures intention "to provide only a minimum of limitation in order that counties and cities may exercise the maximum degree of control over local zoning matters").

¹⁵ See, e.g., *San Remo Hotel v. City and County of San Francisco*, 41 P.3d 87 (Cal. 2002) (upholding an ordinance requiring property owners converting single room occupancy hotels to other uses to pay a fee to replace affordable housing units lost in the conversion).

¹⁶ To qualify as affordable, a proposed development must include at least 10% low income housing, 5% very low income housing, with affordability restrictions for at least 30 years Cal. Gov. Code §65915 (2007) (this statute is part of the chapter entitled "Density Bonuses and Other Incentives")

¹⁷ The Furman Center interviewed many local officials about their IZ programs, as described in the "Data Sources" section below.

¹⁸ Cal. Gov. Code §65300 (2007) (Statute added in 1965 and amended in 1984 to include charter cities)

¹⁹ Cal. Gov. Code §65302 (2007)

²⁰ *Id.* at §65588, subd. (b)

²¹ *Id.* at §65580, *See also* 66 Cal. Jur. 3d §33 (explaining standard of judicial review for compliance)

²² Several of the interviewees in the Furman Center's survey mentioned this as a method by which the state encourages the production of affordable housing.

taxes from newly redeveloped areas that can be used to subsidize affordable housing. There is no systematic data on the production of affordable units under any of the three state programs; however several jurisdictions surveyed mentioned having negotiated the inclusion of affordable units on a case by case basis prior to having adopted IZ. In some cases, such as Contra Costa County, these alternative mechanisms may have resulted in development of a significant number of units.

Data sources

We combine several different data sources on the presence and characteristics of inclusionary zoning in California, including four surveys at various points in time by different organizations and a supplemental telephone survey conducted by Furman Center staff for this project. Most of the data are drawn from a survey conducted in 2002 by the California Coalition for Rural Housing (CCRH) and Nonprofit Housing Association of California (NPH). Because that survey did not obtain complete data on several key variables, including the date of IZ adoption, mandatory status and the presence of density bonuses, in June 2007, the Furman Center conducted a supplementary telephone survey with municipal officials in approximately 35 jurisdictions. The survey instrument and list of officials interviewed are attached in Appendix A. We then compared our dataset against several additional sources: a 1994 survey conducted by Calavita and Grimes; a list of IZ programs reported by Vandell (2003), originally compiled by Rusk (2003); a new Inclusionary Housing Policy database released in the summer of 2007 by CCRH, and a 2007 report by NPH, CCRH and several other organizations.²³ Data from the various sources reveal a number of discrepancies; some may result from changes in program characteristics over time, while others reflect differences in the survey instruments and respondents or simply reporting errors, which raise concerns over the reliability of the data. We have attempted to reconcile the discrepancies at least for two critical pieces of data: the list of jurisdictions that have IZ and the dates when those programs were first adopted, discussed in more detail below.

Adoption of IZ programs

Inclusionary zoning is widely prevalent in the San Francisco Bay Area, as shown in Table 4.1; as of 2002, seven of the 10 counties and 48 of the 104 incorporated cities and towns in the metropolitan area had adopted some form of IZ.²⁴ In two of the three counties without county-wide IZ, Santa Clara and Sonoma, a majority of the cities and towns have adopted their own IZ ordinances. Moreover, most programs in the Bay Area are mandatory: all county-wide IZ ordinances are mandatory, and only four cities — Cupertino, Morgan Hill and Santa Clara City in Santa Clara County and Richmond in Contra Costa County – have voluntary programs.

IZ has been a part of the regulatory environment in California longer than most other parts of the country. Several of the pioneers of IZ in the 1970s, such as the city of Palo Alto, are in the Bay Area. Due to the discrepancies in various surveys described above, determining how long IZ has

²³ According to the most recent survey, 77 jurisdictions in the Bay Area had adopted IZ as of 2006. We use the 55 jurisdictions identified in the earlier survey for our analysis, since the most recent programs are too new to have produced measurable effects. The database can be found online at <http://calruralhousing.org/housing-toolbox/inclusionary-housing-policy-search>.

²⁴ County zoning ordinances apply to unincorporated land within the county; incorporated cities and towns that have adopted their own zoning ordinances are not subject to county zoning.

been in place in each jurisdiction is sometimes difficult. For 49 of the 55 programs, the data sources list multiple years of adoption; the difference in years ranges from one year to more than a decade. The reasons for these discrepancies are unclear; some of the later dates reported may correspond to major revisions of the ordinance, and so may be indicators of when the current characteristics took effect. It appears that some jurisdictions may have had informal or alternate IZ programs and then later adopted a formal policy (for instance, offering a density bonus for affordable housing as part of their housing element, then later adopting a separate IZ ordinance), in which case the two dates may reflect essentially different programs. For consistency, we have chosen to use the earliest date corroborated by at least two of the sources listed above.²⁵ A full list of the dates of adoption we use for our analysis, and notes on the sources, is shown in Appendix B.

According to the earliest dates reported for each jurisdiction, more than one-third of the IZ programs currently in existence were adopted prior to 1990, while about half the programs were adopted during the 1990s (Table 4.2). The Furman Center survey asked jurisdictions whether several of the key provisions of the IZ ordinance had been revised; a majority of the jurisdictions surveyed had made at least one major revision, generally resulting in more stringent ordinances. This is also consistent with the CCRH 2006 database, which reports more stringent characteristics than the earlier surveys on California programs (see Calavita & Grimes 1994, CCRH 2003). Common revisions included raising the per-unit amount of in-lieu fees, increasing the percentage of affordable units required, and increasing the term of affordability.

General components of IZ programs

IZ ordinances frequently describe three core components of the program: the share of units in a particular development on which affordability requirements are imposed, the depth of the subsidy (that is, the income level of the target population) and the length of time affordability must be maintained.²⁶ Variations across these dimensions not only reflect the overall stringency of the program, but likely reflect communities' preferences and policy goals. Some communities, for example, require a larger share of units but with relatively shallow subsidies, while others require a small share targeted at a lower-income population. Jurisdictions also vary in whether they set different requirements for units intended for owner-occupancy and those intended for rental.

Approximately 45 percent of IZ ordinances in the Bay Area require that up to 10 percent of units be designated as affordable, while another one-third of jurisdictions require between 11 and 15 percent of units to be affordable (Table 4.3). Most jurisdictions in these two groups required exactly 10 or 15 percent. The highest share of affordable units required was 25 percent (Corte Madera in Marin County). It is not uncommon for jurisdictions to vary the affordable share required by the size of the project or the target population; higher requirements are usually

²⁵ For two jurisdictions, Livermore and Menlo Park, the dates differed across all of the sources.

²⁶ Some ordinances describe the target population by giving a specific percent of area median income, while others use the terms "very low", "low" and "moderate" income. Standard HUD guidelines define income thresholds as follows: very-low income is up to 50% of area median income, low-income is 50-80% of AMI, 80-120% is moderate income. However, some communities appear to be using an alternate set of cutoffs, under which very low income is 30% of AMI, low income is 50% and moderate income is 80%. Many ordinances do not indicate which set of cutoffs they intend to follow.

imposed on larger projects, while fewer units may be required if the developer sets deeper affordability targets.

In terms of the level of subsidies, the most common targets are a combination of very-low, low and moderate-income households (39%) and low- and moderate-income households (34%). Over half of IZ programs require some set-aside for very-low-income households, while only one jurisdiction (Cupertino) has a set-aside aimed at median-income (Table 4.4). Most ordinances provide a specific breakdown of the share of units that must be reserved for each income group listed; for instance, Dublin requires its 12.5% affordable units be distributed as 30% very-low, 20% low, and 50% moderate income units. Income targets frequently differ for rental and ownership units; in general, rental units are more likely to be targeted at very-low and low-income, while ownership units are often reserved for moderate-income households.

As discussed in Section 2, longer affordability restrictions are generally more restrictive, because they reduce the value of future rents (or profits on future sales). As shown in Table 4.5, the length of affordability requirements among Bay Area IZ ordinances are fairly evenly distributed across a wide range of terms; approximately 18 percent of ordinances require units to be affordable for each of 30 years, 40-49 years, 50-59 years and permanently (only one ordinance requires a 99-year term). Often ordinances require longer terms for rental than homeownership units; a frequently observed pattern is a 45-year term for ownership units and 55 years for rental units. It appears that jurisdictions have frequently increased the length of affordability since the original ordinance.²⁷

Triggers and exemptions

Most ordinances in the Bay Area apply to all residential developments over some minimum size. The minimum size is generally quite small, as shown in Table 4.6; approximately 45 percent require developments of at least 2-5 units to participate (in some cases, small developments are required to pay a fee rather than building units). Only four jurisdictions exempt developments under 10 units, and nearly one-quarter have no minimum size, implying that all residential developments are subject to IZ.

Cost offsets

Two-thirds (37 of 55) of Bay Area IZ programs offer a density bonus, although some indicated that the density bonus only applied if the developer exceeded the minimum share of required units. During interviews, municipal staff also mentioned the presence of several other types of cost offsets, including fast-tracking of permits, fee waivers, and provision of subsidies. In addition, some jurisdictions that limit the annual number of permits as a form of growth control exempt affordable units, including those built under IZ, from the annual permit cap.

Buyout options

Buyout options are widely available in Bay Area IZ programs; only eight jurisdictions offer no buyout options and two-thirds offer more than one option (Table 4.7). In-lieu fees are the most common option (77%), followed by off-site construction (70%), land donation (38%) and transferable development credit (16%). Some jurisdictions restrict the amount of the obligation that can be satisfied through buyout options; for instance, the city of Hercules only allows

²⁷ Information on amendments is based on the Furman Center's survey.

developers to pay 50% of their obligation through fees. Most jurisdictions did not report the amount of the per unit fee, so it is difficult to compare the attractiveness of these options. From the little evidence that is available, it appears that some jurisdictions have set the amount of the cash fees considerably below the costs of construction, while others have attempted to make the two roughly equivalent. A useful task for future surveys would be to collect more systematic data on the size of fees and restrictions on their use.

Affordable housing production

Nearly all jurisdictions reported that at least some affordable units have been developed as a result of their IZ ordinances; in addition to units produced on-site, some officials indicated that units have been built off-site, and several also reported that developers have paid cash fees and/or made donations of land (Table 4.8).²⁸ Over 40 percent of jurisdictions report IZ having resulted in fewer than 100 affordable units, while one third report development of between 100 and 500 units. Two jurisdictions (Dublin and Petaluma) indicate that more than 1000 affordable units have been built. Summing the totals across all 55 jurisdictions with IZ programs, a total of 9154 affordable units reportedly have been developed as of 2003. Collectively, these 55 jurisdictions issued just under 400,000 building permits between 1980 and 2006, so affordable units produced under IZ are approximately 2.3% of new residential units in this period.

Summary

Over the past several decades, local inclusionary zoning ordinances have been widely adopted by counties, cities and towns throughout the San Francisco Bay Area. Nearly all are mandatory and apply broadly to most residential developments, exempting only very small developments (under 5-10 units). Most programs require developers to set aside 10-15 percent of units as affordable, and the income groups targeted (very-low, low- and moderate-income households) imply the need for quite deep subsidies. There is relatively little consistency on the length of affordability requirements; common lengths include 30-year, 45-year, 55-year and permanent terms. As potential offsets for the cost of providing the IZ units, most ordinances offer some type of density bonus or subsidy, and alternatives to building affordable units on-site are widely available. Among jurisdictions for which data are available, nearly all report that some affordable units have been produced under IZ, although the number of units produced varies widely.

4.2 Washington DC Area

The context of inclusionary zoning in the Washington DC metropolitan area differs from the other two regions in the study in several important respects. First, it encompasses jurisdictions in three states (or state-equivalents), each of which has a somewhat different approach to land use planning and zoning. Maryland is known as a fairly progressive state on land use policy; Virginia has traditionally been a more laissez-faire state with regard to regulation, and the

²⁸ For all three of the metropolitan areas in the study, the data on affordable units produced under IZ are self-reported by municipal staff and cannot be independently verified. In addition, it is unclear whether the number of units reported is the number of affordable units ever developed or the number still under affordability restrictions. However we believe the data are likely to be accurate indicators of whether any affordable units have been developed since the programs' inception. To the best of our knowledge, the number of units reported reflects the total across all structure types and includes both owner-occupied and rental units.

District of Columbia has a somewhat unusual governance structure and land market, given the amount of federally owned land and at least potential oversight of Congress. Second, as recently as 2000, only seven jurisdictions – Fairfax, Fauquier and Loudon Counties and Falls Church city in Virginia, Montgomery and Prince George’s Counties and Rockville city in Maryland – had adopted IZ, a much smaller number than in either San Francisco or Boston. However, because five of these jurisdictions are counties, they encompass a fairly large share of the region’s land and population. Third, while IZ seems to be consistently gaining popularity in San Francisco and Boston, there is mixed evidence of legal and political support for IZ in the DC region. Virginia courts struck down an early effort at IZ in Fairfax County, while Prince George’s County voted to repeal its program only five years after adopting it. On the other hand, several additional jurisdictions, including the District of Columbia, have adopted IZ program in the past few years, which may indicate increasing support for the initiative. Appendix C shows the location and adoption dates of all IZ programs in the DC area as of November 2007; only the five counties that had adopted IZ prior to 2000 are used in the analysis.

State regulatory environment: Maryland

The Maryland legislature and courts have demonstrated a substantial commitment to local control of land use. As set forth in several different enabling acts, local governments (counties, incorporated cities, towns and villages) are granted fairly broad authority over zoning and planning. In practice, some incorporated municipalities, particularly smaller towns and villages, have chosen not to exercise zoning authority and so are subject to county zoning and planning. The two counties that border on the District of Columbia, Montgomery and Prince George’s, are subject to the regional planning authority of the Maryland-National Capital Park and Planning Commission. M-NCPPC is a regional planning organization, whose authority extends over Montgomery and Prince George’s counties in Maryland. Each locality selects its own representatives to the M-NCPPC and separate zoning ordinances must still be approved by local county commissions, but in theory planning for all of the member jurisdictions should reflect regional as well as local concerns.

The Maryland enabling act specifically endorses the use of local inclusionary zoning and density bonuses to encourage affordable housing production.²⁹ Montgomery County has one of the oldest inclusionary zoning programs in the nation and a few smaller municipalities in Montgomery and Prince George’s counties have individually adopted IZ (Rockville in the early 1980’s and Gaithersburg in 2006). Frederick County signed an IZ ordinance into law in 2002 and Queen Anne’s County did so two years later in January of 2004. Even though its parent county, Anne Arundel, does not have an IZ program, Annapolis City adopted one in 2004. Finally, the City of Frederick is in the process of forming a program and anticipates its adoption towards the end of 2007.³⁰

State regulatory environment: Virginia

Unlike the other states in this study, Virginia is considered a Dillon’s Rule state, meaning that the state’s delegation of power to the local government is strictly and narrowly construed. Local governments (counties, independent cities and incorporated towns) are empowered to adopt and enforce zoning ordinances, but local jurisdictions may exceed their powers if they adopt new

²⁹ MD. ANN. CODE ART. 66B, § 12.01 (2007).

³⁰ Based on conversations with the Maryland Municipal League.

zoning tools not specifically authorized in the state enabling act. The hurdle this poses to local adoption of IZ is shown in the case of Fairfax County, which adopted an IZ ordinance in the early 1970s (even before Montgomery County adopted its pioneering program), but saw the ordinance struck down by the state court.³¹ Virginia has since adopted an “Affordable Dwelling Unit” enabling act, and Fairfax, Loudon and Fauquier County have adopted IZ ordinances. However, the somewhat limited nature of their programs (discussed in detail below) may be partially in response to the more restricted authority of localities in Virginia. Under the Affordable Dwelling Unit Act, Virginia localities may offer incentives other than density increases to encourage affordable housing, such as reductions or waivers of permit, development, and infrastructure fees.³²

As mentioned above, Fauquier is the third county in Virginia with an IZ program, but its program differs dramatically from those in Fairfax and Loudon counties. Fauquier added a Low and Moderate Income Families Housing Policy to its zoning ordinance in 1996, but it is a voluntary program and offers few incentives to entice developer participation. According to planners in the county zoning department, the ordinance is poorly written, unattractive to developers and generally ineffective in producing affordable units. Indeed, the county is in the process of putting together a new housing initiative, which will incorporate an inclusionary element.

State regulatory environment: Washington, DC

Governance of land use in Washington, DC, is not wholly the authority of local agencies. Although the District’s local Zoning Commission is empowered to issue zoning ordinances³³, the planning of the District incorporates district, federal, and regional elements. The Mayor of the District of Columbia (and the District of Columbia’s Zoning Commission) has the central authority for district planning.³⁴ The National Capital Planning Commission acts as the central federal planning agency, with authority to approve or deny any federal building projects in the region and consider design and location criteria with the aim of preserving historic sites and open space.³⁵ Though the NCPC does not have the authority to approve or deny nonfederal projects, the NCPC may review the District’s planning to prevent any negative impact on the interests or functions of the federal establishment within the National Capital.³⁶ The District zoning regulations also must not be inconsistent with the NCPC’s Comprehensive Plan for the National Capital.³⁷ Additionally, proposed regulations or amendments to the zoning regulations must be submitted to the NCPC for comment and review.³⁸ Finally, the NCPC does not have authority to issue zoning regulations, but may submit proposed regulations or zoning amendments to the Zoning Commission.³⁹

³¹ Board of Supervisors v. De Groff Enterprises, Inc., 198 S.E.2d 600 (Va. 1973).

³² Va. Code Ann. § 15.2-2305

³³ DC ST § 6-641.01

³⁴ DC ST § 2-1002

³⁵ http://www.ncpc.gov/about/key_act/keyactive.html

³⁶ DC ST § 2-1002

³⁷ DC ST § 6-641.02

³⁸ DC ST § 6-641.05

³⁹ DC ST § 2-1006

The District enacted its first IZ ordinance on March 17, 2007; but because this is too recent to measure impacts, it will not be included in the empirical analysis. The program applies to both new construction and rehabilitation, exempting projects smaller than ten units. It requires that 8 to 10 percent of the total residential square footage be designated as affordable; in some areas of the city, the affordable units are equally split between low- and moderate-income households, while other areas reserve all units for moderate-income households. Affordability restrictions on both rental and for-sale units are permanent. The program allows for density bonuses up to 20% under “appropriate” circumstances, and allows off-site construction if the developer can demonstrate economic hardship. In addition, any fines incurred for violations under the IZ program are placed in a Housing Production Trust Fund, a permanent revolving special revenue fund administered to provide assistance in housing production for targeted populations.

Other than the new IZ program, Washington, DC administers two programs that promote affordable housing. The District uses a Neighborhood Investment Program and Economic Development Zones to encourage the development of workforce housing through subsidies and tax abatements. DC also offers a federal income tax credit to first-time homebuyers in the District, as well as interest-free and low-interest loans to eligible low- and moderate-income households, both intended to encourage homeownership.

Data sources

The data on inclusionary zoning in Maryland and Virginia was obtained from a number of sources. The primary reference is a survey conducted by Brown (2001) for a Brookings Discussion Paper on IZ in the Washington, DC metro area. This information was supplemented by a second report issued by PolicyLink in 2003 on IZ in Washington, DC, as well as primary data collected via Internet searches and interviews of local government officials by the Furman Center. All data on Fauquier County was collected by the Furman Center.

Adoption of IZ programs

Within the Washington, DC metropolitan area, four counties (Montgomery County in Maryland, Fairfax, Fauquier and Loudon Counties in Virginia) and the District of Columbia currently have IZ programs, summarized in Table 4.9.⁴⁰ Prince George’s County, Maryland, adopted an IZ ordinance in 1991 but repealed it again in 1996. Because the ordinance was in effect during the period of our analysis, however, it will be included in both the descriptive statistics and the empirical analysis, while DC’s ordinance is excluded as being too new to have produced results. The earliest and best known program in the region is Montgomery County’s ordinance, adopted in 1974; the other counties adopted theirs nearly two decades later in the early 1990s. All of the programs except Fauquier are mandatory, but they vary somewhat in how broadly they apply (discussed in detail below).⁴¹

Unlike in California, where most amendments have tended to increase the stringency of IZ programs, amendments to DC area programs have both relaxed and increased stringency along different dimensions. For instance, 1981 and 1989 amendments to Montgomery County’s ordinance relaxed the ordinance by lowering affordability requirements, implementing a sliding

⁴⁰ The county ordinances apply to unincorporated land in the county, and for the Maryland counties, to those incorporated municipalities that have chosen not to adopt separate zoning ordinances.

⁴¹ All descriptive statistics are as of 1999.

scale for these requirements, and increasing the potential density bonus, but extended the price control period. Similarly, in 2000, Loudon County cut in half both the share of required units (decreasing stringency) and the density bonus (increasing stringency). Prince George's repeal of its ordinance of course demonstrates reduced stringency.

