Policy Sciences **24**: 127–152, 1991.

Growth controls: policy analysis for the second generation

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Abstract. The 1970s spawned a 'first generation' of growth controls which featured explicit (or implicit) restrictions on residential housing construction. These restrictions were typically implemented in small, affluent, and predominantly white suburban communities. Policy analysis responded by focusing almost singlemindedly on how such supply-side restrictions might increase housing prices and drive out the poor. The 1980s and 1990s have, however, given birth to a more comprehensive 'second generation' of controls which many major cities and metropolitan areas are considering. This generation ties commercial and industrial as well as residential development to the reduction of the negative externalities and congestion costs associated with growth. To fully evaluate this second generation, policy analysis must take into account not only housing price effects and the rate of job creation but also the full range of 'amenity effects' associated with differing rates of growth and attendant levels of traffic congestion, air pollution, and other 'public bads.' We develop a framework for such 'second generation' growth control analysis using San Diego as an example.

Introduction

As traffic congestion, air pollution, water shortages, crime, overcrowded schools and other symptoms of unmanaged growth have increased dramatically in the 1980s and 1990s; growth management has replaced rent control and property taxation as the most hotly debated property rights issue.[1] Nowhere is this trend more evident than in trend-setting California where over 100 communities have adopted some form of growth controls and where a number of city governments – including those of San Diego, San Francisco, and Los Angeles – have passed legislation limiting the rate of development.[2]

In the often heated political debate over growth controls, the policy analyst has often been the building industry's most important ally in its lobbying campaign to halt their imposition. The reason: it is the policy analyst who typically provides the strongest factual ammunition against controls in the form of studies which illustrate that 'building caps' and other supply restrictions will drive up housing prices and drive out low income groups.[3] Such studies are useful for industry spokesmen because they can be widely quoted in the press, before legislative bodies, and in advertising circulars; and if the studies are conducted by an 'independent' expert at a respectable university, they have even greater currency.

There is, however, another important dimension to the growth control debate which policy analysts have largely ignored. This dimension involves the identification and measurement of various 'amenity effects' which may

result from reducing negative externalities and congestion costs associated with growth.[4] These costs arise in the form of increased traffic; overcrowded libraries, parks, schools, and criminal justice facilities; inadequate sewage and solid waste disposal capacity; increased air and water pollution; an increase in the probability of water and electricity shortages; and the loss of open space. In their policy prescriptions, analysts have also tended to ignore very real political constraints such as the inability to get tax increases and bond issues passed which may make growth controls a feasible 'second best' option to the economist's often politically unobtainable solution of using the price and tax systems to internalize externalities and reduce congestion costs. For these reasons, analyses to date have given short shrift to growth controls as a productive tool of public policy.[5]

The purpose of this article is to call for a rethinking of growth control analysis as it is commonly practiced. We argue that policy analysts have tended to focus their research far too narrowly on housing prices and the exclusion issue and largely ignored significant amenity effects[6] (as well as a number of important collateral issues). We propose a more comprehensive analytical framework for second generation growth control policy analysis.

To lay the foundation for this framework, we first examine the genesis of a 'first' and 'second' generation of growth controls and illustrate why the identification and measurement of amenity effects has typically taken a back seat to housing price analyses. We then describe the framework and illustrate its use in a discussion of growth controls in San Diego.

The genesis of growth controls

By reducing the rate of increase in housing supply, growth controls are asserted to produce a 'scarcity' effect which, by the laws of supply and demand, drives up housing prices (and rents). At the same time, to the extent that growth controls result in the reduction of expected negative externalities and/or congestion costs associated with growth, controls may also produce 'amenity effects' that likewise will be capitalized in land values (and wages), e.g., a decrease in expected commute time increases the value of a home.[7] This section examines why growth control policy analysis has historically focused upon scarcity rather than amenity effects.

The first generation of controls

The early 1970s gave birth to a 'first generation' of growth control measures designed to slow the rate of development in small suburban communities reluctant to make the transition to urbanized cities. The epicenter of this 1970s growth control movement was Northern California, and the classic case involves the City of Petaluma.

In 1972, the City of Petaluma established a residential housing quota of 500 new units a year for the period 1973 to 1977.[8] In Petaluma's wake, numerous communities in Northern California, particularly around the San Francisco Bay Area, passed similar measures.[9] In reviewing this first generation of controls, several important 'stylized facts' emerge which reveal much about the evolution of growth control policy analysis as it is commonly practiced today.