General components of IZ programs

The basic terms of IZ programs are quite consistent across four of the counties in the DC area; Fauquier County's program is less well defined and less stringent than the other four. Fairfax and Loudon Counties require the smallest share of affordable units (although Fairfax's program sets the requirements on a sliding scale), with Montgomery County requiring the largest share, at 12.5 to 15 percent (Table 4.10). Income targets are generally consistent, at up to 65 to 70% AMI, although Loudon requires some units for households at 30% AMI. Overall, the IZ program in Montgomery County maintains the most stringent requirements, mandating developers to set aside 12.5% to 15% of the project units for households with incomes at or below 65% of AMI.⁴² The affordable share is often determined by a sliding scale, where the final percentage depends on how much density bonus the developers can utilize (the density bonus increases with the percentage of affordable units). The length of affordability requirements is quite short, compared to most of California's IZ programs, although they follow the pattern of longer affordability for rental units than owner-occupied ones.⁴³ The IZ program in Fauquier does not define a required share of affordable units or a target income, and it requires only five years of price/rent controls.

Three counties, Montgomery, Fairfax and Loudon, reclaim about half of the profits from the resale of homeownership units upon expiration of the affordability terms. These proceeds usually go into a fund that helps developers purchase, build and renovate affordable housing. Between 1989 and 1999 the Housing Initiative Fund in Montgomery County collected over \$1.3 million in shared profits (Brown 2001).

Triggers and exemptions

IZ programs in all counties except Fauquier are mandatory for projects of 50 or more units, much higher than the minimum project sizes in California. Of the four counties, Montgomery's ordinance is most broadly applied: as-of-right single- and multi-family developments are subject, with certain exemptions discussed below. In Fairfax and Loudon Counties, IZ is triggered when the developer applies for a rezoning, subdivision or special exception.⁴⁴ Prince George's ordinance applied only in specific low-density districts in 12 different residential zones.

Unlike California, all of the counties with mandatory programs stipulate a variety of conditions under which developments may be exempted from IZ. All of the ordinances exempt developments in single-family zones with large minimum lot requirements. Fairfax County also exempts sites not served by public water or sewer infrastructure, arguing that the existing infrastructure is insufficient for higher density, and all but Fairfax exempt certain districts or zones. Fairfax, Loudon and Prince George's exempt certain building types, such as multifamily

⁴² Fairfax County does reserve one-third of the units for households with incomes at or below 50% of AMI.

⁴³ Note that prior to 1998, the length of mandatory affordability for Fairfax County was 50 years.

⁴⁴ It is unclear how frequently and under what circumstances development permits in Fairfax and Loudon Counties require special exceptions or rezonings.

structures with four or more stories and an elevator. In Loudon County, developers who are exempt from IZ may still receive density bonuses if they voluntarily include affordable housing in the development.

Cost offsets

All of the jurisdictions offer density bonuses in return for affordable housing production, ranging from 10 percent in Loudon and Prince George's to 20 and 22 percent in Fairfax and Montgomery and a maximum of 25 percent in Fauquier. Only Montgomery County offers other cost offsets, including fee waivers, reductions in zoning standards and tax abatements.

Buyout options

All of the counties stipulate some buy-out options if developers can demonstrate that building affordable units on-site would cause financial hardship. All five counties permit in-lieu fees, although Loudon County offers the in lieu payment option only to developers of single-family detached units. Montgomery and Loudon also allow off-site construction (usually in the same or an adjoining planning area), while Montgomery and Fairfax allow land donation. In general, Montgomery County has been hesitant to approve use of buyout options; between 1989 and 1999, only 10 requests to provide affordable units on other sites were approved (Brown 2001). Prince George's County often only allowed off-site construction if the developer was able to provide significantly more affordable units than would be built on site.

Affordable housing production

As of 2003, 15,252 units of affordable housing had been developed under IZ in the Washington, DC metro area (Policy Link 2003). Between 1980 and 2006, the five counties with IZ collectively issued permits for about 500,000 new housing units. Production in Montgomery County far outstrips the others, which in part reflects the longer life of the program. Comparing average annual production rates over the life of each program, however, Montgomery still has the highest average rate of production, although annual production has apparently declined over time (Table 4.11). In addition, as of 1999, only about 60% of the units created by IZ were still restricted by affordability limits; the anticipated loss of affordable units prompted Montgomery County to increase the affordability control period from its initial five year term to 10-20 years. Among the other four counties, Prince George's program had the highest average annual production during its five year operation, while Fairfax and Loudon have lagged well behind their Maryland counterparts. No data are available about production in Fauquier County, but the general sense is that it is grossly underused (perhaps not used at all).

In order to permanently maintain the affordability of the units, all of the counties except Prince George's permit the local housing authority or qualified non-profits to purchase a certain percentage of the IZ stock. In Montgomery County, the local housing authority has purchased around 14% of the total number of affordable units created under IZ (Brown 2001). However, Loudon County also allows developers to convert unsold affordable units to market rate 120 days after the zoning permit has been issued.

Summary

The five IZ programs in the DC metropolitan area differ somewhat from another and vary significantly from the IZ programs in the San Francisco area. Although four of the five counties'

programs are mandatory, like the majority of those in California, all but Montgomery County's apply more narrowly than is typical in California, because they are triggered only under certain circumstances. There is a fair amount of consistency within the DC area on the basic terms – required affordable share, income targeting and length of affordability. These terms are generally comparable to programs in California, except that the jurisdictions in the DC area require a shorter period of restrictions. The minimum project size in DC is much larger than that in California, perhaps reflecting larger average project sizes typical of counties, rather than incorporated cities and towns. Unlike California, all the DC area counties exempt projects more widely, based on underlying density, infrastructure access, location or building type. Density bonuses are widely available, although other costs offsets are less common. Buyout options are also widespread. As in California, all IZ programs have resulted in some production, although the amount of housing produced varies widely across jurisdictions.

4.3 Boston-area suburbs

Like California, Massachusetts is a relatively high housing cost state, and is characterized by relatively stringent land use regulations across the board (Glaeser, Schuetz and Ward 2006, Gyourko and Summers 2006). Despite (or perhaps because of) the overall level of housing costs, the state also has strong infrastructure for developing below-market housing for low- and moderate-income families. The state Department of Housing and Community Development and the Massachusetts Housing Partnership administer a number of state-financed subsidies for affordable housing, often used in conjunction with LIHTC. Moreover, the greater Boston area has a large and well-established community of non-profit housing developers, such as Urban Edge, Nuestra Comunidad and The Community Builders. The relatively high availability of subsidies and presence of groups with expertise in developing conventional subsidized housing may reduce the impact of IZ (or reduce demand for local governments to adopt IZ).

State regulatory environment

Authority over land use regulation is exercised by city and town governments in Massachusetts; unlike the other states in the study, all land is incorporated within city and town boundaries, so county governments have no role in zoning. The Massachusetts' Constitution gives cities and towns home rule authority,⁴⁵ and the state has a strong tradition of local self-governance. The Zoning Enabling Act, Chapter 40A, specifies the zoning powers of towns and cities other than Boston;⁴⁶ Boston's zoning authority derives from a separate act.⁴⁷ Although the process for adopting and amending local zoning is generally similar for cities and towns, bylaws passed by towns are subject to review and approval of the state attorney general before they take effect. In addition, the town meeting form of government means that all changes to town bylaws are

⁴⁵ MASS. CONST. amend. art. LXXXIX, §§ 1-9.

⁴⁶ MASS. GEN. LAWS ch. 40A, §§ 1-17 (2003). The act delegates authority to pass zoning ordinances and by-laws to "cities and towns to regulate the use of land, buildings and structures to the full extent of the independent constitutional powers of cities and towns to protect the health, safety and general welfare of their present and future inhabitants." § 1A

⁴⁷ See <http://www.ci.boston.ma.us/bra/pdf/ZoningCode/Chapter665.pdf>. Because the City of Boston operates under a different regulatory environment and has somewhat different authority over land use regulations, it was not included in the database that forms the basis of our analysis for this study. Boston adopted an inclusionary housing policy (not part of the zoning ordinance) in 2000 that produced an estimated 665 units by 2006 (Boston Redevelopment Authority 2006).

essentially implemented by referendum, which may lead to systematic differences in zoning stringency between cities and towns (Schuetz 2007).

There are several statewide laws in Massachusetts that may alter the effectiveness or incentives of local inclusionary zoning programs. The oldest of these, Chapter 40B, allows developers to apply under an expedited process for a permit to build housing that does not conform to local zoning, if a minimum percentage of the housing units are affordable to low- and moderate-income households. If the developer's application is denied by the local Zoning Board of Appeals, the state Housing Appeals Committee can override the Board's decision and order the issuance of the permit (Massachusetts Department of Housing and Community Development 2004). Chapter 40B is sometimes used by not-for-profit organizations to develop projects that are entirely affordable (usually including state or federal subsidies), but it is also frequently used by for-profit developers who wish to build at higher densities than would be allowed under conventional zoning, similar to voluntary IZ programs. Communities are only subject to Chapter 40B if less than 10% of their existing stock meets state affordability criteria.

A review of selected recent master plans suggests that many communities adopt IZ in order to increase production of affordable housing, up to their 10% quota, in a manner perceived as giving more local control than 40B developments. However, for communities that have learned to manage the 40B process to their liking (i.e. have good relationships with selected affordable housing developers), the state law may reduce the incentive to adopt some form of IZ.⁴⁸ According to the Citizens' Housing and Planning Association, about one-third of all housing produced in the Boston region but outside the City of Boston, and 80 percent of the affordable housing production, now occurs under the auspices of 40B (Gornstein 2007).

Two newer but somewhat related state laws, Chapter 40R and Chapter 40S, create incentives for localities to increase allowable density in designated "smart growth districts". According to the state Department of Housing and Community Development, Chapter 40R "seeks to substantially increase the supply of housing and decrease its cost, by increasing the amount of land zoned for dense housing. It targets the shortfall in housing for low- and moderate-income households, by requiring the inclusion of affordable units in most private projects" (DHCD 2007). By designating eligible locations as smart growth districts, the city or town becomes eligible for a variety of financial incentives from the Smart Growth Housing Trust Fund.⁴⁹ Moreover, beginning with in the fiscal year 2008, any city or town that has established at least one smart growth zoning district will receive state reimbursement for education costs incurred by the additional development made possible by upzoning in those districts.⁵⁰ Although it is too recent to observe effects of Chapter 40R and 40S, it is possible that they will alter the likelihood of communities adopting conventional IZ programs, or will produce affordable units through alternate mechanisms.

⁴⁸ For more discussion and analysis of Anti-Snob laws in Massachusetts, Rhode Island and Connecticut, see S. Cowan, 2006, "Anti-Snob Land Use Laws, Suburban Exclusion, and Housing Opportunity," *Journal of Urban Affairs*, 28 (3): 295-313.

⁴⁹ Ch. 40R, § 9. MASS. GEN. LAWS ch. 10, §35AA (West 2007).

⁵⁰ MASS. GEN. LAWS ch. 40S, § 2. Eligible students are children living in a new smart growth development that are enrolled as of the prior year in a district or charter school, attend a residential or other school pursuant to special education requirements, attend a pre-kindergarten or post twelfth grade session pursuant to special education requirements, or attends a school district through the school choice program.

Data sources

All data on inclusionary zoning in Massachusetts are taken from the Local Housing Regulation Database, compiled in 2004 by the Pioneer Institute for Public Policy and the Rappaport Institute for Greater Boston.⁵¹ Most variables were coded directly from bylaws/ ordinances; information on production of affordable units under IZ was obtained from telephone and email communication with municipal staff and cannot be independently verified.

Adoption of IZ programs

IZ is a relatively new form of zoning in the Boston area, compared to the other two study areas. As of 2004, just over half the suburban jurisdictions within 50 miles of Boston had adopted some form of incentive or requirement to produce affordable housing (Table 4.12). Unlike the DC and San Francisco areas, IZ programs in the Boston-area suburbs are more likely to be optional. Of municipalities that had adopted IZ, just over one-third had entirely mandatory programs, 42 percent had only optional programs, and the remaining 23 percent had at least one mandatory and one optional program (as discussed in more detail below, it is common for jurisdictions to have multiple IZ programs at the same time).

The popularity of IZ has been increasing over time; although a small number of municipalities report having adopted IZ in the 1970s, nearly 60 percent of jurisdictions with known dates of adoption reported have adopted their IZ provisions between 2000 and 2004, and the number of communities adopting IZ has increased in each successive period (Table 4.13). This supports the findings of previous surveys by MHP, which found roughly 20 IZ programs across Massachusetts in 1988 and over 118 in 1999 (NHC 2002).

Although the samples are quite small to identify statistically significant differences, the nature of IZ does appear to be changing over time. Approximately two-thirds of the 48 IZ programs adopted since 2000 have at least some mandatory component, while fewer than half of earlier programs did. Anecdotal evidence suggests that communities with long-standing IZ programs have been increasing the stringency over time; for instance, Cambridge instituted a geographically targeted voluntary program in the late 1980s but after no affordable units were produced under that program, the program was made mandatory in 1998 (NHC 2002). Increasing stringency as well as greater rates of adoption may reflect pressures on communities to increase their levels of affordable housing production in order to reach the 10% quota imposed by Chapter 40B, a target made more difficult by rising levels of market-rate housing production.

General components of IZ programs

While most of the programs require similar shares of affordable units to those in DC and San Francisco, a small number of jurisdictions in Massachusetts have much higher requirements. Roughly 40 percent require 10 percent affordable units and another 18 percent require 15 percent affordability, but six communities require a 25 percent set aside and a few require that over half of all units be affordable (Table 4.14). For instance, Hopkinton's IZ program applies only to duplexes, and one unit in each building must be affordable, while Tyngsborough will grant a 25 percent density bonus for multifamily if half of the units are income-restricted. It was not possible to code a minimum percent affordable units for 27 communities with IZ; nearly all of

⁵¹ More information on the development of the database, and downloadable data, can be found at www.pioneerinstitute.org/municipalregs/.

these are optional IZ programs in which it appears that developers could designate any share of units as affordable (and receive cost offsets on a sliding scale), or in which the specific number of affordable units will be negotiated on a case by case basis.

The income targets in Suburban Boston are somewhat higher than in the DC and San Francisco areas. Over half of communities with IZ (51) specify that the units should be affordable to low- and moderate income households (Table 4.15).⁵² Some detail a particular mix of both low- and moderate-income within a single development while others leave it to the developer's discretion (or at least to informal negotiations). Some set different targets for rental and ownership; for instance, Newton requires that rental units be reserved for low-income households while for-sale units are targeted to moderate-incomes. A relatively small number of communities (17) target affordable units only to low-income households, a stricter standard requiring deeper subsidy from the developer. Only one community (Peabody) requires units affordable to very low income households, while four target only moderate income households. Specific income limits could not be determined for 26 communities with IZ; many of these just require that the units be "affordable" without referencing particular definitions or income targets.

The affordability terms required by most Boston-area IZ programs are strikingly longer than in either of the two other regions; nearly one-third of IZ programs impose permanent affordability constraints on below-market units created under IZ (Table 4.16). A few others require such long periods of time (80 or 99 years) as to be virtually permanent. The true number of permanent or near-permanent restrictions may actually be higher, since many of the communities that do not set a specific length indicate that restrictions should hold "as long as allowable under state law". At the other end of the spectrum, a handful of IZ ordinances require affordability only for 10-15 years; however, anecdotally length of affordability seems to be increasing in stringency over time (NHC 2002). As with several other provisions, some ordinances are quite vague in describing the term of restrictions; for instance, the town of Lincoln requires that the special permit authorizing development of affordable housing "impose appropriate safeguards to ensure the continued use of the subsidized units...for affordable housing" (Town of Lincoln Zoning Bylaw, Section 14.2.2 (b) 2003).

Another dimension of IZ programs that affects stringency is the degree to which affordable units must conform to market-rate units in the development. The LHR database does not contain data on such restrictions (nor do any of the other data sources used for this study), so no systematic conclusions can be drawn. However, case studies of two cities, Cambridge and Newton, indicate that both of those ordinances require that affordable units "be equal in size, quality and character" to market rate units in the same development (NHC 2002).

Triggers and exemptions

Relatively few IZ ordinances in Massachusetts follow the traditional IZ model that is prevalent in California, namely a citywide requirement/incentive from which a small number of projects will be exempted. Rather, Massachusetts ordinances are more similar to Fairfax, Loudon and Prince

⁵² As in California, many ordinances do not define income groups by share of AMI, so it is unclear whether the categories are directly comparable. In addition, some communities specify cutoffs that do not correspond to generally used federal standards; for instance, Wenham's program targets households up to 110% AMI and Concord allows up to 150% AMI (both are counted in the table as "moderate-income", since that is the closest category).

George's County programs, which apply only to specific locations or development types. Table 4.17 summarizes the more common circumstances that trigger IZ among Boston-area suburbs. Less than one-third of IZ ordinances use project size as the trigger for IZ, and nearly all of these are mandatory programs. Among the 26 communities that specify a minimum project size in terms of number of units, the average minimum size is eight units. Two additional communities require IZ of any residential development of 10 or more acres.

The most frequently observed trigger of IZ is an attempt to use cluster or planned development, rather than conventional subdivisions. Although cluster development provisions typically reduce the minimum lot size and other dimensional requirements, most do not authorize more units than could be built on the same parcel under conventional zoning. However, many communities offer the possibility of additional units in return for provision of some type of community benefit, including affordable housing (developers often have the option of receiving bonus units under cluster development for designating additional open space or age-restricted units, which may decrease the attractiveness of building affordable units). Only nine of the 33 IZ ordinances attached to cluster provisions are mandatory.

Another common trigger of IZ is a request to build specific structure types, especially multifamily housing and other high density forms. Eleven ordinances require or encourage affordable units as part of age-restricted housing, twelve programs limit IZ to particular zoning districts, and seven require affordable units for any development that requires a special permit or variance. A few communities have written affordable requirements/incentives into provisions for reuse or conversion of mills and municipal buildings; these provisions are often intended for a specific project.

A fairly common mechanism for voluntary IZ programs was suggested by a 1975 revision of the state's zoning enabling legislation (Chapter 40A), which explicitly authorized localities to grant increases in density in exchange for affordable housing (NHC 2002). Under this mechanism, developers can apply for a special permit granting increased density over that allowed by right; by contrast to the triggers described above, this can usually be applied to conventional subdivisions of single-family houses.

Cost offsets

Unlike the other two study areas, provision of density bonuses and other cost offsets differs considerably by mandatory and voluntary IZ program status, as shown in Table 4.18. Only about one-third of mandatory IZ programs offer a density bonus, while virtually all voluntary programs do. Of the four voluntary programs that do not offer bonus units, three relax other requirements, generally lot sizes or frontages; the town of Ayer "encourages" developers to designate affordable units under cluster development but does not describe any specific incentives to do so. Besides reductions in dimensional requirements, at least one community (Arlington) reduces the number of parking spaces and another (Somerville) offers fast-tracking and waiver of some development fees.

Buyout options

Buyout options are reasonably common among Massachusetts IZ programs, although their presence varies by mandatory-voluntary status. Roughly one fourth of communities with purely

voluntary IZ programs offer alternatives to on-site production, while half of communities with mandatory IZ have buyout options (Table 4.19). Some ordinances, such as Arlington's, state that buyout options should be granted "only under exceptional circumstances". However, the case study of Newton points out that the amount of payment required per unit, originally set in 1977, was not indexed to inflation and therefore is only a fraction of the current cost of developing units (NHC 2002).

Affordable housing production

Unlike in the DC and San Francisco regions, several surveys suggest that relatively few affordable units have been produced under local IZ programs in Massachusetts, although it is also quite difficult to obtain complete and accurate counts of units produced. According to data in the LHR database, which was reported by municipal staff, approximately one-fifth of the communities with IZ programs that reported production outcomes have produced some affordable units through IZ (Table 4.20). However, over one-third of communities were either unable or unwilling to state whether any affordable units had been built. The lack of production may reflect the very recent dates of adoption in many communities: of the 33 communities with known adoption dates prior to 2000, 10 communities reported some affordable housing having been built, 8 reported no development, and 15 did not respond. The database An earlier survey by CHAPA estimates that between 1990 and 1997, approximately 1000 affordable units statewide were constructed under local IZ programs, while about 5000 affordable units were built under Chapter 40B (NHC 2002). Further analysis of the characteristics of IZ and market conditions that may encourage or inhibit production of affordable units will be explored in later sections of this paper.

Summary

IZ ordinances in Massachusetts are quite heterogeneous, and differ not only from one another, but from those in the other two study areas. IZ is a much newer tool in Massachusetts, and is much more likely to be optional (or to have both optional and mandatory components). Most IZ ordinances apply only under a narrow set of conditions, triggered by cluster development, age-restricted housing, specific locations or structure types. Perhaps because IZ is so often associated with other requirements, it is quite common for municipalities to have several different provisions for affordable housing, for instance, an optional density bonus for affordable units as part of cluster zoning and a mandatory requirement in senior housing overlay district. In general, IZ programs among Boston-area suburbs require a higher share of affordable units and longer affordability terms than in other regions, but target a higher income group. The presence of density bonuses and buyout options varies considerably by mandatory status. Quite a few programs have not yet produced any affordable units, although this may reflect the relatively recent adoption of many programs.