First, growth controls in the 1970s typically involved some type of explicit or implicit restriction on the rate (or quality) of *residential* housing construction.[10] Beyond this restriction, the measures did little or nothing to remedy either the causes or consequences of growth. Hence, analysts tended to focus their attentions narrowly on the restriction as the relevant policy instrument.

Second, the measures were typically implemented in small suburban 'bedroom communities' which were economically and culturally dependent on larger metropolitan areas. As a result, the measures inevitably involved significant 'spillover' effects: restrictions pushed development into surrounding unrestricted communities, and problems were exported rather than solved.[11] Moreover, because restrictions often moved people further from employment centers, it was often asserted that growth controls exacerbated rather than solved problems such as traffic congestion and air pollution. Hence, policy analysts felt quite comfortable ignoring possible benefits of growth controls from improved amenity levels because they believed those benefits were significantly reduced or even totally negated by the spillover phenomenon.[12]

Third, the measures were assumed to have little or no effect on the rate of job creation[13] and therefore on the rate of population growth. Rather, both capital and labor were assumed to be mobile so that if a small community imposed growth controls, homebuilders would simply build in adjacent communities, and workers who might otherwise reside in the controlled community and perhaps nearer their place of employment would simply travel farther to work. This assumption reinforced the belief that significant spillover effects would occur, but more important, it has helped foster a common myth, namely, that policymakers cannot control the rate of population growth.[14]

Fourth, the measures were imposed prior to the budgetary 'pincher effect' of tax limitations and rising marginal costs. That is, prior to the 'tax revolt' and in an earlier era of relatively stable or declining marginal costs, local policymakers typically could tax new entrants into a city at levels sufficiently high to ensure the new entrant paid the incremental or 'marginal costs' associated with his or her entry. Thus, existing residents did not have to subsidize new entrants into the city. Indeed, if they so chose, they could adopt tax policies which forced new entrants to pay *more* than their marginal costs and thereby subsidize exisitng residents – a practice known as 'fiscal zoning.'[15] At the same time, the marginal cost of most public services was still equal to or below average cost so that the addition of a new person in the community

actually improved (or at least did not diminish) the level of services in a community under the traditional practice of average cost pricing.[16]

An important implication of this stylized fact is that the first generation of growth controls was *exclusionary* in a very particular and narrow sense: those communities which imposed controls were unwilling to take new entrants *even if these entrants paid their way* by financing required public services and infrastructure. And because restricting housing supply typically increased housing prices and rents, those most likely to be excluded were low and moderate income individuals. This typically meant that a disproportionate share of blacks and other minorities bore the brunt of these exclusionary policies – often criticized as the product of an 'elitist' white majority.[17]

The exclusionary nature of the first generation of controls coupled with the exclusive reliance of most communities on some type of explicit or implicit residential building restriction ultimately led policy analysts to focus almost exclusively on housing price increases and their effects on the poor.[18] This occurred largely because of legal pressures: if a building cap could be shown to be exclusionary, it could be ruled illegal.[19] At the same time, there was little or no attempt to differentiate between price effects induced by the supply-side restriction and price effects due to improved *amenity* levels.[20]

The second generation of controls

The 1980s and 1990s have given birth to a 'second generation' of more comprehensive and sophisticated growth control measures which do not fit the typical profile of exclusion by smaller, relatively affluent communities. The epicenter of this second generation is California where San Diego and Orange Counties, the Cities of Los Angeles and San Francisco, and over 100 local communities are considering, or have implemented, some type of controls. As with the first generation, it is useful to articulate a set of stylized facts about this new generation because these facts provide insight into how policy analysis must evolve.

First, the new measures are not confined to small suburban communities but rather are being embraced by major cities, large metropolitan areas, and even entire states. Hence, it becomes much more difficult to portray such controls as a tool of the affluent to keep out poor minorities, particularly when such controls are imposed in states such as Florida, New Jersey, and Vermont and cities such as Los Angeles and San Diego which house people of every color and across the income spectrum. At the same time, it becomes equally difficult to dismiss the existence of significant amenity effects because spillover is less likely to occur; by implication, the degree of spillover becomes a legitimate area of analytical inquiry.

Second, the measures are being implemented by cities and states all suffering from the financial pincher effect described above.[21] One implication which has become quite clear both to policymakers and the broader public is

that *growth does not pay for itself* in terms of providing revenues to finance incremental facilities and infrastructure. Rather, existing residents must subsidize new entrants by bearing a disproportionate share of new infrastructure and facilities costs; or, more subtly, existing residents must subsidize growth through a deterioration in what slow growth advocates have characterized as the 'quality of life,' as embodied in measures such as air quality, commute time, and the degree of school overcrowding.[22]

It follows that the new generation of controls may be 'exclusionary' but in a much different sense: *existing members of the community are unwilling to accept new entrants unless the new entrants pay their way* by financing the incremental costs of required public facilities and infrastructure. This new battle over growth controls is, therefore, not between the rich and the poor as it was in the 1970s, but rather between existing members of a community and potential new entrants. At stake is who should pay for growth, and the measurement of amenities is a vital part of the answer to that question.

Third, the new measures are no longer simple *residential* building restrictions but rather comprehensive plans designed to bring the rate of population growth, economic expansion, and the provision of public services and regional infrastructure into balance. In particular, the measures typically link the rate of *commercial* and *industrial* as well as residential development to the provision of key public facilities such as parks, libraries, and schools; regional infrastructure such as sewage and solid waste disposal systems; and/or the attainment of certain standards for air quality and traffic congestion.[23]

By linking the rate of development to the timely provision of regional infrastructure and public facilities, these 'facilities-driven' and 'infrastructure-driven' measures are designed to prevent the implicit subsidization of growth by existing residents through the above-mentioned deterioration in the levels of public services and infrastructure. For the policy analyst, it thus becomes an important task to determine the rates of development and population growth which are consistent with a City's ability to provide facilities and infrastructure given current fiscal and zoning constraints or given proposed changes in those constraints. It is equally important to measure the reduction in amenities that might result from exceeding the target rate.

At the same time, by controlling commercial and industrial as well as residential development, the measures seek to address a key criticism of first generation growth controls, namely, that a residential building restriction does nothing to control the rate of population and instead only leads to increased housing prices and 'doubling up' in existing houses.[24] In particular, the controls on commercial and industrial development are expressly designed to reduce the rate of job creation and thereby reduce the rate of population growth.[25]

One analytical implication is that the estimation of housing price effects now becomes much more complex than previously practiced because policymakers have added a demand-side measure to offset the effects of the supply-side restrictions. That is, the measure includes not only a supply-side restric-

tion on the number of houses built but also an implicit check on population growth which may alter the induced demand for housing units. Under such controls, housing prices *need not rise at all* in the presence of comprehensive controls which set stable housing prices as a goal and effectively control population growth. As Figure 1 demonstrates, the supply curve S shifts over time to S′ under controls rather than to S″ under an uncontrolled growth scenario. At the same time, however, the demand curve for housing shifts to D′ instead of D″ because of effective restraints on population growth; and the price of housing remains at P^0.

A second analytical implication is that it becomes equally important for the policy analyst to focus on refining the statistical link between job creation and population growth as well as determine the most efficient types of commercial and industrial restrictions (e.g., explicit limits versus development impact fees on new construction). It should also be clear from these commercial and industrial restrictions that the impacts of growth controls on a local economy are now a legitimate area for analysis, but it should be equally clear that the relevant labor market focus should not simply be *the rate of job formation*. In this regard, the policy analyst must confront a sacred cow – 'more jobs are always better' – and deal with the underlying analytical questions: What rates of job formation and population growth are consistent with a City's desired level of public services and infrastructure under the existing (or an alternative set of) fiscal and zoning rules? What should the target rate of job creation be?[26] How do differing rates of population growth affect the tax base and per capita income?

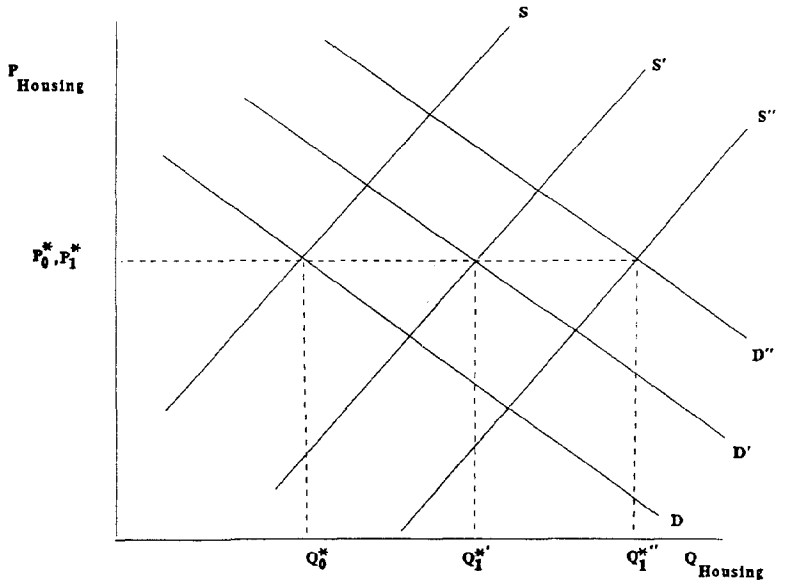

Fig. 1. Stable housing prices with the effective controls.