4.4 Conclusion

In this section, we have illustrated the complexity and variability of local inclusionary zoning programs in three metropolitan areas in which IZ is relatively widespread and longstanding. As the descriptive statistics demonstrate, IZ programs vary by the share of required affordable units, the targeted income population, the length of affordability restrictions, mandatory status, the presence and nature of exemptions or triggers, type and frequency of cost offsets and buyout

options. The characteristics and stringency of IZ programs described in this study vary across jurisdictions – and in some cases, across locations or building types within jurisdictions. However, we do observe some consistent themes across jurisdictions within each metropolitan area. In general, IZ programs in California fit the “standard” model of mandatory programs that apply broadly across locations and structure types within a city or county, but most attempt to soften any negative impacts by granting density bonuses or other cost offsets and offering developers alternatives to developing affordable units on-site. In the Washington DC area, most IZ programs are also mandatory, but exempt small projects and those in low-density areas. Programs in DC also grant density bonuses and cost offsets, and the period of affordability restrictions tends to be lower than in the other regions. IZ programs in Suburban Boston exhibit the highest degree of within-MSA heterogeneity; while some programs are fairly straightforward and have well-defined requirements with broad applicability, many others are optional or written to apply only to narrowly defined geographic areas or types of development. Differences in the structure of IZ programs, state regulatory environments and housing market characteristics make it infeasible to compare effects of IZ across the three regions.

The complexity of IZ programs makes it difficult to compare overall stringency or likely effectiveness of programs across all the components examined. For IZ programs with extensive exemptions or triggers, it is difficult even to determine what share of proposed developments will be subject to the requirements without obtaining additional data, such as the share of undeveloped land served by public water and sewer, or the average size and current zoning of undeveloped land parcels. Even with such data, comparisons are anything but straightforward. For instance, is a program that applies only in a single residential zoning district, which requires 20 percent of units set aside permanently for very-low and low-income households less strict than a program that applies to all land in a jurisdiction, but requires only 10 percent affordable units, targeted at moderate-income households, with affordability restrictions that expire after 15 years? Which is likely to produce more affordable units, a mandatory program with no density bonus that allows off-site construction or an optional program that offers a 20 percent density bonus and fast-track permitting? The theoretical models developed in Section 2 are not sufficient to answer these questions; rather, we must turn to empirical analysis of housing market outcomes under each of the observed IZ programs.

Table 4.1: Presence and mandatory status of IZ programs, SF Bay Area

County	County IZ program	Cities/towns in county	Percent of cities/towns with IZ	
			Mandatory	Optional
Alameda CA	Mandatory	14	57%	0%
Contra Costa CA	Mandatory	19	21	5
Marin CA	Mandatory	11	64	0
Napa CA	Mandatory	5	60	0
San Francisco CA	Mandatory	--	--	--
San Mateo CA	Mandatory	20	35	0
Santa Clara CA	None	15	33	20
Santa Cruz CA	Mandatory	4	50	0
Solano CA	None	7	14	0
Sonoma CA	None	9	78	0
Total		104	40	4

Table 4.2 Timing of IZ adoption, SF Bay Area

Year IZ adopted	Jurisdictions	Percent
Pre 1980	5	9%
1980-89	15	27
1990-99	27	49
2000-04	8	15
Total	55	100

Table 4.3 Required share of affordable units, SF Bay Area

Min affordable share	Jurisdictions	Percent
1-10%	25	45%
11-15%	18	33
16-25%	11	20
Unknown	1	2
Total	55	100

Table 4.4 Target population for affordable units, SF Bay Area

Target income pop	Jurisdictions	Percent
VLI LI	7	13%
VLI LI MI	23	39
VLI LI MI MD	1	2
VLI MI	1	2
LI	2	4
LI MI	19	34
MI	2	4
Total	55	100

VLI = very low income; LI = low income; MI = moderate income; MD = median income

Table 4.5 Distribution of affordability terms, SF Bay Area

Length of affordability	Jurisdictions	Percent
20 yrs	2	4%
30 yrs	10	18
40-49 yrs	10	18
50-59 yrs	11	18
99, permanent	10	18
Unknown	12	25
Total	55	100

Table 4.6 Minimum project size subject to IZ, SF Bay Area

Minimum units	Jurisdictions	Percent
No minimum size	12	23%
2-5 units	26	45
6-10 units	13	21
11+ units	4	7
Total	55	100

Table 4.7 Alternatives to on-site construction, SF Bay Area

Buyout options	Jurisdictions	Percent
Alternative:		
In-lieu fees	44	77%
Off-site development	40	70
Land donation	21	38
Developer Credit Transfer	9	16
More than one buyout option	38	66
None	8	14

Note: rows are not mutually exclusive options. A jurisdiction that offers both in-lieu fees and off-site development would be included in both of those rows, and in the “More than one buyout option” row.

Table 4.8 Affordable units produced under IZ, SF Bay Area

Units produced	Jurisdictions	Percent
0 units	2	4%
1-100	22	39
100-500	18	32
501+	4	7
Unknown	9	18
Total	55	100

Table 4.9 Timing of IZ adoption and amendment, Washington DC Area

County	Adopted	Amended	Repealed
Fairfax VA	1990	1998	n/a
Fauquier VA	1996	n/a	n/a
Loudon VA	1993	2000	n/a
Montgomery MD	1974	1981; 1989	n/a
Prince George's MD	1991	n/a	1996
Washington, DC	2007	n/a	n/a

Note: Washington DC is presented here for comparison but is not included in later empirical analysis

Table 4.10 Required share, target population and affordable length, Washington DC Area

County	Affordable Units Required	Targeted Income (% AMI)	Length of Affordability (years)	
			Owners	Renters
Fairfax VA	6.25-12.5%	Up to 70%	15	20
Fauquier	n/a	n/a	5	5
Loudon VA	6.25%	30%-70%	15	20
Montgomery MD	12.5%-15%	Up to 65%	10	20
Prince George's MD	10%	Up to 70%	10	10

Table 4.11 Affordable units produced under IZ, Washington DC Area

County	Total units produced		Average annual units (adoption to 2003)
	by 1999	by 2003	
Fairfax VA	582	1735	133
Fauquier VA	n/a	n/a	n/a
Loudon VA	208	707	71
Montgomery MD	10,600	11,210	387
Prince George's MD	1600	1600	320
Total	12,990	15,252	227

Note: Since Prince George's ordinance was repealed in 1996, no new units were produced between 1999 and 2003. No data on units developed in Fauquier are available.

Table 4.12 Presence and mandatory status of IZ programs, Boston-area suburbs

Status	Cities/towns	Percent
Inclusionary zoning	99	53.0%
Optional	42	22
Mandatory	34	18
Both optional & mandatory	23	12
No inclusionary zoning	88	47.0
Total	187	100.0

Table 4.13 Timing of IZ adoption, Boston-area suburbs

Year IZ adopted	Cities/towns	Percent
Pre 1980	3	3.03
1980-89	14	14.14
1990-99	16	16.16
2000-04	48	48.48
Date unknown	18	18.18
Total	99	100.0

Table 4.14 Required share of affordable units, Boston-area suburbs

Minimum pct affordable	Cities/towns	Percent
10% or less	39	39%
11-15%	18	18
16-60%	15	15
NA	27	27
Total	99	100

Table 4.15 Targeted population for affordable units, Boston-area suburbs

Targeted Income Group	Cities/towns	Percent
VERY LOW, LOW, MOD	1	1%
LOW	17	17
LOW, MOD	45	45
LOW, MOD, MEDIAN	6	6
MODERATE	4	4
NA	26	26
Total	99	100

Table 4.16 Distribution of affordability terms, Boston-area suburbs

Term (years)	Cities/towns	Percent
10	2	2%
15	2	2
20	2	2
30	7	7
40	3	3
50	1	1
80	1	1
99	3	3
Perpetuity	30	30
NA	48	48
Total	99	100

Table 4.17 Trigger conditions for IZ, Boston-area suburbs

Trigger condition	Cities/towns
Minimum project size	28
Cluster/PUD	33
Structure type	18 MF: 14 TH: 2 Accessory apartments: 2 Duplex: 1
Senior housing	11
Specific districts	12
Developer initiated	10
SP/variance request	7
Conversion/reuse	3
No specific condition listed	8

Note: the conditions are not mutually exclusive; many communities have more than one IZ with different triggers, or may list multiple conditions for a single program (i.e. multifamily housing in a specific district).

Table 4.18 Density bonuses by mandatory status, Boston-area suburbs

IZ program	Has density bonus	Total cities/towns	Percent
Mandatory	11	34	32%
Voluntary	38	42	90%
Both mandatory & voluntary	21	23	91%
Total	70	99	71%

Table 4.19 Alternatives to on-site construction by mandatory status, Boston-area suburbs

Inclusionary status	Has buyout options?	Total cities/towns	Percent
Optional	11	42	26%
Mandatory	17	34	50%
Both opt & mandatory	10	23	43%
Total	38	99	38%

Table 4.20 Affordable units produced under IZ by mandatory status, Boston-area suburbs

Inclusionary status	Any affordable units built?			Total	Percent built any (of known outcomes)
	Yes	No	Unknown		
Optional	10	18	14	42	36%
Mandatory	6	14	14	34	30%
Both opt & mandatory	5	11	7	23	31%
Total	21	43	35	99	33%

Section 5: Challenges to empirical analysis

In Section 2, we discussed the predicted impacts of several stylized models of IZ. In order to obtain clear theoretical predictions about the isolated impacts of a single policy (or single component of a policy), it is necessary to make some simplifying assumptions. As the descriptions of IZ programs in our sample jurisdictions presented in Section 4 illustrate, however, most IZ programs are considerably more complex than the models presented. There are several challenges to conducting empirical analysis of both the effects of IZ on housing markets and the effectiveness of IZ at producing affordable housing. First, because IZ ordinances are complicated, often ambiguous and change over time, it is difficult to construct accurate, comprehensive measures of their overall stringency. Second, IZ ordinances function as part of a larger regime of local and state land use and housing policies; distinguishing the effects of IZ from that of other regulations poses technical and conceptual challenges. Finally, determining the “success” of IZ programs would require better data on production of affordable units –under IZ and other programs – than are currently available and would require a consensus about what counts as success.

5.1 IZ ordinances are complicated, open to interpretation, and change over time

In Section 4, we describe how IZ programs in our study areas vary by a number of characteristics, including mandatory status, exemptions, cost offsets, buyout options, required share of affordable units, depth of income targeting and length of affordability restrictions. Ideally, an empirical analysis of IZ would control for the structure and stringency of these programmatic elements. However, the complexity, ambiguity, and frequently changing nature of IZ ordinances makes it challenging to construct measures that accurately reflect the stringency of a given policy. As described in Section 4, IZ ordinances often set different income targets based on tenure, or construct a sliding scale of share of affordable units with lower unit requirements for lower income targets. One of the most important components in determining the stringency of IZ is the size of the density bonus offered (if any). Unfortunately, determining the true size of the bonus is quite difficult; often bonuses vary by the density of the underlying zoning district (which is itself not an easy piece of data to obtain), the share of units provided and/or the income group targeted. Some programs do not even define a numeric target, but determine the size of the bonus through case-by-case negotiations with the developer. In addition, the effective size of the bonus (the number of additional units that can actually be developed) may be further limited by other zoning regulations or at the discretion of municipal officials, who may respond to community pressure to limit height or density.

Nor is the problem just an issue of how to construct composite measures; in many instances the regulations are intentionally written ambiguously to leave room for interpretation on the part of municipal officials. For instance, several of the counties in the DC area allow exemptions from IZ if providing affordable units “presents a physical or financial hardship” (Brown 2001). Exactly what circumstances constitute such hardship may vary in the opinion of local officials at any given point in time, and quite likely differs across jurisdictions as well; such clauses could be interpreted so narrowly as to require almost universal compliance or so broadly as to exempt virtually all projects – or used to discourage projects confronted with significant opposition from neighbors. Given the amount of discretionary implementation written into many IZ programs, it

is entirely possible that two programs that appear quite similar on paper will be implemented with differing degrees of stringency and thus will produce quite divergent outcomes. As with other types of land use regulation, the variation in enforcement means that even the most carefully constructed measures of regulatory stringency are likely to be imperfect indicators of true stringency (Schuetz 2007, Sims and Schuetz 2007).

A final problem in constructing accurate measures of the stringency of IZ programs is that the contents of the programs change over time; detailed case studies of several communities suggest that jurisdictions revise their IZ ordinances roughly every 5-10 years to adjust for changing economic, political and legal conditions (Brown 2001). Calavita and Grimes (1998) indicate that jurisdictions in CA that adopted IZ during the early-to-mid 1970s revised them to be more stringent during late 1970s and early 1980s, but that in the 1990s the trend was towards more lenient revisions, such as adding cost offsets and buyout options. A study by CCRH (2003) reports that nearly 50 percent of jurisdictions with IZ have amended their ordinances at least once, many in the five years prior to the study, with a general tendency towards greater stringency. In an updated study, NPH (2007) finds that newer IZ programs tend to produce more rental housing, targeting lower-income households, and impose more stringent on-site production requirements. Cambridge, MA, initially enacted a voluntary IZ program, but, after 10 years of no affordable housing production, changed the regime to mandatory (PolicyLink 2003). As difficult as it is to assemble a fairly complete set of characteristics on a selection of IZ programs at a single point in time, identifying changes in individual components over a longer period would be infeasible for any large sample.

5.2 IZ interacts with other land use regulations

IZ is merely one component of a locality's land use regulations, and may be adopted in conjunction with other regulatory changes to achieve several policy goals. If IZ is adopted concurrently – and used together with – other land use policies, it will be difficult empirically to isolate the effects of the policy. In addition, other policies may affect the incentives or ability to use IZ. Below we discuss some of the local land use regulations that are likely to interact with IZ programs.

The stringency of conventional zoning, including the basic underlying density and level of difficulty of obtaining building permits, will affect the attractiveness of any IZ program that offers cost offsets. Baseline densities that are well below profit-maximizing densities will enhance the appeal of a density bonus, while other cost offsets will be relatively more valuable in areas with high baseline development fees or cumbersome permitting processes. Areas with particularly stringent zoning are also likely to have relatively high housing prices and low levels of permitting, which may confound perceived effects of IZ. As mentioned earlier, underlying density regulations, such as building height caps or setbacks, may constrain the ability of developers to utilize the full amount of the density bonus. Localities may change their underlying zoning when they add IZ to increase the relative attractiveness of using IZ; for instance, Prince George's County, MD, adopted its IZ policy together with a systematic reduction in its allowable conventional density, generating a stronger incentive for developers to use IZ than would have existed under the prior zoning (Brown 2001).

A variety of local regulations may be designed to work in conjunction with IZ ordinances. Some communities with growth management policies, such as permit caps or subdivision phasing, exempt or grant preference to developments with affordable housing, in order to encourage use of IZ. As shown in Section 4, many of the ordinances in Massachusetts create IZ as part of cluster or open space residential zoning; developers have greater flexibility and receive a density bonus for planned developments that include designated open space as well as affordable housing. A recent trend of zoning for age-restricted housing (either in special districts or allowing higher densities than in underlying districts if housing is restricted by age) is frequently combined with an affordable housing requirement; some portion of the age-restricted housing must be affordable as well. Similarly, some communities place restrictions on the occupants of accessory apartments, stipulating that such apartments may only be constructed if the residents are elderly, low- or moderate-income, or relatives of the primary structure's residents (Local Housing Regulation Database 2006). Given the compound nature of these requirements, some of which also involve a more complex permitting processes than standard housing developments, it will be difficult to attribute any price effects of the broader policies to the affordable housing component.

5.3 IZ programs interact with other affordable housing policies

Inclusionary zoning is not the only policy tool used to produce affordable housing; IZ may reinforce, crowd out (or be crowded by) other local or state programs. Failure to control for other affordable housing programs and policies may thus confound empirical results attributed to IZ. As described in Section 4, at least three of the five states in our sample – California, Massachusetts and Maryland – have statewide affordable housing or land use policies that are likely to interact with IZ. In addition, local jurisdictions across all of the states may also use federal subsidies, such as Section 8 or Low Income Housing Tax Credits, to provide affordable housing. These programs could be employed differentially across IZ and non-IZ jurisdictions. Cambridge, MA actually combines IZ with Section 8, by requiring that all of the rental units generated under IZ go to Section 8 housing voucher holders (PolicyLink 2003). This scenario illustrates the difficulty of teasing apart the impact of the IZ unit versus the Section 8 subsidy.

In general, the amount of affordable housing that already exists and the alternative means that could be used to develop affordable housing may affect whether and when a jurisdiction decides to adopt IZ, how it structures the program, the likelihood that affordable units are built under IZ, as well as the price and quantity of market-rate housing in the community. For instance if a local government decides to raise property tax levels to fund public construction of affordable housing, rather than adopt IZ, the observed housing market outcomes could nonetheless look quite similar. Therefore empirical analysis should attempt to control for the presence of other affordable housing production programs.

5.4 Data limitations and conceptual difficulties in evaluating “success” of IZ

Most of the discussion so far has focused on challenges to identifying the impacts of IZ on the price and production of market-rate housing. Another important component of evaluating IZ programs is an assessment at how effective they are at producing affordable housing units.

There are several additional challenges to answering this question, ranging from problems with data collection to discordant definitions of successes..

First, although some surveys have attempted to collect data on the number of affordable units produced by jurisdiction under IZ (or cash and land donations given in lieu of affordable units), the data are incomplete and of questionable accuracy. Many jurisdictions do not keep records on the number of units built, so surveys rely on the institutional memory of municipal staff (Local Housing Regulation Database 2006). In some jurisdictions with longstanding programs (for instance, Montgomery County, MD), many of the units produced have outlived their original affordability restrictions (Brown 2001).

Second, even if a complete inventory of affordable units built under IZ could be assembled, analyzing the effectiveness of the programs requires a comparison to the counterfactual: how many affordable units would have been produced in the absence of IZ. To answer that question, we would also need data on the number of affordable units produced in jurisdictions without IZ through other mechanisms, including Low Income Housing Tax Credit units and housing funded through other state, local or federal subsidies. An inventory of all affordable housing units by jurisdiction is not currently available.

The third challenge to assessing the “success” of IZ comes not from data limitations, but from a lack of consensus on the primary goals of the program. Many of the arguments advanced in favor of inclusionary zoning are somewhat tangential to the direct economic impacts described above (see, for instance, CA Coalition for Rural Housing 2003, Brown 2001, PolicyLink 2003). According to many advocates, IZ offers three main advantages over other means of producing housing that is affordable to low- and moderate-income households (assuming that the market will not produce housing at sufficiently low cost for these households). First, they argue that IZ does not involve direct out-of-pocket subsidies from government, and so is less costly for the public sector.⁵³ Second, relative to previous federal housing programs, IZ may be more likely to create affordable units in economically integrated neighborhoods and thus avoid concentrating poor households. The greater dispersal of affordable units is also viewed as somewhat less likely to trigger community opposition from potential neighbors. Third, it may be politically more feasible for local governments to adopt IZ than to obtain alternate sources of funding to develop affordable units (i.e. federal or state subsidy programs). These arguments raise questions about what the primary objectives of IZ programs are and what they ought to be. Should they aim to maximize the total number of affordable units produced? To minimize the costs of producing affordable units, either overall or to the public sector? Or to disperse affordable units throughout the jurisdiction? Evaluating the validity of these arguments, or comparing the economic efficiency and political feasibility of IZ relative to other methods of developing affordable housing, is outside the scope of this study.

5.5 Conclusion

⁵³ However, the study by CCRH (2003) suggests that in fact many local governments do provide additional subsidies to developers producing units under IZ. Developers may also use LIHTC or other federal or state subsidies in conjunction with IZ.

Despite the difficulties outlined above, it is critical from a policy perspective to attempt to assess the impacts and effectiveness of inclusionary zoning. Municipal governments across the U.S. continue to adopt local IZ policies, without having full information about the likely impacts of these policies. Given the prevalence of these policies, the perfect research design should not be the enemy of the good. As we describe in Section 6, our study improves on both the data and methodology of prior research. The results of our empirical analysis are likely to be limited by the challenges described above; however, this study should be viewed as a first step in an ongoing research agenda on the topic, to be continued and supplemented as better data become available.

Section 6: Empirical strategy and data description

Using data on IZ in the San Francisco and DC metropolitan areas and Suburban Boston, we explore three research questions: which jurisdictions have adopted local IZ programs, what affects the amount of affordable housing produced under IZ, and how does IZ affect the price and production of market-rate housing. In this section, we describe in greater detail the empirical strategy and data used to analyze each of these questions.