As a final stylized fact which addresses the exclusion issue and compliance with the law, the new measures also typically feature some type of provision to promote affordable housing by giving preference in the building permit queue to low income housing by exempting affordable housing from the restrictions, or by specifying that a certain percentage of all new housing should be for low income individuals. As Peter Zorn, David Hansen, and Seymour Schwartz have already demonstrated,[27] the effectiveness of such programs is an important area of research for policy analysts, and the development of techniques to gauge such effectiveness should continue.

Given this set of stylized facts, it should be clear that if growth control analysis is to become more useful to policymakers, it must shift its singular focus from measuring scarcity effects capitalized in land values and wages to identifying and measuring the full range of scarcity and amenity effects as well as their distributional consequences. At the same time, second generation growth control analysis must also deal with other collateral issues such as the extent of the spillover and doubling up phenomena, the link between job creation and population growth, and the determination of target rates of growth for desired levels of services. In the next two sections, we outline the requisite analytical framework, illustrate that growth-induced changes in amenity levels are important, and discuss the techniques available to measure amenity levels.

Comprehensive growth control policy analysis

In evaluating a second generation growth control measure, the policy analyst should attempt to: (1) estimate the full range of scarcity and amenity effects associated with alternative growth management proposals, (2) determine the distributional and general welfare implications of these effects, and (3) examine the relevance of the important collateral issues which have been discussed above and which are summarized in Table 1. Only when these tasks are completed will the analyst be able to provide decisionmakers with an assessment of the desirability and effectiveness of the measure.

Scarcity or supply side effects

The supply side effects associated with building restrictions have implications both for economic efficiency and equity. On the efficiency side, housing supply restrictions may impose a 'dead weight loss' on the economy in the form of constraining supply below the free market clearing level. However, if growth generates negative externalities or congestion effects, an unrestricted housing market will actually provide an *oversupply* relative to the welfare-maximizing level, and a properly administered supply restriction may actually *improve* public welfare.[28] The analytical point is that simply estimating the

Table 1. Fundamental issues in growth control policy analysis.

1. Degree of 'spillover' effects
2. Degree of subsidization of growth by existing residents
3. Rates of development and population growth consistent with city's ability to provide facilities and infrastructure
4. Extent of 'doubling up'
5. Link between rate of job creation and population growth
6. Efficiency properties of various commercial and industrial growth controls
7. Target rate of job creation
8. Effect of differing rates of population growth on tax base and per capita income
9. Effectiveness of various affodable housing provisions

price effect due to supply side shifts[29] without any attempt to determine the extent to which the restriction may internalize externalities or reduce congestion costs begs an important question. This question can be answered using a variety of standard microeconomic techniques.

With regard to equity, the increase in *rents* induced by controls benefits landlords at the expense of tenants (absent any consideration of amenity effects), and this distributional effect is reflected in the present discounted value of the income transfer. More problematical, however, are the increases in *housing prices* that result from supply restrictions. Housing price increases are commonly thought to benefit existing homeowners, and this phenomenon forms the core of the 'capture theory' which identifies self-interested homeowners intent on appreciation as being the political force behind growth controls.[30] However, this claim likewise must be qualificd. In particular, a homeowner will benefit if he or she sells the appreciated property and migrates out of the region.[31] However, if the homeowner remains in the house – a more likely occurrence – the increase in imputed rent will offset the increase in the value of the house and little or no benefit will accrue.[32]

Amenity effects

The importance of amenity effects and their welfare implications should be obvious from Table Two. These effects (relative to the case of unconstrained growth) include: reduced health care costs and mortality and morbidity rates associated with reductions in air and water pollution; fewer lost recreation days due to a reduction in sewage spills; the reduced risk of becoming a crime victim[33] or experiencing water and power shortages; reduced congestion costs associated with overcrowded freeways and arterials, parks, recreational facilities, schools,[34] criminal justice facilities, and libraries; 'utility' derived from the preservation of open space; and a reduction in the tax and fee burden of residents necessary to support regional and community infrastructure (a reduction implicit in a reduced level of capital expenditures).

Table 2. The measurement of growth-induced externalities.

Amenity effect	One appropriate measurement tool
A. Air pollution	
1. Health damage	Contingent valution
2. Visibility impairment	Hedonic price model
B. Sewage spills	
1. Health damage	Contingent valuation
2. Lost recreation days	Travel cost analysis
C. Public safety	
1. Police protection	Contingent valuation
2. Fire protection	Contingent valuation
D. Congestion	
1. Traffic-freeways	Hedonic price model
2. Traffic-arterials	Hedonic price model
3. Recreational facilities (beaches, parks, etc.)	Travel cost analysis
4. Public facilities (libraries, museums, etc.)	Contingent valuation
5. Parking	Contingent valuation
E. Reliability	
1. of water supply	Contingent valuation
2. of power supply	Contingent valuation
F. Loss of open space	Contingent valuation
G. Expenditure avoidance	
1. Sewage capacity	Forecast expenditures
2. Solid waste disposal site	Forecast expenditures
3. School overcrowding	Forecast expenditures

In theory, all the amenity effects created by different rates of growth should be capitalized either in the value of land or in wages; and each effect should be measurable using the hedonic price model.[35] However, as a practical matter, the hedonic price model may be difficult to use or yield unreliable estimates.

For example, there may be insufficient (or no) variation in the data sample as in the case of a relatively uniform regional air basin.[36] Similarly, the public may be unaware of an amenity effect such as health benefits associated with a reduction in ozone pollution.[37] If either or both of these conditions hold, the policy analyst must resort to other valuation techniques. For our purposes, the two most useful techniques are contingent valuation and travel cost analysis.[38]

Contingent valuation (CV) uses survey techniques to determine how much people are willing to pay for non-marketed public goods such as improvements in air quality, damages from sewage spills, or a reduced crime rate.[39] Travel cost analysis is the most frequently used member of a class of techniques which are based upon the household production approach of Gary Becker.[40]

Turning once again to Table Two, we see that the hedonic price model can measure the effects of traffic congestion and visibility impairment, travel

cost analysis is appropriate for measuring the cost of lost recreation days due to sewage spills, and contingent valuation is appropriate for measuring the amenity and disamenity effects of crime, health damages from air pollution, the reliability of water and electricity supply, and various forms of congestion other than traffic.[41]

All three valuation methods discussed above operate from a 'utility-theoretic' paradigm and presume that people 'care' about the relevant amenity and that this concern is reflected in different levels of individual satisfaction or utility. In some cases, however, people may in fact not care (or care little) about an externality such as pollution. In such cases, CV and other utility-theoretic methods will *underestimate* the amenity effects associated with different growth rates in a local community *if* there exists either federal or state laws which set standards the community *must* meet.

For example, suppose that residents of Oblivious, California do not regard the dumping of raw sewage into the ocean as a health hazard but that the federal government prohibits Oblivious from such dumping and requires secondary treatment. Suppose further that additional population growth in Oblivious would require the expansion of the sewage treatment plant to comply with this prohibition. Then, utility-theoretic methods such as hedonics or CV would underestimate the costs of additional growth. Nonetheless, these costs might be estimated by the expenditures which will be necessary to comply with federal law, expenditures which existing residents of Oblivious could avoid (or reduce) in the absence of growth or under a slower growth rate. Based on this observation, we include a fourth measurement tool in Table Two, forecast expenditures, and we believe that for certain amenity effects such as those associated with solid waste disposal and sewage capacity, '*expenditure avoidance*' represents a potential significant benefit from controls. (Expenditure avoidance refers to those expenditures which can be avoided by reducing the rate of growth; in this case, reducing the rate of population growth allows existing residents to delay or defer capital expenditures designed to expand existing facilities to accommodate growth.)[42]

As a final observation, it is an unfortunate fact of analytical life that it is both more difficult and more costly to measure many amenity effects than it is to simply estimate a hedonic price model using readily available data. This is particularly true with the CV method which usually entails the costly collection of original survey data. The greater difficulty and higher cost of these alternative methods have reinforced the tendency in first generation policy analysis to use the hedonic price model and to focus narrowly on the estimation of housing price effects. This tendency has been further reinforced by the politics of fundraising: development interests have been very generous in funding such studies. It has been much more difficult for researchers to raise the funds necessary to conduct more comprehensive studies.[43] It is hoped that at least one consequence of this article will be to sensitize not only the academic community but also the relevant government agencies to the high cost of *not* conducting a comprehensive analysis.