6.1 Which jurisdictions have adopted IZ?

Understanding how jurisdictions that have adopted IZ differ from those that have not will provide useful insight into local policy goals, and will help resolve the endogeneity problems faced in analyzing the effects of IZ on housing market outcomes. Several explanations for why jurisdictions adopt IZ are plausible. Because the explicit goal of the policy is to create a supply of below-market housing units, we would expect that jurisdictions that have experienced unusual increases in housing prices – or that anticipate unusual price increases in the near future – would be more likely to adopt IZ than jurisdictions with less price inflation.⁵⁴ There are also systematic differences in jurisdictions' willingness to adopt additional forms of regulations: some local governments are consistently more likely to be innovators and adopt more regulations or adopt new forms of regulation sooner. The literature on diffusion suggests that jurisdictions react to the behavior of their neighbors, in which case the prevalence of IZ in the immediate vicinity may affect the probability and timing of a jurisdiction's adoption of IZ. To identify which determinants affect the probability that a jurisdiction has adopted IZ, we would ideally like to estimate the following equation:

$$(1) \quad \Pr[IZ_{it}] = f(X_{it-1}, Own_regs_{it}, IZ_{jt}), \quad j \neq i$$

where IZ_{it} is a binary variable indicating the presence of IZ in jurisdiction i at time t , X_{it-1} is a vector of housing supply and demand determinants in jurisdiction i at time $t-1$ (some point prior to adoption of IZ, to avoid reverse causality), Own_regs_{it} is a vector of variables measuring other types of land use regulations in jurisdiction i in time t , and IZ_{jt} is a measure of the prevalence of IZ among neighboring jurisdictions (j) at time t . Because Own_regs_{it} and IZ_{jt} are observed concurrently, it is unclear whether other regulations prompt the adoption of IZ or vice versa, or whether both are driven by common underlying variables. In any case, the estimated coefficients on Own_regs_{it} and IZ_{jt} should not be interpreted as proof of causal relationships. Table 6.1 provides brief descriptions and sources for all variables; descriptive statistics are shown in Table 6.2. We have tried to create relatively consistent variables across the three metropolitan areas, but in some cases variables are defined differently to accommodate the form or content of the data.

For Suburban Boston and the San Francisco area, we will estimate probit models of Equation 1, with slight variations to accommodate the data available for each area. The presence of IZ among Boston-area suburbs is observed in 2004, IZ in San Francisco jurisdictions are measured

⁵⁴ Some jurisdictions may adopt IZ in order to satisfy state planning requirements or guard against charges of exclusionary zoning; these motives are likely to be driven by state planning or fair housing laws, so would differ across states but not across jurisdictions within the same state.

as of 2006. Almost all IZ programs in both areas were adopted after 1980, so baseline characteristics for both sets of regressions are measured as of 1980 (the 4 jurisdictions in each MSA that had adopted IZ prior to 1980 are excluded from the regressions). Controls for ethnic composition also vary by MSA; regressions for the San Francisco area include measures of the share of black, Asian and Hispanic population separately. In nearly all jurisdictions in the Boston area, the population is over 90 percent non-Hispanic white, so it is not feasible to include separate measures for other racial/ethnic groups. Regressions on Boston-area suburbs also include controls for other types of land use regulations; data on other regulations are not available for San Francisco. To identify whether IZ is correlated with other types of regulations, we include continuous variables indicating the weighted average minimum single family lot size required by zoning, the number of potential multifamily lots that are permitted under baseline zoning, and dummy variables indicating the presence of cluster zoning, growth management, wetlands protection bylaws and septic regulations.⁵⁵

Patterns of diffusion of regulations among local governments suggest that jurisdictions are more likely to resemble physically proximate neighbors than more distant jurisdictions, even controlling for underlying characteristics. Technically, this creates the possibility of spatial autocorrelation among the error terms (i.e. unobservable characteristics in the error term exhibit correlation with unobservable characteristics in the error terms of their geographic neighbors). All models presented in the analysis calculate robust standard errors clustered by county to correct for spatial autocorrelation; clustered standard errors differ from non-clustered estimates, confirming the presence of spatial correlation. In addition, as a direct measure of whether jurisdictions' adoption of IZ is influenced by their geographic neighbors, most of the models include an indicator of the share of jurisdictions within the same county that have adopted IZ (or the mean year of IZ adoption in the county). As shown in Table 6.3, prevalence and timing of IZ adoption among Boston-area suburbs show distinct patterns across counties.

Unfortunately it is not feasible to estimate similar regressions for the DC area jurisdictions. As of 2000, only five jurisdictions had adopted IZ, and because all of them are counties, comparing those counties to the 18 other counties in the MSA without IZ would yield too small a sample size for meaningful results from regression analysis. As an alternate method of comparing counties with and without IZ, we calculate mean differences in characteristics similar to those used in the Suburban Boston and San Francisco regressions. Because four of the five counties adopted IZ on or after 1990, we use 1990 as the baseline period.⁵⁶

6.2 What affects the quantity of affordable housing actually produced under an IZ program?

The second research question we examine is what affects the amount of affordable housing produced under IZ. As discussed in Section 2, the potential costs of IZ are the predicted negative impacts on housing markets (increased prices or decreased production), while production of affordable units is the primary potential benefit. We would expect various structural components

⁵⁵ Further information on how these variables are measured can be found in the codebook to the LHR database, available online at www.masshousingregulations.com. An extended discussion of the multifamily zoning measure is included in Schuetz (2007a and b).

⁵⁶ We have not yet acquired 1970 census data, and so cannot compare pre-IZ characteristics between non-adopters and the county with the oldest IZ program, Montgomery County MD.

of IZ (such as whether it offers density bonuses) and the length of time IZ has been in place to affect the amount of affordable housing produced under the program. Market pressures on housing supply and demand that affect production of market-rate housing should also affect production of affordable units. The specification of the model to be estimated varies somewhat with each MSA, depending both on data availability and the nature of IZ programs. All of the jurisdictions in the San Francisco and DC areas that have IZ have produced at least some affordable units, and we have obtained at least rough estimates of the number of units produced. However, in the Boston suburbs, many of the programs have never been triggered, and data on the number of units produced (if any) are not exact. Equation 2 shows the general specification to be estimated for San Francisco; equation 3 shows the model to be estimated for Suburban Boston. The reasons for the different models are described in more detail below.

$$(2) \quad IZ_units_{it} = f(IZ_structure_{it}, IZ_years_{it}, X_{it-1})$$

$$(3) \quad Pr[IZ_used_{it}] = f(IZ_structure_{it}, IZ_years_{it}, X_{it-1}, Own_regs_{it})$$

where IZ_units_{it} is the number of affordable units built under IZ in jurisdiction i by time t ,⁵⁷ $Pr[IZ_used_{it}]$ is a binary variable indicating whether any affordable units have been built in jurisdiction i at time t , $IZ_structure_{it}$ is a vector of variables describing the characteristics of the IZ program, IZ_years_{it} is the number of years since IZ was adopted, X_{it-1} is a vector of housing supply and demand determinants in jurisdiction i at time $t-1$, and Own_regs_{it} is a vector of variables measuring other types of land use regulations in jurisdiction i in time t . Structural characteristics of the IZ program are observed at a single point in time, concurrent to production levels, and for the analysis are assumed to have remained constant since the date of adoption. However, we know anecdotally that at least some places have substantially amended their IZ programs since original adoption; changes in the stringency of IZ components since adoption will introduce noise into the estimated coefficients on the structural characteristics. Further descriptions of the variables are shown in Table 6.1.

Analysis of affordable housing production under IZ in the Boston suburbs raises two empirical challenges. First, adoption of IZ in the Boston area is relatively recent; as shown in Table 4.13, nearly half the IZ programs in the LHR database were adopted between 2000 and 2004. Not surprisingly, a majority of the newer programs (27 of 48) reported that IZ has not been triggered (or used voluntarily) as of the survey date. It will be difficult to determine whether this results from structural reasons, market pressures or simply program duration. In particular, it will be difficult to assess the effect of mandatory status (which theoretically is one of the more important characteristics), because over half of the mandatory programs have been adopted since 2000 and likely have not existed long enough to produce either affordable units or significant effects on housing markets. The small sample of programs that has existed long enough to have produced affordable units limits our ability to conduct fine-grained analysis of the relevance of program characteristics, and may bias estimated effects of IZ on housing markets towards zero.

⁵⁷ In our analysis for this paper, time t is the year in which the survey of IZ programs was conducted, and is constant for all jurisdictions within an MSA but differs across MSAs. However, this model could also accommodate panel data with multiple observations per jurisdiction over time, if such data were available.

The second complication in the analysis of affordable housing production in Suburban Boston (and to a lesser extent, in the analysis of the effects of IZ on housing prices and permits) is that a relatively large number of observations are missing data on whether IZ has ever been applied and the year IZ was adopted. Roughly one-third of jurisdictions with IZ (34 out of 99) do not report whether IZ has been applied, and 17 percent did not report the year IZ was adopted. Results of t-tests on mean differences in a number of characteristics (shown in Appendix D) show few systematic differences between jurisdictions that report the year IZ was adopted and those that do not (those missing year of adoption are less highly educated and more likely to target very low income households). Jurisdictions that do not report whether IZ has ever been applied tend to have larger, older populations, higher housing density, less restrictive zoning and older IZ programs. Excluding observations with missing data, particularly year adopted, seems unlikely to generate much bias in our results, but the missing data do further reduce our sample size, which will tend to increase standard errors and reduce significance levels.

The analysis of affordable housing production in San Francisco area jurisdictions also poses a number of methodological challenges. Many IZ programs in the Bay Area have existed longer than those in Massachusetts, but only 55 jurisdictions had IZ as of 2006, yielding quite a small sample for statistical analysis. Of those 55 IZ programs, only four are optional, so it is not possible to test for statistically significant differences between mandatory and optional programs. Data are missing on the required length of affordability for roughly one-fifth of the programs (12/55), making it difficult to identify the effect of that characteristic. As shown in Table 6.4, there do not appear to be consistent patterns or correlations in the structural components of IZ programs, although more recently adopted programs are more likely to require some deep targeting of income, making at least some units affordable to very low income households.

Whereas the analysis of affordable housing production under IZ in Suburban Boston is measured as a binary outcome, whether any affordable units have been built, for the San Francisco area, because all jurisdictions with IZ have produced at least some affordable housing, we estimate the effect of structural and market dynamics on the actual number of units produced. There are several potential weaknesses of the data on the number of affordable units, however. Among the San Francisco area programs, nine jurisdictions did not report the number of units, further reducing the sample size and raising questions of selection bias. It is also unclear exactly what the reported numbers include: the number of affordable units currently in existence, the number of units ever created (which could include units with expired affordability), or possibly completed units and ones currently in the development pipeline. The numbers are self-reported by municipal staff and have not been independently verified, so the accuracy relies on the extent and quality of internal record-keeping or institutional memory. Therefore as a robustness check on our results, we run the specifications both on the number of units as a continuous variable and as an ordered categorical variable; results are essentially the same, so we report only the estimates on the continuous measure.

Due to the small sample, we do not conduct regression analysis of the number of affordable units produced by DC-area counties with IZ, but report the number of units along with mean characteristics for each county in Table 7.6.

6.3 How have IZ programs affected housing prices and production?

The third research question we examine is whether IZ has affected the price and production of market-rate housing. As Section 2 describes, to the extent that IZ imposes additional costs on new development, we would expect it to reduce production of new housing and increase prices of both new and existing houses, holding other factors constant. To test these hypotheses, we will estimate reduced-form models of housing prices and permits, including measures for the presence of IZ, as shown in Equation 4.

$$(4) \quad \text{Permits}_{it} = f(\text{IZ_structure}_{it}, \text{IZ_years}_{it}, X_{it}, \text{Own_regs}_{it}, \text{City}_i, \text{Year}_t)$$

where Permits_{it} is a measure of housing permits (or prices) in jurisdiction i at time t , IZ_structure_{it} is a vector of variables describing the characteristics of the IZ program, IZ_years_{it} is the number of years since IZ was adopted, X_{it} is a vector of housing supply and demand determinants in jurisdiction i at time t , and Own_regs_{it} is a vector of variables measuring other types of land use regulations in jurisdiction i in time t . City_i and Year_t are vectors of fixed-effects for jurisdiction and year.

One of the main challenges to identifying the effects of IZ (and other land use regulations) on housing prices and production is the possible confounding effects of omitted (and sometimes unobservable) variables. In particular, if jurisdictions that adopt IZ differ systematically from those that do not – for instance, by adopting other land use regulations or policies that constrain development, or if their residents are more likely to use the political process to block development through informal mechanisms – we run the risk of attributing the effects of those other policies and practices to IZ. In order to avoid this problem, we estimate the models of housing prices and permits as a panel data set, including fixed effects for each jurisdiction (county, city or town) and year. Any characteristics of jurisdictions that do not change over time (perhaps including resident preferences over development) are absorbed by the jurisdiction fixed effects, while time trends that are consistent across jurisdictions (such as changes in interest rates or regional economic trends) are absorbed by the year fixed effects. Thus the coefficients on IZ variables should be interpreted as the estimated effect of a change in IZ policy within a given jurisdiction, and should give an unbiased estimate of the effect of IZ if there are no concurrent changes that directly affect housing market outcomes.

Ideally, we would also control for changes within jurisdictions in housing supply and demand determinants, including other land use regulations, which could impact housing prices and production. Unfortunately, because most of our control variables are drawn from the decennial census, we do not have annual data that would allow us to observe year-to-year changes. We interpolate values for the intervening years; this method should give reasonable approximations of annual values for variables that change slowly over the decade, but are less reliable for variables that experience large changes over this period or have high annual variance. Historically, demographic composition in most jurisdictions tends to be relatively stable (although some places experience rapid demographic change), but the linear interpolation is likely to be a poor estimate of annual population changes. If the interpolated right-hand side variables are relatively close to the true annual values of the variables, then including them will improve the accuracy and predictive power of the model. However, if the interpolations are not

closely correlated with the true values, then including them will introduce noise and possibly bias into the regressions.

As a measure of housing production in all three metropolitan areas, we use annual permits for single-family houses. We chose to use single family permits because they make up the overwhelming majority of all housing permits issued in all three areas during the period from 1980 to 2005. In any given year, single-family permits average over 90 percent of total permits, and between 50 and 90 percent of jurisdictions in our sample issue no permits for multifamily housing. Using a measure of combined single-family and multifamily permits is not feasible, because the two markets display very different patterns over time and with respect to basic market determinants (for instance, multifamily permits rise in the mid-1980s before dropping off sharply after 1986, likely reflecting changes in allowed depreciation in the Tax Reform Act of 1986, while single family permits continue to rise until the early 1990s).⁵⁸ Because annual permits are highly variable (for instance, a large subdivision may be permitted in a single year but built over several years, in which very few new permits are issued), we construct three-year rolling averages of permits as the dependent variable.⁵⁹

Using a similar logic, as the most relevant measure of housing costs, we use data on the sales prices of single family homes. Most jurisdictions in our sample have very few sales in any given year of other property types for which sales data are available (in Boston, we have data on prices of two- and three-family structures, and in both Boston and San Francisco we have condominium prices).⁶⁰ Table 6.1 provides more detailed descriptions and sources of the housing sales data for

⁵⁸ The thinness of the market for new multifamily production causes several problems for analyzing it separately as well, some technical and some conceptual. The distribution of multifamily permits is highly skewed, with most observations clustered at zero and a small number of jurisdictions that issue relatively large numbers of permits in a single year. Although this problem could be addressed by measuring multifamily as a binary outcome (any multifamily permits) or using tobit models, these techniques are more challenging when incorporating fixed effects and clustered standard errors and may not fully correct the problem, given the large proportion of left-censored observations. More conceptually, if very few jurisdictions ever permit multifamily, it seems likely that those jurisdictions differ in some fundamental way from the jurisdictions that do not allow multifamily or that the projects reflect idiosyncratic circumstances, so any estimates of multifamily permits will suffer from endogeneity problems. In the Boston area, concerns over possible endogeneity are exacerbated by the presence of the state's affordable housing program, Chapter 40B. Interviews with planners and developers suggest that a large share of multifamily development in recent years has been done under 40B, and thus is not consistent with conventional zoning. From reviewing comprehensive plans of many of the Boston-area jurisdictions, it seems that many of the most recent adopters of IZ have chosen to create IZ in direct response to prior negative experiences with 40B developments. That suggests that these communities may have issued a large number of multifamily permits, usually overriding their conventional zoning, shortly before adopting IZ. Unfortunately, because we have no reliable data on projects developed under 40B, we cannot directly test for such reverse causation.

⁵⁹ The universe of permit-issuing jurisdictions changes over time; the census adds and removes places. The following places in our sample of CA jurisdictions are missing permit data for at least some years: American Canyon, Brentwood, Clayton, Danville, Dublin, East Palo Alto, Lafayette, Moraga, Oakley, Orinda, San Ramon, St. Helena and Windsor. Four of these places – Clayton, Danville, Dublin and East Palo Alto – have IZ; all but Clayton adopted IZ well after permit data became available, so this should not affect the results.

⁶⁰ We repeat the specifications for Suburban Boston, shown in Table 7.4, using median price for all property sales as well. Besides single-family, two- and three-family and condos, "all properties" includes larger multifamily, commercial buildings, and vacant land sales. Several of the smaller towns have small numbers of single-family sales but substantial numbers of total sales – given the locations and characteristics of these towns, it seems likely that total sales include a number of vacant land parcels intended for residential subdivisions, a property type that should reflect price effects of IZ. Regression results using total sales prices are substantively the same as results of

each area. Our analysis focuses on price effects in the owner-occupied market rather than the rental market for two reasons. First, the rental market in most jurisdictions in the sample is quite small (median owner-occupancy rate is approximately 75-80 percent, and many jurisdictions have a small absolute number of rental housing units as well), so that median rents may reflect idiosyncratic characteristics of a few large properties. Second, the only source of data on rents is the decennial census, so effects of IZ on rents could only be seen on a small number of widely spaced observations.

Ideally we would like to include measures of the structural components of IZ described in Section 2 (mandatory status, density bonus, etc.). However, the sample size and limited variation across these components within each metropolitan area in our sample hinder our ability to do this. Virtually all the IZ programs in the San Francisco and DC areas are mandatory, and although the Boston suburbs are roughly evenly split between mandatory and optional programs, a very large share of the mandatory programs have been adopted so recently that it is uncertain whether they have produced any observable effects on housing markets, let alone whether those effects can be distinguished by type of IZ program. Moreover, anecdotal evidence suggests that quite a few jurisdictions in all three areas have amended their IZ programs since original adoption, but we do not have sufficient data on the timing and nature of changes to incorporate the evidence into our regressions. If current IZ programs are more stringent than previous ones, then using current characteristics will introduce noise into our estimates because of the error with which those characteristics are measured.

Rather than use a simple indicator variable for the presence of IZ in a given year, we test for different effects based on the length of time IZ has been in place in each jurisdiction. We would expect some lag time before IZ produces any effects on housing prices or permits, since projects begun shortly prior to the adoption of IZ usually will be grandfathered in. Moreover, the effects of IZ may flatten out over time, as developers and officials become more adept at implementing the program. To test for the lag in initial effects, we indicate the presence of IZ using a two-year lagged dummy variable, while using the natural log of years since IZ is adopted accommodates nonlinear effects over time.⁶¹ These functional forms yield more strongly significant and robust results than similar specifications using non-lagged dummies and linear time trends. All specifications exclude jurisdictions that do not report the year IZ was adopted.

In addition to including the interpolated controls for market determinants of housing supply and demand, in the Suburban Boston specifications, we also control for adoption of several other types of land use regulations, namely cluster zoning, growth management, wetlands bylaws and septic rules. It is not possible to control for two of the regulatory variables used in the analysis of probability of adopting IZ, single-family minimum lot size and potential multifamily lots, because the data for these variables are observed at a single point in time. Following the same logic described in the previous paragraph, that the effects of land use regulations are likely to vary with the time they have been in place, we control for the log of years since each of the other regulations was adopted. We are missing data on the year of adoption for a number of each of

single-family prices, but more strongly significant. However, given the uncertainty about the composition of sales, we do not show these results here.

⁶¹ Conversations with developers and local officials in several Boston area jurisdictions suggest that it takes about 2-3 years for residential projects to be completed.

these regulations as well, so those jurisdictions with missing data are excluded from the regression. Unfortunately, dropping these observations excludes one third (33) of the sample jurisdictions with IZ, raising concerns about the possibility of selection bias among the remaining observations. In Appendix E, we present several robustness checks on the functional form of other land use regulations; using lagged dummies rather than log of years gives similar results.

To analyze changes in housing prices and permits in the DC counties with IZ, we construct a difference in difference estimate for each of the four counties that adopted IZ after 1980. In Table 7.6, we calculate average permits for each county during the three years immediately prior to the year IZ was adopted and three years after IZ is presumed to be effective (incorporating the two-year lag). We then compare those changes to changes over the same period in average permits across the 18 counties that had not adopted IZ by 2000. Under the traditional interpretation of difference-in-differences, the difference in production across the two periods between treatment and control groups is the effect attributed to the change in policy. Table 7.6 also compares differences in median housing prices for counties with IZ and the control group in 1990 and 2000. The estimated price changes are a noisier estimated effect of IZ than permits, both because prices are observed at quite wide time intervals and because the lack of multiple observations for IZ counties makes it impossible to calculate statistical significance of the differences. In addition, the price changes for Prince George's County are difficult to interpret as the effect of IZ, because the county adopted IZ in 1991 but repealed it in 1996. Unfortunately, we are not able to construct difference-in-differences estimates for the DC area's oldest and best known IZ program, Montgomery County, because it was adopted in 1974, while our data series begin in 1980.