Distributional and welfare consequences

One of the major problems with most of the existing growth control literature is its closed-economy, partial equilibrium orientation. In its extreme form, this framework assumes a closed system with an exogenous growth rate. These two assumptions are generally sufficient to lead to the conclusion that the owners of developed land gain from higher housing prices due to housing caps, that the owners of undeveloped land lose due to lower values for their land, that renters lose due to higher rents, and that substantial 'doubling up' occurs because the addition to the existing population has to be housed somewhere. The same level of congestion occurs with and without housing caps for most public facilities because the number of people is unaffected by the housing caps. The only externalities then come from how the land is used and differences in the spatial structure of the city. In such a framework, homeowners may vote to impose housing caps because they provide a benefit, but it should not be surprising that it can always be shown that in this closed model, growth controls reduce aggregate welfare.

Shifting to an open economy-general equilibrium framework, however, reveals a much different set of stylized theoretical predictions about the effects of growth controls.[44] The major force in the open economy model is the movement of agents to maximize their utility.[45] This inherently limits the overall magnitude of the economic impacts of growth controls. Under such an approach: (1) it is impossible to generate long term unemployment effects;[46] (2) tests of the magnitude of housing price changes in the face of growth controls are pure tests of amenity changes rather than primarily scarcity effects as typically assumed in the empirical literature on growth control (if the population in the system as a whole is fixed);[47] and (3) growth controls involve a distributional game played largely between new and existing residents.

As a rule, controls benefit the owners of developed property through both supply and demand side effects. In the absence of sizable economies of amalgamation,[48] renters lose in *both* the case of controlled growth and uncontrolled growth relative to the benchmark of a stable population, but the growth control scenario may dominate the uncontrolled scenario with respect to renter welfare.

In particular, renters lose under uncontrolled growth because as development occurs, the rent gradient is raised; and the only constraint on this increase are disamenity effects associated with growth. That is, as more people enter the apartment market and drive rents up, congestion, pollution, and other externalities partially offset these increases by driving rents down. Renters similarly 'lose' under a controlled growth scenario *relative to the status quo* of stable population because supply side effects may push the rent gradient up. (This need not occur if commercial and industrial development – and therefore the rate of job creation – are balanced with residential development.) However, *renters may still be better off* relative to the uncontrolled scenario because of amenity effects and because of effective brakes on the

rent gradient effect; and it is the analyst's job to determine the net effects.

In terms of distributional fiscal impacts, the following point is worth noting – if for no other reason than to understand the politics of growth controls: The imposition of growth controls will benefit existing residents to the detriment of new entrants if the fiscal pincher effect holds. That is, in the absence of controls, property tax limitations and rising marginal costs for public services impose a disproportionate share of the costs of growth on existing residents. (It is worth repeating that average cost pricing in a rising marginal cost world is the source of the inequity.) The benefits that will accrue to existing residents will come in the form of increased amenity levels relative to the unconstrained case and/or a lower relative tax and fee burden for public services.

In such a case, controls arguably are 'fair' in that they prevent subsidization of growth by existing residents; and they are clearly politically attractive. It follows that the analyst who wishes to examine and measure this distributional impact either for local policymakers or the courts must take into consideration both current fiscal limitations and the cost and pricing structures for public goods. Such an analysis will provide insight to policymakers who wish to undertake reforms designed to accommodate growth while minimizing damage to existing residents or who wish to limit growth based on current constraints.

In this distributional game, it is also worth noting an interesting possibility: in an open economy with a population of agents with heterogeneous tastes for public amenities who initially sorted themselves into different cities, it is possible to change the level of amenities in a particular city and get a complete swapping of existing residents for new residents without changing the level of aggregate utility in the system. *The existing residents all lose and the newcomers all gain.* While a benefit-cost analysis of such a situation is likely to be neutral, it is unlikely that existing residents would view it as such.

Finally, with respect to the sensitive issue of exclusion of the poor, their fate will rest with the effectiveness of those programs in the comprehensive control plan which are designed to mitigate housing price effects and insure affordable housing. If the plan succeeds in maintaining or increasing the amount of affordable housing available to low income individuals, then low income residents will be better off.[49]

Growth control in San Diego

Between 1970 and 1986, the population of San Diego increased by 44% and in 1987 it became the fastest growing metropolitan area in California and one of the fastest in the nation. During that period, San Diegans – many of whom were deeply concerned about the possible 'Los Angelization' of 'America's finest city'[50] – witnessed a significant and unprecedented deterioration in the ability of the City to provide basic infrastructure and public services. Traffic

congestion and crime increased dramatically (even as the crime rate was steadily falling in the U.S. and elsewhere in California), severe ozone pollution regularly ranked the City second worst in the nation, sewage spills and attendant closures of beaches and bays became commonplace, the Metropolitan Water District of Southern California forecast impending water shortages, county planners predicted electricity shortages, developers were rapidly transforming a rich inventory of environmentally sensitive canyons, hillsides, and wetlands areas into tract housing, local landfills were reaching capacity, and parks, libraries, and particularly schools were becoming increasingly overcrowded.

In response to political pressures arising from this rapid deterioration, the San Diego City Council passed an emergency Interim Development Ordinance (IDO) which placed a temporary 18-month cap on residential housing construction, and Mayor Maureen O'Connor appointed a special Citizens Advisory Committee (CAC) to debate and design a more permanent growth management plan. This plan, after some modification by the City Council, was to be submitted as a referendum for voter approval on the November 1988 ballot.

To assist the CAC in its deliberations, the City's Planning Department contracted with the Center for Real Estate and Urban Economics (CREUE) from the University of California at Berkeley. The Planning Department's original intent was to obtain a comprehensive socioeconomic statistical analysis of the full range of scarcity, amenity, and distributional consequences of various competing growth control measures – from a first generation cap such as the IDO to a comprehensive second generation growth management plan which linked the rate of commercial, industrial, and residential development to the provision of infrastructure and public facilities. However, during several months of debate over the appropriate tasks for CREUE within the CAC, the initially broad scope of the study was considerably narrowed. Eventually, CREUE was directed to focus on a set of 'first generation' growth control scenarios in which residential housing construction was capped at different levels, from an unconstrained 12,000 units per year to 4,500 units. CREUE was also directed to conduct an essentially 'first generation' type of analysis, that is, it was directed to focus primarily on housing price (and job) effects.[51] From the standpoint of the political economy of policy analysis, it is useful to understand how and why the scope of the study was narrowed.

The first reason lay with a pro-development majority coalition on the CAC which used its agenda-setting powers to ensure that the two major negative aspects of growth controls – housing price increases and a reduction in the rate of job creation – would be the central focus of the study.[52] The second reason lay with the expertise of the CREUE group which was well-versed in the use of hedonic housing price models to examine price effects[53] but which had relatively little experience with other techniques to assess congestion costs and the valuation of public resources. The third reason, which reinforced the reluctance of the CREUE group to tackle the more ambitious task

of valuing amenities and examining welfare effects, was a very meagre budget and short timeframe: the City allocated roughly $50,000 for a project which, if the original intent had been realized, should have been budgeted at $500,000 (or more), and gave CREUE less than five months to produce its analysis.

The CREUE study

CREUE analysts used a standard hedonic price model to examine potential housing price effects; they regressed housing prices for single family homes over the period 1980–1987 on a set of variables which included income, house characteristics such as age and size, and locational factors such as proximity to the coast and employment centers. To capture growth control effects, the model also included the number of housing completions in the relevant district, the ratio of developed to developable land, and an indicator variable equal to one if the sale occurred after implementation of the IDO, and zero if before.

On the basis of their regression results, CREUE concluded in their final report[54] that the IDO had driven up the average housing price by $5,150. CREUE also concluded that under a more permanent 4,500 unit annual cap, housing prices would rise in the short run by three to five percent in two of the City's seven 'super districts'[55] while in the long run, the cap would increase the average price countywide by 1995 by about 2.5 percent under strong employment growth and exhibit little or no effects under moderate growth.

The CREUE study was released with great fanfare during a joint meeting of the City Council and the CAC, and one of its authors, Jon Landis, was widely quoted in the press criticizing growth controls and saying that 'building caps don't work.' In ensuing debates over the final form of the City's growth control referendum, several pro-growth city council members frequently quoted the CREUE study to argue for passage of an essentially non-binding growth-accommodating residential building cap of 7,590-unit annual cap. This watered-down 'first generation' proposal eventually triumphed over a much tougher competing 'second generation' proposal favored by Mayor O'Connor which sought to link development to regional infrastructure and the provision of public facilities.

At the same time, building industry spokespeople also frequently quoted the CREUE results during a multimillion dollar lobbying campaign which was waged to defeat a competing November ballot measure known as the 'Quality of Life' Initiative, essentially a second generation growth management plan put on the ballot by Citizens for Limited Growth which based the rate of development on the attainment of regional standards for infrastructure.

Within the narrow scope of hedonic price model estimation, the CREUE

study is open to a number of the usual criticisms,[56] but to focus on whether the hedonic price model was correctly implemented would be to miss the broader point, namely, that the real failure[57] of the CREUE study lay in its inability to provide San Diego policymakers with any insight as to whether potential amenity and welfare effects warranted the imposition of a comprehensive 'second generation' growth control management strategy despite possible negative scarcity effects.[58]

The next section is devoted to briefly discussing some of the problems associated with the measurement of amenity effects and illustrating their potential importance through construction of some 'guesstimates' for a stylized second generation growth control plan in San Diego. The intent of presenting these guesstimates is to illustrate that amenity effects can be measured and that they are too large to be ignored. We wish to emphasize, however, that a *full* and rigorous analysis of amenity effects and associated welfare implications are well beyond the scope of this study and that the guesstimates presented for San Diego are meant to be merely illustrative.