Table 6.1: Variable definitions and sources

Variable	Definition/source
<i>IZ variables – Boston-area suburbs</i>	
Source: LHR database	
IZ	= 1 if jurisdiction has adopted IZ by 2004. Also included as dummy variable for IZ lagged by two years.
Log(years IZ)	Log(Number of years since IZ adopted)
Mandatory	= 1 if IZ program is mandatory, 0 if optional
Density bonus	= 1 if IZ offers density bonus, 0 otherwise
Buyout options	= 1 if IZ includes options besides on-site construction, 0 otherwise
Minimum size trigger	= 1 if IZ triggered by minimum project size, 0 otherwise
Cluster trigger	= 1 if IZ triggered by cluster zoning, 0 otherwise
IZ year adopt missing	= 1 if data missing on year IZ adopted
IZ ever applied	= 1 if IZ program applied by 2004, 0 otherwise
<i>IZ variables – San Francisco</i>	
Source: CA Coalition/NHC of CA, Furman Center survey	
IZ	= 1 if jurisdiction has adopted IZ by 2006.
Mandatory	= 1 if IZ is mandatory
Density bonus	= 1 if IZ offers density bonus
Number of buyout options	Number of buyout options (4 maximum)
Min project units	Minimum project size needed to trigger IZ
Min % affordable	Pct affordable units required
Some units target VLI	= 1 if some units targeted at very low income households
Years affordable	Required number of years affordable
Years IZ in place	Years since IZ adopted
Affordable units	Number of units produced 1 = < 20 units; 2 = 21-100; 3 = 101-250; 4 = 251+
Pct in county w/ IZ	% of jurisdictions in county with IZ
Avg year IZ adopted, county	Average year IZ adopted within county
<i>IZ variables – Washington DC</i>	
Source: Brown, Furman Center survey	
IZ	=1 if IZ adopted (2000)
Year IZ	Year IZ was adopted
IZ units	Total affordable units produced by 2003
<i>Housing market outcomes – all areas</i>	
SF permits	Annual single-family units permitted (1980-2006) Source: Census New Residential Construction series
Prices – Boston-area suburbs	Median sales price, single-family homes in constant 2000\$ (annual, 1987-2004) Source: Banker and Tradesman TownStats
Prices – San Francisco	Median sales price, existing single-family homes in constant 2000\$ (annual, 1988-2006). Data on 8 pairs of cities are reported jointly. Source: Data Quick

Prices – Washington DC	Median housing value, specified owner-occupied units in constant 2000\$ (1990, 2000) Source: decennial census
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Demographic and other control variables – all areas

Log(pop)	Log of population (1970, 1980-2006). Intermediate and subsequent years linearly interpolated/extrapolated. Source: All demographic variables taken from decennial census.
% change pop	Percent change population, 1970-1980
% change price	Percent change in housing prices, 1970-1980
Pct BA, post-grad	% of population with college, graduate degrees. Linearly interpolated/extrapolated between census years.
Pct non-Hisp white	% of population, white non-Hispanic.
Pct non-Hisp black	% population black, non-Hispanic
Pct non-Hisp Asian	% population Asian, non-Hispanic
Pct Hispanic	% population Hispanic
Pct < 18 yrs	% of population < 18 years.
Housing density	Housing units/land area.
Log(area)	Log of land area.
Distance to Boston, Distance to Boston ²	Distance to Boston (miles), distance squared. Calculated using lat-long coordinates from centroid of each jurisdiction.
Distance to San Francisco	Distance (miles) to San Francisco
Distance to San Jose	Distance (miles) to San Jose
Distance to Washington DC	Distance (miles) to Washington DC
County, City	= 1 if jurisdiction is a county or city; town is omitted category

Other land use regulations – Boston-area suburbs

Pct in county w/ IZ	% of jurisdictions in county with IZ. Source: All data on Boston regulations from LHR.
Log(SF lot size)	Log of average single-family minimum lot size (2004).
Log(MF lots)	Log of potential MF lots allowed under zoning (2004).
Cluster	= 1 if cluster zoning allowed, 0 otherwise
Growth	= 1 if annual cap on permits or subdivision phasing.
Wetlands bylaw	= 1 if jurisdiction has adopted local wetlands bylaw.
Septic rules	= 1 if jurisdiction has adopted septic regulations.

Table 6.2: Variable summary statistics

Area	Variable	Mean	Std. Dev.	N
Boston-area suburbs				
	IZ	0.529	0.500	187
	Years IZ	6.061	7.792	99
	Mandatory	0.576	0.497	99
	Density bonus	0.707	0.457	99
	Buyout options	0.384	0.489	99
	Minimum size trigger	0.150	0.358	99
	Cluster trigger	0.176	0.382	99
	IZ year adopt missing	0.091	0.288	99
	IZ ever used	0.338	0.477	65
	SF permits	51.57	56.92	187/yr
	SF price	248,456	112,390	187/yr
	Pop	21,575	22,158	187/yr
	% change pop	0.109	0.228	187/yr
	% change price	0.219	0.126	187/yr
	Pct BA, post-grad	27.17	16.23	187/yr
	Pct non-Hisp white	95.60	6.54	187/yr
	Pct < 18 yrs	28.80	6.43	187/yr
	Hsg density	1.07	1.72	187/yr
	Area	11,309	7180	187
	Distance to Boston	22.54	9.94	187
	Pct in county w/ IZ	52.94	16.74	187
	SF lot size	40,031	21,887	187
	MF lots	4172	8168	187
	Cluster	0.802	0.399	187
	Growth	0.289	0.454	187
	Wetlands bylaw	0.701	0.459	187
	Septic rules	0.583	0.494	187
San Francisco CMSA				
	IZ	.48	.502	113
	Mandatory	.927	.269	52
	Density bonus	.70	.454	50
	Number of buyout options	2.0	1.31	56
	Min project units	5.33	5.57	54
	Min % affordable	13.56	4.39	54
	Some units target VLI	.554	.502	56
	Yrsaff	55.36	27.15	42
	Years IZ in place	12.87	7.85	55
	Affordable units	199	289	46
	Pct in county w/ IZ	49.56	19.55	113
	Avg year IZ adopted, county	1993	4.9	113
	Population	82,208	195,683	113
	County govt	.080	.272	113

Pct BA, post-grad	27.6	15.1	113
Pct non-Hispanic black	4.87	9.43	113
Pct non-Hispanic Asian	5.75	5.41	113
Pct Hispanic	10.11	8.69	113
Hsg density	.0005	.0004	113
Land area	2.00e+08	6.25e+08	113
Distance to San Francisco	29.3	16.6	113
Distance to San Jose	43.1	24.4	113
Price, single-family existing	439,692	283,628	2146
Single-family permits	152	282	2870
<hr/>			
Washington DC counties			
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IZ	.217	.422	23
IZ adopted	1988	8.6	5
IZ units	3813	4952	4
SF permits	1005	1452	23
Price	202,020	60,345	23
Population	164,592	215,990	23
Pct BA, post-grad	29.53	12.81	23
Pct non-Hispanic black	12.17	8.69	23
Pct non-Hispanic Asian	1.26	1.40	23
Pct Hispanic	1.51	1.30	23
Pct < 18	30.34	4.36	23
Hsg density	.406	.939	23
Land area	241,097	98,768	23
Distance to Washington DC	37.9	17.9	23
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Table 6.3 Prevalence of IZ and timing of IZ adoption by county, Boston-area suburbs

County	Cities/towns*	1990	2000	2004	Year unknown
Bristol	14	0.0%	14.3%	28.6%	0
Essex	34	14.7	26.5	55.9	4
Middlesex	53	24.5	41.5	73.6	4
Norfolk	28	10.7	10.7	42.9	3
Plymouth	23	0.0	0.0	26.1	2
Suffolk	3	0.0	0.0	33.3	1
Worcester	32	3.1	12.5	56.3	3

*Column 2 shows the number of cities/towns in each county that are part of the LHR database. Several counties are only partially covered by the database, so totals do not match census definitions. Table shows percent of cities/towns with IZ programs of known year of adoption.

Table 6.4: Correlation of IZ program components, San Francisco CMSA

	Mandatory	Density bonus	Number buyout options	Min project units	Min % affordable	Some units target VLI	Years affordable
Density bonus	-0.188						
Number buyout options	0.185	-0.050					
Min project units	0.024	-0.072	-0.166				
Min % affordable	0.151	-0.073	-0.167	0.128			
Some units target VLI	-0.096	-0.054	0.168	-0.008	0.103		
Years affordable	0.017	-0.106	0.196	-0.013	0.269*	-0.192	
Year IZ adopted	0.086	0.024	-0.048	0.090	-0.076	0.294**	-0.446***

Matrix shows pairwise correlation coefficients between variables.

*, ** and *** indicate significance at 10%, 5% and 1% levels, respectively

Section 7: Regression results

The analysis reveals some interesting patterns in the adoption and effects of IZ across the study areas. As expected, jurisdictions that adopt IZ differ in a number of ways from those that do not, prior to IZ adoption, and these differences are fairly consistent across the three study areas. The amount of affordable housing seems to be largely a function of the length of time IZ has been in effect. The estimated effects of IZ on housing permits and prices are less conclusive; the results provide some evidence that IZ constrains supply and raises prices in the Boston area, but the results are not robust across all specifications. There is no evidence of a significant effect of IZ on the price or production of market-rate housing among San Francisco area jurisdictions.

7.1 Which jurisdictions in the Boston-area suburbs have adopted IZ?

The Boston-area suburbs that have adopted IZ differed from those that do not have IZ even prior to IZ adoption, as shown in Table 7.1. The first column presents the results of probit models on the relationship between basic determinants of housing supply and demand and the probability that a jurisdiction has adopted a local IZ program. Not surprisingly, larger and more highly educated jurisdictions are more likely to have adopted IZ by 2004. Communities that experienced larger increases in housing prices between 1970 and 1980 (the decade prior to the emergence of IZ programs in the Boston area) are also more likely to have adopted IZ, suggesting that it may be a policy reaction to a decreasing supply of affordable housing. However the coefficient on change in housing prices decreases and becomes only weakly significant after adding controls for other regulations (Column 2). The lack of significant coefficients on demographic characteristics likely reflects the relative homogeneity of the populations.

The likelihood of adopting IZ also is affected by the jurisdiction's broader land use regulatory environment and the actions of neighboring communities, as shown in Column 2. The probability of having IZ increases with the share of other communities in the same county that have IZ, reflecting the patterns of diffusion shown in Table 6.3. This can have important implications for the effects of IZ on housing markets, because the prevalence of IZ among neighboring jurisdictions is likely to reduce the ability of developers (and consumers) to avoid IZ by moving to a nearby location. Having cluster zoning also increases the probability of adopting IZ, a finding that corresponds with the descriptive information in Section 4, which revealed that many IZ policies are triggered by or otherwise combined with cluster zoning. Communities with growth management policies are more likely to adopt IZ, all else constant, which reflects a somewhat contradictory combination of constraining supply yet trying to encourage below-market rate housing. Adding regulatory variables to the model from Column 1 roughly doubles the explanatory power of the model (the R-squared rises from 0.13 to 0.28), suggesting that other policies and market forces are both important determinants of regulatory choices. Although it is perhaps not surprising that there is a positive correlation between IZ and other types of regulation, few other empirical studies have been able to establish this correlation, due to the difficulty of obtaining data on regulations.

As shown in Table 4.13, only a small number of Boston-area suburbs adopted IZ prior to 1990; the model shown in Column 3 of Table 7.1 examines whether these early adopters differ from

later IZ adopters. The coefficients on demographic variables suggest similar influences on the timing of early adoption; larger, faster-growing, more affluent communities are more likely to have adopted IZ prior to 1990. On the regulatory variables, the peer effects of neighbors' IZ also are evident in timing of adoption. Communities without septic regulations (generally those closer to Boston and with more developed sewer and water infrastructure) are more likely to have adopted IZ sooner. The coefficient on single family lot size is weakly significant, perhaps suggesting that places with more restrictive baseline zoning – hypothetically a significant driver of housing prices – were among the first to require or encourage development of below-market rate housing, although it is unclear how robust these results are.

7.2 Which jurisdictions in the San Francisco area have adopted IZ?

One striking similarity between the Suburban Boston and San Francisco results is the apparent influence of neighbors; as shown on Column 1 of Table 7.2, the probability of having IZ increases with the percent of other jurisdictions in the county that have IZ. The t-statistic on percent of jurisdictions in the county with IZ is roughly 6, showing a very strong positive relationship, and adding the variable increases R-squared from about 0.03 to 0.16. Jurisdictions with higher initial housing density are less likely to adopt IZ. Somewhat surprisingly, compared to the Boston results, there are few significant differences in demographics between jurisdictions with IZ and those without; population size is only weakly significant, as is share of children, and neither educational attainment or racial/ethnic composition differ by presence of IZ. Neither are most of these variables significant determinants of the timing of IZ adoption, as shown in column 2. More affluent jurisdictions with a smaller share of children adopt IZ sooner, although those coefficients are only weakly significant, while cities adopt IZ earlier than towns. Once again, the regulatory behavior of ones' neighbors seems to be a factor; the coefficient on average year of IZ adoption in the county is positive and strongly significant. The Suburban Boston results suggest that it might improve the predictive power of the model to control for other types of land use regulations, if such data were available.

7.3 Which jurisdictions in the Washington DC area have adopted IZ?

Although the methodology used to analyze IZ adoption in the DC area differs from that used in the other two areas, the observed differences between jurisdictions with and without IZ in the DC area are quite similar, as shown in Table 7.3. Two of the three earliest counties to adopt IZ (Fairfax and Prince George's) had much larger populations prior to IZ than the average non-IZ county, although Loudon and Fauquier Counties were much smaller. The adopters are all larger in geographic area, and with the exception of Fauquier County, they are closer to Washington DC and have more highly educated populations. Perhaps the most obvious difference between jurisdictions with and without IZ is that only counties have adopted IZ in DC metro area (until the District in 2007); county governments play no role in zoning in Massachusetts, but in San Francisco, IZ has been adopted by counties, cities and towns. All but Prince George's County had higher average housing prices than non-adopters prior to adoption. Prince George's and Fairfax Counties also issued several times as many building permits as the average non-IZ county prior to the adoption of IZ.

7.4 Affordable housing produced under IZ in Suburban Boston, San Francisco and DC

The only robustly significant predictor of whether a jurisdiction in Suburban Boston has produced any affordable units under its IZ program is the length of time the policy has been in effect, as shown in Columns 5-6 of Table 7.1. Given how recent many of the IZ programs in the Boston area are, and the relatively long time needed to complete a development project (2-3 years, according to several local developers), this is not a particularly surprising finding. Likely as a result of the restricted sample and time frame, few of the characteristics of IZ seem to affect whether IZ has been used; the estimated coefficients on mandatory status, density bonus, buyout options and IZ triggered by minimum size are not significantly different from zero. The only significant coefficient is the dummy indicating that IZ is triggered by cluster zoning when controlling for market pressures and other regulations (Column 6). However, this may simply reflect that jurisdictions with cluster zoning are more likely to have used IZ, regardless of the trigger mechanism; the dummy on cluster zoning was omitted because of perfect multicollinearity (no jurisdiction without cluster zoning reported having used IZ). In general, given the small number of observations, the share of very recently adopted programs, and the relatively large number of places for which we are missing data on whether IZ has ever been used, it is difficult to draw strong conclusions from these results about what programmatic, market or regulatory characteristics make it more likely that IZ programs will produce affordable units.

Production of affordable units under IZ in the San Francisco area appears to reflect more of the nuances of IZ programs, as shown in Columns 3-5 of Table 7.2. Similar to the Boston results, the number of affordable units built increases with the length of time IZ has been in effect. In addition, the number of units built increases with the presence of a density bonus and minimum project size that triggers IZ. These results suggest that less stringent programs actually produce more affordable units, a plausible explanation if developers avoid jurisdictions with highly stringent programs. Column 4 of table 5 examines the relationship between market forces and affordable units produced. Places with larger Hispanic populations and farther from San Jose produced fewer affordable units; places farther from San Francisco produced more affordable units. Jurisdictions with a higher share of neighbors with IZ also produced more affordable housing under IZ, although the difference is only weakly significant. Column 5 adds controls for market forces to IZ program characteristics. Coefficients on program characteristics stay fairly constant, although some standard errors increase, while few of the market variables are statistically significant. The small sample size raises two possible concerns with the results, however; standard errors increase in small samples, decreasing the probability of observing statistically significant estimates, while some of the significant results could reflect spurious or idiosyncratic correlations of these particular jurisdictions that are not observed in the larger population. Thus we encourage readers to interpret these results with caution.

The number of affordable units produced among DC area counties also reflects the length of time IZ has been in place. Montgomery County's program, in effect over 15 years longer than the next eldest, has produced by far the largest number of units, although some of these were no longer affordable at the time of the survey and production appears to have slowed in recent years. The number of units produced increases across the other counties with number of years IZ has been in place, although Prince George's program produced a surprisingly large number during its five year tenure.

7.5 Effects of IZ on single-family permits and prices in Boston-area suburbs

The estimated effects of IZ on single-family permits in Suburban Boston, shown in Columns 1-4 of Table 7.4, provide some evidence that IZ constrains new development, but the results are not conclusive. The simplest model, including a dummy variable for the lagged adoption of IZ as well as jurisdiction and year fixed effects, suggest that the presence of IZ is associated with roughly 10 percent fewer single-family permits per year, significant at the five percent level (Column 1). The regression on log of years since IZ adopted gives a very similar result in magnitude, -0.09, and is significant at the one-percent level (Column 2). The median number of single-family permits per year is about 35 during the time period examined, implying that a jurisdiction that adopted IZ in 1990 might have issued 45-50 fewer permits between 1990 and 2005. However, the estimated magnitude on log of years drops by about one-third and becomes statistically insignificant once controls for market forces are added (Column 3). If the variables added in Model 3 are accurate estimates of the within-jurisdiction changes in market determinants of permits, these results would imply that observed differences in permits reflect changes in housing market conditions that are correlated with the adoption of IZ, rather than the effects of IZ itself. Because it is unclear whether the interpolated values of the variables are accurate indicators of the true values or may be introducing bias into the regression, however, it is difficult to know which specification is better.

In the final specification on log of permits (Model 4), which adds controls for several other types of land use regulations, the absolute value of the estimated coefficient on log of years since IZ adopted becomes positive, although the magnitude is extremely small and statistically it is indistinguishable from zero. These results are consistent with a situation where the adoption of IZ is correlated with other regulatory changes and those other changes, rather than IZ, produce the previously estimated constraint on supply. But this specification raises the concern of selection bias, because it excludes all the jurisdictions for which we do not have data on the year that the other regulations in the regression were adopted. The overall sample size and the number of jurisdictions with IZ programs drops by one-third from Model 3 to Model 4; robustness checks shown in Appendix Table E.1 suggest that the estimated coefficient on log of years IZ is quite sensitive to the exclusion of these observations in other specifications as well.

The results show slightly stronger evidence that IZ has put upward pressure on single-family home prices in Boston-area suburbs between 1987 and 2004, shown in Columns 5-8 of Table 7.4. The estimated coefficient on the dummy for lagged IZ adoption (Column 5) suggests that adopting IZ is associated with just under a three percent increase in prices, controlling for jurisdiction and year fixed effects. The estimated coefficient on log of years since IZ adoption (Column 6) suggests that a one percent increase in time since adoption is associated with a 1.8 percent increase in prices, also significant at the one-percent level. Adding controls for interpolated changes in population, education, demographics, etc. (Column 7) decreases the magnitude to just under one percent, and the estimate is only significant at the ten percent level. Once controls for adoption of other regulations are added (Column 8), the estimated magnitude increases slightly but the estimate is not statistically significant, although again the sample size decreases sharply due to missing data. The median duration of IZ programs in the Boston suburbs was about two years, as of 2004, and the real median single family sales prices in 2002

was roughly \$287,000. Applying the estimate from Model 7 (the most conservative estimate from the models that show at least marginal significance of IZ) implies that sales prices increased by roughly \$1600 over a two-year period in jurisdictions that adopted IZ programs in 2002.

7.6 Effects of IZ on single-family permits and prices in San Francisco area

The analysis shows no evidence of a statistically significant effect of IZ on either single-family permits or single-family housing prices in the San Francisco area. In none of the models shown in Table 7.5 are the estimated coefficients on the measure of IZ statistically different from zero. Models 1-3 show results of regressions of the log of average annual permits on the lagged dummy variable for IZ and the log of years since IZ was adopted; the first two columns show regressions including just year and jurisdiction fixed effects, while Model 3 adds interpolated values of various controls.⁶² Models 4-6 repeat the same specifications, using the log of sales prices of existing single family homes. A number of other specifications including indicators of the various components of IZ programs (density bonus, required share of affordable units, minimum project size, targeting very-low income households) were also tried, and in none of them were the coefficients significant. Based on the data available, it does not appear that the adoption of IZ among jurisdictions in the Bay Area has produced systematic effects on either housing production or housing prices.

Several problems with the data suggest that those results should be interpreted cautiously, especially in light of both the theoretical predictions from the economic models and the results from Suburban Boston. One serious concern is that the identification strategy relies on the year IZ was adopted; as described in Section 4, the various surveys of IZ do not always agree on the year of adoption. If some of the dates used in the regressions are just random errors, or mistakenly report the dates that the jurisdictions adopted informal or less stringent precursors to the programs currently in place, this variable will be an imperfect measure and will be less likely to yield significant results. In addition, the regressions provide estimates of the average effect of IZ across all jurisdictions; if the effects of IZ vary among jurisdictions, either because of differences in how IZ programs are structured, how they are implemented, or interactions with different economic or political conditions in the particular location, then the average may obscure the effects of some types of IZ. For instance, as mentioned in Sections 4 and 5, some jurisdictions may adopt IZ in order to fulfill state regulatory requirements, but may have little interest in enforcing the policies once they are on the books. Those jurisdictions will see little effect from IZ (and bring down the average effect for the entire data set), not because IZ has no effect on the supply or price of housing, but because the IZ is not enforced.

Figures 7.1 and 7.2, which present simple graphs of the time patterns in housing production and prices for jurisdictions that adopted IZ in each of the past four decades, illustrate how differences among the jurisdictions may have obscured our estimates of the effects of IZ. Figure 7.1 shows

⁶² One somewhat odd result from the regression including controls (Column 3) is the significant negative coefficient on the share of Asian residents. It is possible that this reflects Asians, particularly recent immigrants, moving into jurisdictions with weaker demand, or reflects the effects of some unobserved characteristic of jurisdictions with large Asian populations, or is simply caused by measurement error of the variable. In any case, it is advisable not to draw a causal inference based on this coefficient.

the average annual number of single-family permits issued during the 1980s, 1990s and since 2000. As shown in the first two groups, the changes in annual permits since 1980 are quite similar when comparing all jurisdictions that had not adopted IZ by 2006 and all those that had adopted IZ at some point. However, this comparison obscures considerable variation among jurisdictions with IZ, as shown in the last four groups of columns. In particular, those jurisdictions that adopted IZ prior to 1980 or after 2000 issued substantially more permits, both before and after adoption, than jurisdictions that adopted IZ in the 1980s and 1990s. The most recent adopters seem to have been developing much more rapidly in the early decades and saw dramatic drops in the number of permits, even before adopting IZ. The small number of jurisdictions in each of these groupings makes it difficult to identify statistically significant patterns, but it appears that there is at least as much heterogeneity in patterns of housing production across the jurisdictions that have IZ as between those with and without IZ.

Although less pronounced, there is also considerable variation in changes in housing prices among jurisdictions with IZ (Figure 7.2). Jurisdictions that adopted IZ prior to 1980 had higher than average housing prices as early as 1980 and have seen some of the sharpest increases in prices between 1980 and 2000. This would be consistent with either the explanation that IZ resulted in higher prices in those locations, or that jurisdictions with strong location-specific demand were some of the first to adopt IZ. As of 1980, jurisdictions that adopted IZ in the 1980s and 1990s more closely resembled those that have never adopted IZ, and have seen price increases roughly comparable to the non-IZ group since then. The most recent adopters, which had some of the lowest housing prices at the beginning of our study period, have seen relatively modest price increases, and in 2000 were still relatively affordable.

In summary, the analysis of IZ in the Bay Area suggests that jurisdictions with IZ have had varied patterns of housing price growth and production following the adoption of the program. We are unable to determine whether these variations reflect pre-existing differences in the communities' characteristics or housing markets, differences in the types of IZ programs or ways in which IZ is implemented, or simply limitations of the data. Accordingly, while we find no significant effect of IZ on housing production or on housing prices in the Bay Area, those results should be interpreted with caution.

7.7 Effects of IZ on single-family permits and prices in Washington DC area

The analysis of IZ in the Washington DC area also reveals no effects of IZ on permits or prices, although it is impossible to determine whether this reflects the true impacts of IZ or simply the severe data limitations. Table 7.6 compares changes in single-family permits and median housing prices, before and after IZ adoption, in each county with IZ and the control group (18 counties without IZ). These are essentially difference in difference estimates, calculated separately for each county without any additional controls.

The difference in difference estimates for Fairfax and Prince George's Counties show decreases in both housing production and prices after the adoption of IZ. In Fairfax County, average annual permits dropped after IZ adoption, from 6775 in 1987-89 to 5459 in 1992-94. Average annual permits in the control counties dropped by 233 during this time period, yielding an estimated drop in Fairfax of 1082 annual permits that would be attributable to IZ if the

assumptions of the methodology are correct (discussed below). Similarly, in Prince George's county, average annual permits decreased by 570 in the period after IZ adoption, compared to a decrease of 150 in the control counties, for an estimated result of 420 fewer permits from IZ. Fairfax and Prince George's Counties also experienced larger drops in housing prices during the decade in which they adopted IZ than did the control counties, as shown in Table 7.6. Average housing prices in Fairfax dropped from \$325,254 in 1990 to \$266,415 in 2000 (both in constant 2000 dollars), while real prices in the control counties dropped by \$8,599. Average housing prices in Prince George's dropped by \$13,927 during the same period, also exceeding the price drop in control counties in both absolute and percentage terms. Although the decrease in housing production would be consistent with IZ acting as a constraint on supply, the drop in prices is difficult to explain in terms of the policy. Another possible explanation for the observed pattern of decreased permits and prices in Fairfax and Prince George's would be that both counties experienced a decrease in demand or other underlying changes that affected housing markets.

The two other counties that adopted IZ during the 1990s, Loudon and Fauquier, also show changes in housing permits and prices that are difficult to explain solely as a result of adopting IZ. Average annual permits in Loudon County doubled between the three years prior to adopting IZ and the three years afterwards, from 1384 to 2811. Permits in the control counties were essentially flat meanwhile, decreasing by one percent. Average annual permits in Fauquier also rose in the period after IZ was adopted but not by an amount statistically larger than the increase in the control group during the same time. Again a comparison of the relative changes in housing prices between the control group and jurisdiction with IZ suggests that the difference in difference estimates may be confounding the effects of IZ with larger market forces. Real average prices in Loudon County dropped by a negligible amount (\$169) between 1990 and 2000 and average prices in Fauquier rose by \$24,138, while prices in the control counties dropped by \$8599 during the same period. An increase in demand for Loudon and Fauquier County, relative to the control counties, seems a more plausible explanation for the gains (absolute or relative) in permits and prices in both counties than the effects of adopting IZ. Both counties experienced very rapid growth in population and increasing affluence of their populations during the 1990s, as they essentially shifted from rural outliers to true commuting suburbs of the expanding DC metropolitan area.

Two limitations of the data suggest caution in interpreting the difference-in-difference estimates as true effects of IZ. First, difference in difference estimates are most reliable when the treatment and control groups are quite similar (or differences can be controlled for in regression analysis), so that the change in the control group can be viewed as the right counterfactual for what would have occurred in the treatment group absence the policy change. As Table 7.3 shows, all of the counties that adopt IZ differ from the control counties on observable characteristics prior to adopting IZ, and might have experienced different changes in permits and prices even without the adoption of IZ. Second, the difference in difference estimates of price changes are likely to provide less reliable estimates than changes in permits, because only a single observation for prices is available both before and after, and these points are observed at widely spaced intervals, so are likely to reflect additional changes over time in both treatment and control groups (and in the case of Prince George's, the span includes adoption and

subsequent repeal of IZ).⁶³ Overall, our inability to control for pre-existing differences and changes in underlying housing market conditions limit our ability to draw clear conclusions about the effects of IZ in the DC area.

7.8 Conclusion

The analysis of IZ programs in the San Francisco and DC metropolitan areas and the Boston-area suburbs reveals some interesting evidence on each of the three research questions posed. As expected, jurisdictions that adopt IZ differ from non-IZ jurisdictions: larger, more affluent (thus presumably more expensive) jurisdictions are more likely to adopt IZ, as are those whose neighbors have IZ. Results from Suburban Boston also suggest that adopting IZ is positively correlated with having several other types of regulations. How much affordable housing is produced under IZ seems to be largely a function of the length of time IZ has been in place, although the San Francisco results also suggest that more flexible programs produce more affordable units. Results on the effects of IZ on housing permits and prices are quite mixed both within and across the metropolitan areas. The Suburban Boston results provide some evidence consistent with theoretical predictions: regressions on panel data including jurisdiction and year fixed effects suggest that IZ may be constraining housing production and increasing housing prices. Those results are not, however, robust to inclusion of controls for changes in demographics or other types of regulations. The results from San Francisco show no evidence of a statistically significant effect of IZ on either prices or permits. However inconsistencies among data sources reporting the timing of IZ adoption raises concerns over the reliability of the data used in these regressions. Unfortunately, it is also difficult to infer any statistically significant impacts of IZ on DC area housing markets, given the small number of observations, heterogeneity of the counties with IZ and large initial differences between counties with and without IZ.

One concern that arises in identifying the effects of IZ in both Massachusetts and California is the difficulty of defining clear treatment and control groups. Both states have statewide laws that may encourage more jurisdictions to adopt IZ than would do so in the absence of the laws, while at the same time establishing mechanisms for jurisdictions without local IZ programs to develop affordable housing. This suggests that some of the control jurisdictions may operate as though they have informal IZ programs, with similar effects on housing supply, while some of the treatment jurisdictions may have IZ programs on the books that are seldom used or not rigorously enforced. If this is the case, then the relevant question may not be whether having an IZ policy on the books raises prices and constrains supply, but whether the jurisdiction actively requires (or offers incentives for) affordable housing through any mechanism.

Collecting reliable data on such programs is likely to be a difficult undertaking. Alternatively, it may be useful to develop a better understanding of the various motives that prompt jurisdictions to adopt IZ (or comparable informal policies). Our failure to identify many significant predictors

⁶³ Analysis of Prince George's is also complicated because the county substantially downzoned much of its land concurrently with adopting IZ, according to Brown (2001), which is likely to have had an independent effect on permits and prices. Brown also states that Prince George's County officials voted to repeal IZ at least in part because they believed the county had too much of the region's affordable housing, which may have decreased the desirability of PG for middle- or upper-income households and decreased prices.

of whether jurisdictions in the San Francisco area have adopted IZ (Table 7.3) suggests that there are omitted variables that affect the probability of having IZ, and which may have a direct impact on housing permits and prices, causing our results to be biased. In particular, most of the control variables included in our models are proxies for market forces that are likely to affect the supply or demand for housing, under the assumption that IZ is a response to market conditions. However, the demand by local residents for land use regulation also may reflect more complex political, social or institutional factors, such as the desire for economically or ethnically homogenous neighbors, and aesthetic or environmental preferences over the timing, location and type of development. Some of these factors are likely to be captured by our control variables (for instance, the racial and ethnic heterogeneity of the current population is likely to be a reasonable predictor of racial exclusive preferences). And many of the institutional or political factors are likely to remain fairly constant over time, so will be absorbed by the jurisdiction fixed effects in the models on housing permits and prices. Nonetheless, we recognize that our models may be omitting important political or social preferences that affect both the likelihood of adopting IZ and how effective IZ is at producing affordable housing. Developing a better understanding of the political economy of IZ is thus an important area for future research.

Table 7.1 Determinants of adopting and using IZ, Boston-area suburbs

Dependent variable: (probit: dF/dx)	Has IZ		IZ adopted 1980-90	IZ ever used (2004)		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable:						
Log(years IZ)					0.102**	0.159***
					(0.045)	(0.056)
Mandatory					-0.041	0.125
					(0.165)	(0.121)
Density bonus					-0.119	-0.274
					(0.140)	(0.225)
Buyout options					0.090	0.086
					(0.101)	(0.159)
Minimum size trigger					-0.053	-0.210
					(0.212)	(0.151)
Cluster trigger					0.134	0.212***
					(0.127)	(0.076)
IZ year adopt missing					-0.044	0.227
					(0.217)	(0.241)
Log(pop)	0.168***	0.024	0.126***	0.103		0.151
	(0.053)	(0.081)	(0.019)	(0.170)		(0.151)
% change pop, 1970-80	-0.204	0.087	0.131***	-0.351		-0.386
	(0.179)	(0.150)	(0.047)	(0.566)		(0.389)
% change hsg prices, 1970-80	1.241***	0.946*	0.338	0.986		2.048
	(0.347)	(0.516)	(0.223)	(1.158)		(1.254)
Pct BA, post-grad	0.013***	0.015***	0.007***	0.008		0.009*
	(0.004)	(0.003)	(0.003)	(0.006)		(0.005)
Pct non-Hisp white	-0.021	-0.026	0.035**	-0.002		0.000
	(0.014)	(0.017)	(0.015)	(0.029)		(0.020)
Pct < 18 yrs	-0.002	0.010	-0.014*	0.024		0.056**
	(0.015)	(0.019)	(0.007)	(0.018)		(0.025)
Hsg density	0.010	0.039	-0.016	-0.024		0.019
	(0.028)	(0.044)	(0.042)	(0.084)		(0.062)
Log(area)	0.050	0.059	0.007	0.143		0.275***
	(0.089)	(0.065)	(0.042)	(0.103)		(0.088)
Distance to Boston	0.011	0.024	-0.007	0.002		-0.040
	(0.018)	(0.017)	(0.018)	(0.031)		(0.047)
Dist to Boston^2	-0.000	-0.000	0.000	-0.000		0.001
	(0.000)	(0.000)	(0.000)	(0.001)		(0.001)
Pct in county w/ IZ		0.007***	0.003***	-0.001		-0.004
		(0.002)	(0.001)	(0.006)		(0.006)
Log(SF lot size)		-0.205	0.130*	-0.242*		-0.272**
		(0.207)	(0.072)	(0.130)		(0.124)
Log(MF lots)		0.020	-0.010	0.032		0.054
		(0.014)	(0.007)	(0.028)		(0.037)
Cluster zoning		0.497***	0.031			
		(0.075)	(0.085)			
Growth mgt		0.184**	0.023	0.004		0.047
		(0.075)	(0.111)	(0.130)		(0.101)
Wetlands bylaw		0.085	0.036	0.009		-0.338
		(0.062)	(0.022)	(0.157)		(0.228)
Septic rules		-0.088	-0.103**	-0.136		-0.408**
		(0.127)	(0.046)	(0.167)		(0.176)
Observations	181	180	94	64	65	64
Pseudo R-squared	0.13	0.28	0.37	0.14	0.08	0.27

Robust standard errors, clustered by county, in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7.2: Determinants of IZ adoption & affordable housing production, San Francisco

Dependent variable: (estimator)	Has IZ	Year IZ adopted	Log(affordable units)		
	(probit: dF/dx)	(OLS)	(OLS)		
	(1)	(2)	(3)	(4)	(5)
Density bonus?			0.770*		0.838**
			(0.392)		(0.253)
Number of buyout options			0.316		0.168
			(0.244)		(0.240)
Min project units			0.099***		0.125***
			(0.021)		(0.028)
Min % affordable			-0.034		-0.028
			(0.036)		(0.042)
Some units target VLI			-0.552		-0.572*
			(0.378)		(0.307)
Log(years IZ in place)			1.025***		0.993**
			(0.289)		(0.339)
Log(pop)	0.185*	1.749		-1.324	-0.152
	(0.106)	(1.616)		(1.454)	(1.119)
Pct BA +	-0.001	-0.128*		-0.012	-0.003
	(0.004)	(0.068)		(0.011)	(0.022)
Pct black non-Hisp	0.008	0.003		0.027	0.037**
	(0.006)	(0.060)		(0.025)	(0.014)
Pct asian non-Hisp	0.010	0.137		-0.034	-0.021
	(0.010)	(0.092)		(0.042)	(0.035)
Pct Hisp, all race	-0.004	0.117		-0.075**	-0.056*
	(0.010)	(0.078)		(0.028)	(0.026)
Pct < 18 yrs	-0.017*	0.162*		0.029	0.070
	(0.010)	(0.087)		(0.040)	(0.047)
Hsg density	-595***	-3,091		2,204	1,207
	(198)	(1,957)		(1,944)	(1,557)
Log(area)	-0.123	-1.376		1.613	0.683
	(0.103)	(1.572)		(1.253)	(1.015)
Distance to San Fran	-0.001	-0.056		0.040**	0.046**
	(0.003)	(0.047)		(0.017)	(0.018)
Distance to San Jose	0.001	0.011		-0.028**	0.001
	(0.002)	(0.025)		(0.011)	(0.010)
Pct in county w/ IZ	0.012***			0.029*	0.004
	(0.002)			(0.013)	(0.012)
Avg year IZ adopted, county		0.557***			
		(0.127)			
County	0.246	2.496		-2.104	-0.687
	(0.231)	(6.005)		(3.232)	(2.256)
City	0.032	-2.97***		1.124	0.704
	(0.129)	(0.88)		(0.615)	(0.585)
Observations	109	51	45	46	45
R-squared	0.16	0.36	0.37	0.44	0.73

Robust standard errors clustered by county in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7.3 Differences between IZ and non-IZ counties, DC area (1990)

	With IZ	Mont.	Pr Georges	Fairfax	Fauquier	Loudon	No IZ	Difference
IZ adopted		1974	1991-96	1990	1996	1993		
IZ units built		11,210	1600	1735	NA	707		
Population	360,666		652,968	569,818	31,157	45,016	110,127	250,539**
Pct BA+	42.0		34.0	56.9	22.6	38.4	26.1	16.0***
Pct black	15.0		37.8	5.9	15.3	7.0	11.4	3.6
Pct Asian	2.3		2.6	3.9	0.3	0.8	1.0	1.4**
Pct Hispanic	2.4		2.1	3.3	0.6	1.8	1.3	1.1*
Pct < 18	30.1		29.3	29.4	31.4	34.1	30.4	-0.3
Hsg/acre	0.458		0.750	0.834	0.026	0.046	0.382	0.1
Area (acres)	317,802		308,257	247,121	412,794	322,473	219,790	98,012**
Dist. Wash DC	21.6		7.1	13.7	43.4	31.6	42.5	-20.8**
Housing value	258,773		170,311	325,254	217,769	255,089	186,256	72,517***
Total permits	2,773		1,715	6,788	351	342	668	2,105***
N	5						18	

* significant at 10%, ** significant at 5%, *** significant at 1%

Since Montgomery County adopted IZ in 1974, its characteristics in 1990 likely reflect the accumulated effects of IZ and thus do not provide a baseline for comparison with the control group.

Table 7.4 Effects of IZ on housing permits and prices, Boston-area suburbs

Dependent variable:	Log(permits, 1980-2006)				Log(prices, 1987-2004)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable:								
IZ (2-year lag)	-0.102** (0.038)				0.028*** (0.006)			
Log(years IZ)		-0.091*** (0.024)	-0.032 (0.020)	0.004 (0.065)		0.018*** (0.003)	0.008* (0.004)	0.011 (0.006)
Log(pop)			0.560*** (0.146)	0.816*** (0.084)			0.088 (0.112)	0.054 (0.108)
Pct BA +			-0.014** (0.004)	-0.014* (0.007)			0.007*** (0.002)	0.007** (0.002)
Pct white			-0.003 (0.008)	0.003 (0.011)			0.003*** (0.001)	0.004*** (0.001)
Pct < 18			-0.021 (0.022)	-0.019 (0.031)			0.003 (0.005)	0.006 (0.004)
Hsg units/acre			-0.623 (0.356)	-0.589** (0.221)			0.209** (0.064)	0.246** (0.067)
Pct towns in county w/ IZ			-0.003 (0.002)	-0.006* (0.003)			-0.001 (0.001)	-0.001 (0.001)
Log(yrs cluster zoning)				0.087** (0.032)				0.006 (0.016)
Log(yrs growth controls)				0.014 (0.078)				-0.011 (0.017)
Log(yrs wetlands bylaw)				-0.095** (0.036)				-0.010 (0.007)
Log(yrs septic regs)				-0.093*** (0.024)				-0.021*** (0.003)
City/town FEs	Y	Y	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y	Y	Y
Observations	4590	4590	4590	3051	2703	2703	2703	1785
R-squared	0.76	0.76	0.77	0.77	0.97	0.97	0.97	0.97

Robust standard errors clustered by county in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

The decreased sample size in models (4) and (8) are caused by missing data on the year of adoption for cluster zoning, growth controls, wetlands bylaws and septic regulations. Model 4 reflects data on 113 jurisdictions, model 8 includes 110 jurisdictions; the other models reflect data for 166 jurisdictions (observations missing data on the year IZ was adopted are excluded from all models). Regressions on prices exclude all observations with fewer than 50 sales in a given year.

Table 7.5 Effects of IZ on housing permits and prices, San Francisco

Dependent variable:	Log(Permits 1980-2006)			Log(Prices 1988-2006)		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable:						
IZ (2-year lag)	0.069 (0.064)			0.013 (0.010)		
Log(years IZ)		0.063 (0.043)	0.098 (0.073)		0.009 (0.007)	0.002 (0.006)
Pct in county w/ IZ			-0.003 (0.005)			0.001 (0.001)
Log(pop)			1.291* (0.575)			-0.007 (0.070)
Pct BA +			0.003 (0.017)			-0.001 (0.002)
Pct black			-0.009 (0.012)			-0.000 (0.003)
Pct Asian			-0.013** (0.005)			0.001 (0.002)
Pct Hispanic			0.014 (0.012)			0.002 (0.002)
Pct < 18 years			0.019 (0.022)			0.001 (0.004)
Hsg units/acre			-4,189* (1,972)			509 (333)
Jurisdiction FEs	Y	Y	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y	Y	Y
Observations	2870	2870	2870	2072	2072	2072
R-squared	0.81	0.81	0.82	0.98	0.98	0.98

Robust standard errors clustered by county in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 7.1

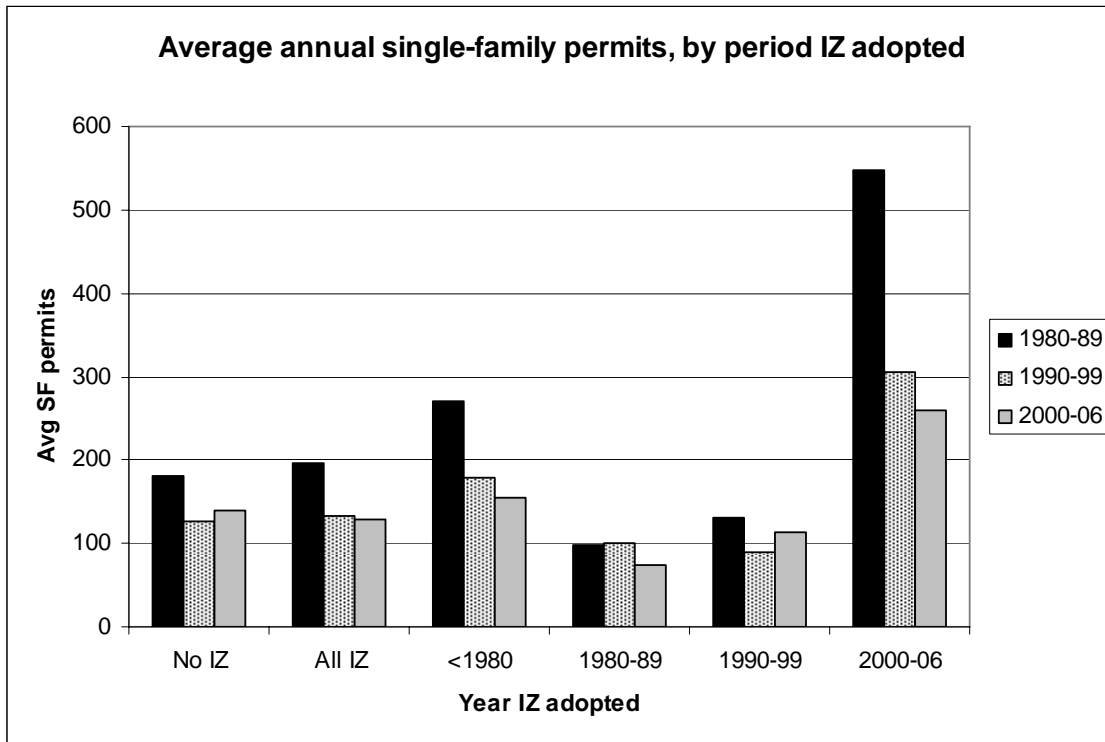


Figure 7.2

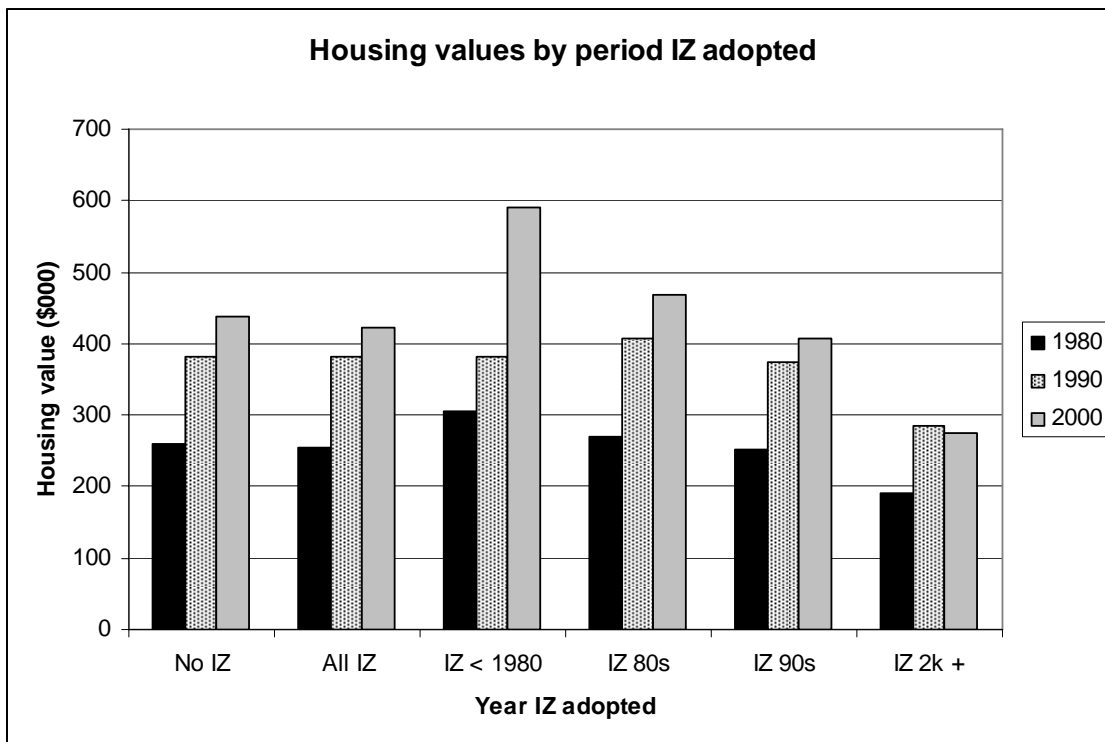


Table 7.6 Effects of IZ on housing permits and prices, Washington DC

Average annual permits				Median housing price			
Fairfax (1990)							
	Fairfax	Control	Diff		Fairfax	Control	Diff
Pre (1987-89)	6775	1319	5456	1990	325,254	193,014	132,239
Post (1992-94)	5459	1086	4374	2000	266,415	184,415	82,000
Post – Pre	-1316	-233	-1082***	2000-1990	-58,839	-8,599	-50,239
Prince Georges (1991)							
	PG	Control	Diff		PG	Control	Diff
Pre (1988-90)	4537	1173	3,364	1990	170,311	193,014	-22,703
Post (1993-95)	3967	1023	2944	2000	156,384	184,415	-28,030
Post – Pre	-570	-150	-420***	2000-1990	-13,927	-8,599	-5,327
Loudon (1993)							
	Loudon	Control	Diff		Loudon	Control	Diff
Pre (1990-92)	1384	969	415	1990	255,089	193,014	62,075
Post (1995-97)	2811	957	1854	2000	254,920	184,415	70,506
Post – Pre	1427	-12	1439***	2000-1990	-169	-8,599	8,431
Fauquier (1996)							
	Fauquier	Control	Diff		Fauquier	Control	Diff
Pre (1993-95)	258	1023	-765	1990	217,769	193,014	24,755
Post (1998-2000)	388	1100	-712	2000	241,907	184,415	57,493
Post – Pre	130	77	53	2000-1990	24,138	-8,599	32,738

*, ** and *** indicate statistical significance of two-tailed t-tests.

Control group is defined as the group of 18 counties in DC MSA that have not adopted IZ by 2000.

Section 8: Conclusions and policy implications

In this study, we have examined the characteristics of local IZ programs in the San Francisco and DC metropolitan areas and Suburban Boston, and analyzed three important questions: how do jurisdictions that have adopted IZ differ from those that have not; what market conditions and characteristics of IZ programs affect the production of affordable housing units under IZ; and how has IZ impacted overall housing prices and production. Below we briefly summarize the results of our research, outline a future research agenda and additional data needs, and offer a few guidelines for policymakers who may be considering adopting local IZ programs.

What have we learned?

The descriptive statistics reveal considerable diversity in the structure and characteristics of IZ programs, both within and across the three regions examined. Nearly half the jurisdictions in the San Francisco area have IZ and the median program has been in place for 15 years. IZ is equally widespread in Suburban Boston but many programs have only come into effect in the past five years. Only a few jurisdictions in the DC area have adopted IZ, but those counties have had it for at least a decade. In California, most IZ ordinances apply broadly to all residential development, with only a few exemptions. The DC area counties tend to give broader exemptions for projects under 50 units and low-density single-family developments. IZ programs in the Boston area are more narrowly written than in the other regions; rather than applying to most residential construction, IZ is often triggered by development proposals in certain locations, structure types or in combination with cluster zoning. Over 40 percent of the Boston-area suburbs have voluntary IZ programs, while nearly all in San Francisco and DC are mandatory. Alternatives to on-site construction, such as fees or land in-lieu, are widely offered in San Francisco and DC but relatively scarce in Massachusetts. A large majority of programs in all regions offer density bonuses or other types of cost offset. Programs in DC tend to have the shortest period of affordability restrictions (10-20 years), followed by California (40-50 years), while one-third of Boston-area suburbs require permanent affordability restrictions. The target income and median required share of affordable units (10-15 percent) are quite similar across the three regions.

Analysis of our first research question illustrates some of the differences between jurisdictions in both Massachusetts and California that adopt IZ and those that do not. Interestingly, we find that larger and more affluent jurisdictions are more likely to adopt IZ, or to adopt it sooner. The probability of having IZ increases with the share of other jurisdictions in the county who have IZ, even controlling for other characteristics. Results from Suburban Boston (the only region for which we have data on other land use regulations) suggest a positive correlation between having IZ and having other types of regulations, specifically cluster zoning or growth management. The regressions are more effective at predicting the likelihood of having IZ in the Boston-area suburbs than in the Bay Area; one possible explanation is that California's regulatory environment, particularly the state planning requirement, may encourage adoption of IZ by jurisdictions that otherwise would be less likely to have such a policy.

The analysis of affordable housing production under IZ reveals considerable variation across regions in the outcomes of the programs. Nearly all jurisdictions with IZ in the Bay Area have

produced some affordable housing under the program; the median jurisdiction has built 85 units over the program's existence, or roughly seven units per year. Across all jurisdictions in the area, 9,154 affordable units had been built as of 2003 through IZ. To put this in the context of other affordable housing production programs, 29,636 affordable units have been built in the Bay Area under the Low Income Housing Tax Credit (LIHTC) program between its inception in 1987 and 2003, implying annual production rates for LIHTC of about 1800 units.⁶⁴ All of the DC area counties with mandatory IZ have also produced affordable housing through the programs, with a median lifetime production of 1668 or annual production of 227 units per county. Comparing affordable housing production under IZ to LIHTC in the DC area, roughly three times as many units have been produced under LIHTC as IZ (15,252 compared to 45,337) over the course of both programs' lifetimes. In both DC and San Francisco, production of IZ units amounts to roughly 2-3 percent of total housing production over the past 25 years. IZ has been less effective at producing affordable housing in Massachusetts than in the other two regions; nearly half of Boston-area suburbs with IZ report that no affordable units have been built, although this probably reflects the recent adoption of many programs. The results of regression analyses in Suburban Boston and San Francisco suggest that the amount of affordable housing produced under IZ is largely a function of the length of time that IZ has been in place, although the San Francisco results suggest that programs with density bonuses and those that exempt smaller projects also produce more units.

In answer to the final research question, how has IZ impacted housing prices and permits, the results vary across the study areas and offer mixed evidence on whether IZ constrains housing supply. Results of regression analyses for Boston area suburbs do provide some evidence that IZ has increased prices and lowered production, although the estimated effect is relatively small. The estimated effect of IZ on sales prices of single-family homes is positive in all specifications and statistically significant when controlling for jurisdiction-specific characteristics that remain constant over time, as well as for time-varying trends that affect all jurisdictions (such as changes in interest rates or overall economic conditions). However, the magnitude and significance levels of the estimated effect decrease when we control for predicted changes in demographics and the jurisdictions' adoption of several other regulations. The estimated effect of IZ on single-family permits is negative and statistically significant in specifications including jurisdiction and year fixed effects, but the magnitude and significance decrease in the specifications that control for other regulations and demographic changes. The analysis shows no statistically significant effects of IZ on single-family permits or sales prices of existing single-family homes among jurisdictions in the San Francisco area.

What questions should be addressed by future research?

Our study makes use of the newest and most complete data sources on IZ programs and conducts the most methodologically rigorous analysis to date of the effectiveness and effects of IZ. Nonetheless, data limitations hinder our ability provide conclusive answers to several important questions. Below we outline some of these questions, and highlight the data needed to conduct additional research. Some questions could be more effectively answered with alternate research methodologies, such as comparative case studies or modeling development pro formas.

⁶⁴ Data on production of LIHTC units is available online at <http://www.huduser.org/datasets/lihtc.html#data>. Some units built under IZ may receive subsidies through LIHTC.

1) How do the effects of IZ vary by program structure and characteristics? Economic models suggest that the effects of IZ, both in producing affordable units and in constraining housing supply, should vary by the structure and characteristics of IZ programs. As we have discussed, there is considerable variation across the three regions in how IZ programs are designed. Unfortunately, because there was less variation within regions and relatively small sample sizes, we are not able to test for statistically significant differences in outcomes by program characteristics. It may be possible for future research to investigate these differences, as the number of programs within regions increases or better data on existing programs becomes available.

2) How does IZ interact with other regulations? IZ is only one of many land use regulations that affect housing development. To isolate the effect of IZ, ideally one would control for the jurisdictions' broader regulatory environments. We only have data on other regulations for the suburbs in the Boston area, and even then the data are incomplete. The Boston results do suggest that the presence of IZ is correlated with other regulations, which implies that future analysis should attempt to obtain comparable data on regulatory regimes in other regions.

3) What is the role of informal or alternative policies that produce affordable housing? In both California and Massachusetts, jurisdictions that do not have IZ may produce affordable housing through alternate mechanisms. In addition, it appears that some California jurisdictions may have had informal policies for some time before adopting their current ordinances. Both these circumstances may blur the difference between our "treatment" and "control" groups and confuse our analysis of the effects of having IZ. Therefore it would be useful for future research to examine the prevalence and activity of these informal or alternative mechanisms.

4) How does IZ affect housing markets in large cities? The majority of jurisdictions in both the Boston and San Francisco areas (from which the regression results are drawn) are relatively small suburbs; as of 2000, the median jurisdiction in the Boston area had a population of about 14,600, the median jurisdiction in San Francisco had just under 30,000 residents. It seems likely that demand for housing in small suburban jurisdictions will be more elastic than in large cities, given the ease of finding a comparable substitute and lower level of location-specific amenities.⁶⁵ Moreover, because we look primarily at smaller suburban areas, we are unable to examine the impact of IZ on multifamily housing markets. The recent adoption of IZ in a number of large cities, including New York City and Washington DC, should enable future research on the effects of IZ in large cities.

5) How does IZ affect housing markets in less heavily regulated areas?

All three of the metropolitan areas studied are highly regulated regions with very strong underlying housing demand, and were already quite expensive in the 1980s and 1990s when IZ was adopted. A new study that ranks MSAs by degree of land use regulation lists Boston and San Francisco as 2nd and 5th, respectively, with Washington DC well above the national average

⁶⁵ Several papers looking at the effects of regulations in suburban areas have posited that regulations create spillover effects in the prices of nearby jurisdictions, so may increase housing prices across the region but do not create large differentials across jurisdictions within the region (see Pollakowski and Wachter 1990, Glaeser, Schuetz and Ward 2006, Schuetz 2007).

(Gyourko, Saiz and Summers 2007). In our sample jurisdictions, IZ is merely one of many regulations – including large minimum lot sizes, procedural regulations and development fees, environmental protection and growth controls – that may affect housing prices and production. The standard empirical approach treats land use regulations as marginal determinants of housing prices, after controlling for market factors that affect supply and demand. Moreover, it seems reasonable that any single type of regulation would contribute a relatively small amount to differences in prices; this should be particularly true for programs such as IZ that are fairly recent additions to the regulatory framework and apply only to selected development proposals. The relative size of IZ programs' impacts, conditional on other regulations, is ambiguous. If housing supply is already highly inelastic in tightly regulated markets, then the marginal effect of IZ may be quite small. However it is also possible that in tightly regulated markets, IZ interacts with existing regulations to produce larger effects than it would in more laissez-faire markets.

6) Why and when do jurisdictions choose to adopt IZ? Our study assumes that the primary reason for jurisdictions to adopt IZ is to provide below-market rate housing, which implies that it should be more prevalent in high-cost areas or places that have recently seen rapid increases in housing prices. However, jurisdictions may also be prompted to adopt IZ in order to satisfy state planning or fair housing requirements, to guard against litigation, or as a response to organizing campaigns by advocacy organizations or local politicians. The motivation behind adopting IZ, and the degree of support from current residents, may affect the willingness or ability of local officials to implement it effectively.

7) How can jurisdictions with IZ better evaluate their ongoing programs?

More thorough and accurate record-keeping by jurisdictions with IZ would both improve the quality of future academic research and enable jurisdictions to assess the efficacy of their own programs. Current surveys reveal some of the shortcomings of prior accounting, even on basic elements: the various surveys of California jurisdictions contain many discrepancies on the adoption dates of IZ programs, while many Massachusetts jurisdictions were unable to report either the dates of adoption or the amount of affordable housing produced. To assess how widely and consistently IZ is applied, jurisdictions should keep records of the share of proposed developments that are subject to IZ (broken down by the size, district, building type, etc. of the development). A complete accounting of production should include not just the number of units produced, but also the breakdown of rental versus home-ownership units, and the number and value of alternatives (off-site units, cash or land contributions and whether those have actually been used to develop affordable units). Because the subsidies required by IZ often are limited to a particular period of time, it is also critical to know how many of the units produced under an IZ program are still affordable. To assess the value of density bonuses, fast-track permitting or other cost offsets, jurisdictions would need to record the underlying density allowed by baseline zoning and the number of additional units that are actually built in the final project, the standard length of time to obtain permit, or other measures of the value of the cost offsets. Finally, jurisdictions should keep track of the costs of implementing the IZ program -- the time of municipal staff to administer program, the program's net impacts on municipal services, etc.

One of the critical questions about IZ is whether and to what extent it reduces the profitability of new housing development. Large scale regression analysis, like that undertaken for this study, can examine this only indirectly by identifying changes in housing prices and production.

Alternately, small scale analysis that attempts to model the financial statements of specific development under detailed specifications of an IZ policy (that is, sensitivity analysis of development pro formas) would provide additional insight into the ways in which cost offsets may – or may not – reduce the size of the effective tax of IZ. The detailed data described above would enable this type of analysis; for instance, a comparison of the number of units allowed by right under conventional zoning in a particular location to the number of units developers have actually attained under an IZ policy with density bonus in the same jurisdiction..

Policy implications

Over the past decade, housing prices in many large metropolitan areas, particularly in the Northeast and California, have risen dramatically, due at least in part to restrictive local land use regulations. In addition to increasing overall price levels, some of these regulations, such as large single-family minimum lot sizes and restrictions on multifamily housing, directly reduce the feasibility of developing housing that is affordable to low- and moderate-income households. Local governments and non-profit organizations are seeking policy tools that will enable them to provide affordable housing within the economic and political realities of this context. In locations where stringent zoning has driven up prices and prevented the development of affordable housing, the optimal policy response would be to relax the underlying regulations, thereby encouraging greater housing development across a wide range of housing types and prices. However, revisions of baseline zoning seem politically unlikely in a large number of jurisdictions. As a second best option, IZ is one of a number of policy tools that could be used to encourage production of below-market housing units. Other policies available to local governments include providing direct subsidies to low-income households or offering subsidies for construction or rehabilitation of below-market units. These policies will differ in their relative effectiveness and efficiency at producing affordable units, the economic costs imposed and the distributional consequences of those costs. It is beyond the scope of this study to conduct a full cost-benefit comparison of alternative policies, but we offer here suggestions about how IZ should be considered in such a comparison.

An assessment of policies should compare the expected number of affordable units that will be produced and the relative per-unit costs of each tool. A highly simplified means of predicting how many affordable units will be produced under IZ is to multiply the required percentage of affordable units by the median number of new units permitted per year; this assumes that all residential developments will be subject to IZ and that permit levels will not decrease with IZ, so likely overestimates the number of affordable units. In the Boston-area suburbs, where most IZ programs require 10 percent of units be income-restricted, jurisdictions issued a median 43 permits per year between 2000 and 2006, implying that IZ would produce at most 4.3 affordable units per jurisdiction per year (unfortunately we do not have data on the actual number of affordable units produced but do know that over 40 percent of the jurisdictions have produced no affordable units to date). Using a slightly more sophisticated version of this method, we can predict affordable housing production under IZ in the Bay Area. Multiplying each jurisdiction's required percent of units by actual permits in that jurisdiction for each year that IZ is in place suggests that a median jurisdiction that adopted IZ in 1994 should have produced 188 units of affordable housing by 2006. However, the data on actual production reports a median production of 85 units over this time period.

One of the key considerations in evaluating any subsidy is its distributional consequences: who will benefit from the policy and who will be hurt? In terms of who is hurt, IZ, like impact fees or other land use regulations, imposes additional costs on new construction and new homebuyers. These costs may be offset by benefits, such as density bonuses, that reduce or eliminate the net cost to developers (and thus to new homebuyers), but not all jurisdictions fully offset the costs of IZ. Any price increases that result from IZ actually benefit existing homeowners but harm households that do not currently own homes in the jurisdiction and wish to purchase one (either in-movers or current residents who rent their homes). The costs are thus concentrated on a relatively small number of households, rather than broadly distributed, and favor long-standing residents over in-movers. By comparison, an increase in baseline property tax rates that is used to pay for direct subsidies would spread the costs of affordable units across all households, current and new, but may be more difficult to achieve politically than IZ. Two groups are likely direct beneficiaries of an IZ program: those who directly benefit by being selected to live in the newly created affordable units; and if IZ brings about price increases, those existing homeowners who see their home values appreciate as a result of the IZ requirements imposed on new housing.⁶⁶ The number of direct beneficiaries is likely to be small relative to the total population. Whether the direct beneficiaries of the newly created affordable units come from outside the community, or are of different racial or ethnic groups or social class than existing residents depends in large part on the design of the IZ program.

Although the data limitations prevent us from identifying how the design of IZ programs affects the amount of affordable housing produced, or the impacts of the program on prices and productions, we can infer some general relationships. By definition, IZ programs are linked to levels of production of market rate housing. That is, because IZ designates some percentage of total units as affordable, the higher the rates of residential development, the larger the number of affordable units produced under the IZ program should be. IZ programs that are so restrictive as to scare off developers or discourage new entrants to the jurisdiction, thereby choking off market-rate development, will actually produce fewer affordable units than more flexible programs that do not constrain supply. The design of an IZ program also should reflect local policy goals. If the primary goal is to yield the maximum number of affordable units, then options such as off-site production or cash/land donations are likely to increase total production. If the primary goal is to achieve integration of market-rate and affordable units, then a jurisdiction may choose not to allow such buyouts, but then will risk a lower yield of affordable units.

Finally, it is important to emphasize that while IZ may result in some new development of below-market units, it is not a solution to the basic problem of high housing costs. Unless paired with efforts to reduce other costs of building, IZ will not reduce overall price levels in the market and may in fact lead to a bifurcated housing market, raising prices of market-rate units while creating a small submarket of subsidized housing. Policymakers should consider not just the potential benefits, but also the costs and the distributional implications of IZ relative to other

⁶⁶ To the extent that IZ successfully attains other policy goals, such as enabling low-income workers to live closer to their jobs or reducing the concentration of poverty, it may create indirect benefits for employers or through decreased traffic congestion and environmental impacts. Evaluating the presence and size of such impacts is beyond the scope of this study, however.

tools used to encourage the production of affordable housing in choosing which policy or combination of policies to adopt. Our analysis does not provide definitive results on the potential effects of IZ on constraining supply or increasing housing costs. But as the results from Suburban Boston suggest, IZ could have those negative effects in certain circumstances; policymakers should thus carefully consider the risks and attempt to design any IZ program to minimize those risks.

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List of interviewees

Janet Anderson
Homebuyer Programs Coordinator
Emeryville CA

Ron Bendorff
Rohnert Park CA

Carol Berg
Housing & Community Development
Director
Santa Cruz CA

Jill Bergman
Senior Planner
Danville CA

David Boatwright
Housing Coordinator
Pleasant Hill CA

Tim Doone
Senior Planner
Brisbane CA

Scott Erikson
Pleasanton CA

Mary Jo Fields
Virginia Municipal League

Vera Gill
Senior Planner, Housing Division
Cupertino CA

Lynn Goldberg
Senior Planner
Healdsburg CA

Jean Hasser
Senior Planner
Napa CA

Jocelyn Immacolato
Associate Planner
Sebastopol CA

Michelle King
Santa Cruz CA

Mike Lappen
Senior Planner
South San Francisco CA

Stacey Laumann
Planner
Marin County CA

May Lee
Housing & Redevelopment Project Manager
Fremont CA

Tom Liao
Housing Manager
San Leandro CA

John Lucero
Housing Specialist
Dublin CA

Marjorie Matthews
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Santa Clara County CA

Meg Norwood
Housing Analyst
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Nelson Oliva
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Erwin Ordenez
Senior Housing Planner
Santa Clara CA

Joel Paulson
Associate Planner
Los Gatos CA

Robert Pendoley
Dir. of Planning/Asst Town Manager
Corte Madera CA

Luke Peterson
Pleasanton CA

Tom Reynolds
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Patrick Roche
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Milly Seibel
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Steve Stafford
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San Rafael CA

Danielle Staude
Senior Planner
Mill Valley CA

James Walgren
Community Development Director
Los Altos CA

Dan Watrous
Planning Manager
Tiburon CA

Ann Welsh
Director of Planning and Building Services
Fairfax CA

Tim Wong
Housing Coordinator
Novato CA

Appendix A: FURMAN CENTER SUPPLEMENTAL IZ SURVEY (CA)

Jurisdiction: _____

Respondent name: _____

Title/Position: _____

Phone: _____

Date and time of call: _____

Furman Center staff: _____

INTRODUCTION AND BACKGROUND ON THE STUDY

I'm _____, from the Furman Center for Real Estate and Urban Policy. We are an academic research center at New York University, and we are doing a study on the effects of inclusionary housing in the San Francisco Bay area, as well as in Boston and Washington DC. Based on the recent survey by the California Coalition for Rural Housing, we understand that your [city/town/county] has an inclusionary housing program, and we would like to ask you a few questions to expand on the information in the survey. Who would be the best person for me to speak to?

Thank you for taking the time to talk with me. The questions should take approximately 15 minutes. We are asking these questions to clarify or expand on information presented in the previous study, and to better understand how IZ works in your jurisdiction. Since our study includes a large number of communities, most of the information will be presented in the aggregate (i.e., the percent of communities that adopted IZ before 1990). In some cases we may describe the characteristics of individual communities in more detail, for instance, describing changes in a particular program over time. Any information you provide to us will not be attributed to you personally, by name or title, unless you explicitly authorize us to do so.

PRESENCE OF IZ & DATE OF ADOPTION

Question 1)

We are interested in knowing more about the characteristics of inclusionary housing in your community, and how much affordable housing has been produced under the program. In our study, we are defining inclusionary housing (or inclusionary zoning) as any local ordinance that requires or provides an incentive for developers to reserve a certain percentage of housing units in a market-rate residential development for low- or moderate-income households.

- a) Based on this definition, does your jurisdiction currently have an IZ program?
 - Yes
 - No
 - Unsure

- b) If yes: in what year was the IZ program established? _____

Question 2)

- a) If no IZ program currently exists, has one existed in the past?
 - Yes
 - No
 - Unsure

If an IZ program existed previously,

- b) In what year was the previous program established? _____
- c) In what year did it end? _____
- d) To the best of your knowledge, why is it no longer in effect:
 - Repealed by local government
 - Struck down by court decision/state action
 - Other _____

MANDATORY/VOLUNTARY STATUS

Question 3)

Some inclusionary housing programs are mandatory, that is, the ordinance requires the developer to reserve some affordable units. Other programs are voluntary, in that the developer may choose to reserve affordable units, in exchange for a density bonus or some other cost offset, but developers may also choose not to participate.

- a) Based on this distinction, is the current IZ program in your jurisdiction:
 - Mandatory
 - Voluntary
 - Both
- b) Has that ever been changed? _____
- c) If so, in what year? _____

PROJECT AND RESIDENT ELIGIBILITY

Question 4)

Most IZ programs set the number of required affordable units as a percentage of total units in the development. In some cases, the required percentage of units varies by whether the project is rental or owner-occupied, or by the targeted income level of the residents. If this is applicable to your jurisdiction:

- a) What share of units must be affordable, and at what level of income
 - Rental _____ % of units
 - _____ % of AMI
 - Ownership _____ % of units
 - _____ % of AMI
- b) If these requirements have changed since the IZ program began:
 - Has the share of affordable units increased or decreased? _____
 - Has the targeted income level(s) increased or decreased? _____
- c) In what year were the provisions changed? _____

Question 5)

a) How long must the units be made affordable to low- or moderate-income residents?

Rental _____years

Ownership _____years

b) Has the length of affordability even been changed?_____

Was the previous length longer or shorter than the current one?_____

c) What year was it changed?_____

PROJECT EXEMPTIONS

Question 6)

Some IZ programs only apply to certain types or sizes of development, for instance, residential projects with a small number of units may be exempt. In your jurisdiction:

a) Are projects below some minimum size exempted from IZ?_____

If yes, what is the minimum size?_____ units

b) Has the minimum project size has changed over time?_____

Was the previous project size larger or smaller than current size?_____

In what year was it changed?_____

Question 7)

a) Are there any other reasons for projects to be exempted from IZ?

Baseline zoning

Tenure

Not served by public water/sewer?

Location within jurisdiction

Building type (elevator, certain height, etc)

Other_____

b) Have any of these exemptions changed over time? _____

What year: _____

Have they been expanded or contracted? _____

INCENTIVES OR COST OFFSETS

Question 8)

a) Some IZ programs offer incentives or cost offsets to encourage developers to set aside affordable units, or to set aside a larger number of units. Does the IZ program in your jurisdiction offer any of the following incentives?

- Density bonus
- Property tax abatement
- Fast-track processing
- Standards reduction (i.e. lower parking requirement, waive building height cap, etc)
- Fee waiver/deferral/reduction
- Other _____

b) Have any of those incentives changed over time? _____

Which ones? _____

In what year? _____

Question 9)

If your jurisdiction has growth controls (cap on building permits/population growth/subdivision phasing), are projects with affordable units exempted or given preference in some way?

ALTERNATIVES TO ONSITE DEVELOPMENT

Question 10)

Under some ordinances, to satisfy the IZ requirement or quality for the cost offset, developers must build affordable units on site, in the same location as market-rate units. Other ordinances offer alternatives to developers to meet the requirement.

a) In your jurisdiction, are any of the following options available as alternatives to building affordable units on site?

- Building affordable units at another location
- Making cash payment in lieu of units
- Donating land in lieu of units
- Other _____

b) Have the alternatives changed over time? _____

In what year? _____

AFFORDABLE HOUSING PRODUCTION

Question 11)

a) Since the IZ program in your jurisdiction was implemented, how many affordable housing units have been built?

Rental units _____

Owner-occupied units _____

b) Were any of these units built “off-site”, not in the same location as the market-rate units in the eligible development? _____

c) Are there any previously affordable units built under IZ on which the affordability restrictions have expired? _____

d) If so, how many previously affordable units are no longer restricted? _____

Question 12)

If your jurisdiction offers alternatives to building affordable units, have any of the following alternatives been used?

- Developers have made cash-in-lieu donations
- Developers have made land donations
- Other _____

Question 13)

To the best of your knowledge, have any IZ developments used additional subsidies, such as Low Income Housing Tax Credits or Community Development Block Grant Funds?

- Yes
- No
- Unsure

WRAP-UP

Thank you for taking the time to speak with me today. We greatly appreciate your assistance in improving the quality of our research. May we include your name and affiliation in the “Acknowledgements” to our study?

- Yes
- No

[If yes, verify spelling of name and title]

Name: _____

Title/Position: _____

If you provide us with an email address, we would be happy to send you a copy of our final study, expected to be completed in November.

Email: _____

Appendix B: Sources for Dates of IZ Adoption, San Francisco

Jurisdiction	Year IZ adopted	Source(s)
ALAMEDA COUNTY CA	2000	2, 3, 5
BENICIA CA	2000	2,3, 5
BERKELEY CA	1986	1,2, 3, 5
CALISTOGA CA	1989	1, 4, 5
CLAYTON CA	1995	3, 5
CONTRA COSTA COUNTY CA	2006	5, 6
CORTE MADERA CA	1989	2, 3, 4, 5
COTATI CA	1985	1, 2, 3, 5
CUPERTINO CA	1983	2, 3, 5
DANVILLE CA	1994	4, 5, 6
DUBLIN CA	1996	2, 3, 4
EAST PALO ALTO CA	1994	1, 2, 3, 6
EMERYVILLE CA	1990	2, 3, 4, 5, 6
FREMONT CA	2002	2, 3, 4, 5, 6
HALF MOON BAY CA	1996	2, 3
HEALDSBURG CA	1993	2, 3
HERCULES CA	1997	2, 3, 5
LARKSPUR CA	1990	1, 2, 3
LIVERMORE CA	1980	6
LOS ALTOS CA	1990	2, 3, 5
LOS GATOS CA	1976	1, 6
MARIN COUNTY CA	1980	1, 4, 5, 6
MENLO PARK CA	1986	1
MILL VALLEY CA	1985	1, 6
MORGAN HILL CA	1977	2, 3
MOUNTAIN VIEW CA	1999	2, 3, 4, 5
NAPA CA	1999	2, 3, 6
NAPA COUNTY CA	1992	1, 2, 3, 5
NOVATO CA	1999	2, 3, 5, 6
PALO ALTO CA	1973	2, 3, 4, 5
PETALUMA CA	1984	1, 2, 3, 4, 5
PLEASANT HILL CA	1991	2, 3, 4, 5
PLEASANTON CA	1978	2, 3, 5
PORTOLA VALLEY CA	1991	2, 3, 5
RICHMOND CA	2001	2, 3, 4, 5
ROHNERT PARK CA	2002	2, 3, 4, 5, 6
SAN ANSELMO CA	1995	2, 3

SAN CARLOS CA	1991	1, 2, 3, 4, 5
SAN FRANCISCO CA	1992	2, 3, 4, 5
SAN LEANDRO CA	1980	2, 3, 4, 5
SAN MATEO CA	1992	1, 2, 3, 4, 5
SAN MATEO COUNTY CA	1994	2, 3
SAN RAFAEL CA	1988	2, 3, 4, 5
SANTA CLARA CA	1992	2, 3, 5
SANTA CRUZ CA	1980	2, 3, 5
SANTA CRUZ COUNTY CA	1978	2, 3, 4, 5
SANTA ROSA CA	1992	1, 2, 3, 4, 5
SEBASTOPOL CA	1994	2, 3, 4, 5
SONOMA CA	1995	1, 2, 4, 5
SOUTH SAN FRANCISCO CA	2001	2, 3
SUNNYVALE CA	1980	1, 2, 3, 4, 5
TIBURON CA	1988	2, 3, 5
UNION CITY CA	2001	2, 3, 4
WATSONVILLE CA	1991	1, 2, 3, 5
YOUNTVILLE CA	1992	2, 3, 6

Source codes:

1= Calavita & Grimes 1994

2 = CCRH/NPH 2003

3 = Vandell 2003

4 = NPH 2007

5 = CCRH 2007

6 = Furman Center 2007

Appendix C: IZ programs in the Washington DC metropolitan area as of November 2007

Jurisdiction	Year Adopted	Year Amended	Year Repealed
Alexandria City, VA	Unknown		
Annapolis City, MD	2004		
Arlington County, VA	April 2004; 2005	n/a	December 2004
Baltimore City, MD	In Planning	n/a	n/a
Fairfax County, VA	1990	1998	n/a
Falls Church City, VA	1998	yes, year unclear	n/a
Fauquier County, VA	1996	n/a	n/a
Frederick City, MD	2007/2008	n/a	n/a
Frederick County, MD	2002		
Gaithersburg City, MD	2006	n/a	n/a
Loudon County, VA	1993	2000	n/a
Montgomery County, MD	1974	1981; 1989	n/a
Prince George's County, MD	1991	n/a	1996
Queen Anne's County, MD	2004		
Rockville City, MD	1990	2001;2002	n/a
Washington, DC	2007	n/a	n/a

Appendix D: Robustness checks on missing data, Boston

Table D.1 Differences between reporting and non-reporting jurisdictions, Boston

Variable	Year IZ adopted			IZ ever used			n
	Missing	Not missing	Difference	Missing	Not missing	Difference	
<i>IZ program characteristics</i>							
Mandatory	0.50	0.59	-0.09	0.60	0.56	0.04	99
Density bonus	0.67	0.72	-0.05	0.71	0.70	0.01	99
Buyout options	0.22	0.42	-0.20	0.49	0.33	0.16	99
Number IZ triggers	1.06	1.27	-0.21	1.29	1.20	0.08	99
Min project size	0.17	0.31	-0.14	0.37	0.23	0.14	99
Cluster trigger	0.33	0.33	0.00	0.34	0.33	0.02	99
District trigger	0.11	0.12	-0.01	0.11	0.13	-0.01	99
Structure trigger	0.28	0.16	0.12	0.14	0.20	-0.06	99
Yrs affordable	78.6	74.9	3.6	63.1	81.1	-18.0*	51
Income target	20.4	14.2	6.2**	15.2	15.3	-0.1	72
IZ ever used	0.20	0.35	-0.15				
Ever used missing	0.44	0.33	0.11				
Year IZ adopted				1993	1998	-4.8**	81
Year missing				0.23	0.16	0.07	99
<i>Demographics/location</i>							
Population	13,924	23,524	-9,600	31,227	16,762	14,465***	99
Pct BA plus	20.1	27.8	-7.7**	25.7	26.9	-1.3	99
Pct white	95.9	97.0	-1.1	96.2	19.2	77.0	99
Pct < 18	29.7	28.5	1.2	26.7	29.8	-3.1***	99
Housing density	0.8	1.1	-0.3	1.9	0.6	1.2***	99
Distance Boston	25.8	21.7	4.1	20.8	23.2	-2.4	99
<i>Other regulations</i>							
Pct in county with IZ	53.0	59.3	-6.3	60.4	57.0	3.4	99
SF min lot size	45,664	39,828	5,836	34,346	44,377	-10,031**	99
# MF lots	2,700	5,819	-3,119	8,147	3,717	4,430**	99
Cluster zoning	0.88	0.96	-0.08	0.94	0.95	-0.01	99
Growth caps	0.41	0.30	0.11	0.34	0.31	0.03	99
Wetlands bylaw	0.76	0.78	-0.02	0.66	0.84	-0.18**	99
Septic rules	0.71	0.61	0.10	0.51	0.69	-0.18*	99

*, ** and *** denote statistical significance of two-tailed t-tests at 10%, 5% and 1% levels, respectively

Appendix E: Robustness tests on functional form of other regulations, Boston

Table E.1 Robustness checks on single-family permits

Dependent variable:	Log(permits, 1980-2006)			
Variable:	(1)	(2)	(3)	(4)
Log(years IZ in place)	-0.060 (0.053)	0.006 (0.053)	0.007 (0.059)	0.004 (0.065)
Log(pop)		0.711*** (0.127)	0.762*** (0.103)	0.816*** (0.084)
Pct BA +		-0.016* (0.007)	-0.015* (0.007)	-0.014* (0.007)
Pct white		0.002 (0.009)	0.002 (0.009)	0.003 (0.011)
Pct < 18		-0.023 (0.032)	-0.021 (0.032)	-0.019 (0.031)
Hsg units/acre		-0.539 (0.280)	-0.579** (0.220)	-0.589** (0.221)
Pct towns in county w/ IZ		-0.005 (0.003)	-0.006* (0.003)	-0.006* (0.003)
Cluster zoning (2-yr lag)			0.124*** (0.023)	
Growth controls (2-yr lag)			-0.052 (0.116)	
Wetlands bylaw (2-yr lag)			-0.166** (0.049)	
Septic rules (2-yr lag)			-0.114** (0.037)	
Log(yrs cluster zoning)				0.087** (0.032)
Log(yrs growth controls)				0.014 (0.078)
Log(yrs wetlands bylaw)				-0.095** (0.036)
Log(yrs septic regs)				-0.093***
City/town FEs	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y
Observations	3051	3051	3048	3051
R-squared	0.75	0.76	0.77	0.77

Robust standard errors clustered by county in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%

Table E2 Robustness tests single-family housing prices

Dependent variable:	Log(prices, 1987-2004)			
Variable:	(1)	(2)	(3)	(4)
Log(years IZ in place)	0.020*** (0.002)	0.010* (0.004)	0.011* (0.005)	0.011 (0.006)
Log(pop)		0.020 (0.106)	0.042 (0.120)	0.054 (0.108)
Pct BA +		0.007** (0.002)	0.007** (0.002)	0.007** (0.002)
Pct white		0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
Pct < 18		0.007 (0.005)	0.007 (0.005)	0.006 (0.004)
Hsg units/acre		0.267*** (0.071)	0.257** (0.076)	0.246** (0.067)
Pct towns in county w/ IZ		-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Cluster zoning (2-yr lag)			-0.004 (0.022)	
Growth controls (2-yr lag)			-0.010 (0.031)	
Wetlands bylaw (2-yr lag)			-0.009 (0.010)	
Septic rules (2-yr lag)			-0.020** (0.007)	
Log(yrs cluster zoning)				0.006 (0.016)
Log(yrs growth controls)				-0.011 (0.017)
Log(yrs wetlands bylaw)				-0.010 (0.007)
Log(yrs septic regs)				-0.021*** (0.003)
City/town FEs	Y	Y	Y	Y
Year FEs	Y	Y	Y	Y
Observations	1785	1785	1785	1785
R-squared	0.97	0.97	0.97	0.97

Robust standard errors clustered by county in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%