Measuring amenity effects

In measuring amenity effects, the question the policy analyst seeks to answer is relatively simple: what is the difference in per capita expenditures necessary to maintain a set of specified amenity levels A, with a population of $N + M$ rather than M?[59] Finding an answer to that question, however, is significantly complicated by the lack of readily available raw data and other methodological hurdles. At least five major problems typically present themselves.

First, amenity levels change over time, and this introduces a strong temporal dimension to the externality cost estimates. To address this, there are two obvious options: (1) take some future year like 2000 or 2010 as the reference point compared to the current conditions or (2) calculate the annualized value of the discounted stream of payments needed to maintain A over, say, the next 20 years.[60] The latter seems preferable if there are large capital costs in specific periods or if there are large year to year changes in amenity levels, but this option requires making judgements about the appropriate discount rate. It is also more burdensome in informational terms because one must now have information on the size of the divergence between A and the state of the world with constant per capita expenditures in each year and on the costs and benefits of achieving A in each of those years.

Second, the relationship between population growth and the change in the amenity level is not always straightforward. For example, does the crime rate increase with population growth (above some certain threshold) or does crime increase only when population growth is accompanied by other factors such as increases in densities?[61]

Third, what is the appropriate baseline for the amenity? In the extreme case, a given amenity level may deteriorate over time even without population

growth; for instance, the road and bridge systems of a city are constantly decaying without increasing maintenance expenses.

This, in turn, raises a fourth problem: how do you distinguish between the improvements in an amenity level due to a technological change and the deterioration in an amenity level due to increased growth? For example, under an uncontrolled growth scenario, air quality may get only slightly worse instead of considerably worse because of massive additional expenditures on pollution control technology.[62] In such a case, the researcher must evaluate both the cost of the new technological requirements imposed by the local air pollution control district as well as the damages done by increased pollution levels.[63]

Fith – and with greatest consequence for the researcher's budget – appropriate data may not be readily available or even exist. For example, while the local air pollution district is likely to have a reasonably good idea of the new technology that it will require industry to install, it is unlikely to have a firm estimate of what the cost of those technological requirements will be; and it has even less of an idea of what the dollar value of the damages of the higher levels of air pollution are to residents. This means the researcher must not only estimate the cost of new technology but also arrive at damage estimates (e.g., by using contingent valuation or hedonic pricing techniques or by applying existing estimates of damages from elsewhere to the particular case).

Some guesstimates

Recognizing that similar and myriad problems exist for the measurement of virtually all of the other amenities under scrutiny, we can nonetheless attempt some 'guesstimates.'[64] In presenting these guesstimates, we can demonstrate the application of the various measurement techniques cited above and suggest how the budget-constrained analyst might be able to develop 'back of the envelope' calculations with perhaps readily available data to make a 'first pass' at the problem. To focus narrowly on the accuracy of these guesstimates would, however, be to miss the major points of this exercise, namely, that: (1) amenity effects are measurable using readily available valuation techniques, and (2) amenity effects are potentially significant in magnitude.

Let us begin, then, with the biggest ticket item, increased traffic congestion. The costs of this disamenity can be measured in several ways. As indicated above, one method is the hedonic price model: increased travel time should decrease the value of a house.[65]

In its study of growth controls, CREUE estimated an hedonic price model with a distance to employment center variable. We have converted the distance coefficient to a time measure and estimate that each additional minute of commute time reduces the price of the average San Diego house by about $1000. This estimate indicates that a growth-induced five to ten minute increase in the average one-way commute time translates into a $5000 to

$10,000 decrease in the value of the average house. Amortizing these sums into an annual cost per household yields an annual 'congestion tax' of about $580 to $1,160.[66]

A second method is based on numerous 'value of lost time' studies. The method is straightforward: the analyst multiplies an hourly rate for lost time times the amount of time lost. The hourly rate can be calculated in any one of a number of ways, including the average wage rate (or some fraction of it) or contingent valuation estimates of willingness to pay to avoid travel time. Once again assuming a five to ten minute increase in the average one way commute time, this translates into 60 to 120 hours lost over the course of an employment year for an average household of 1.5 workers. Using an hourly rate of $10, this yields a guesstimate of $600 to $1,200, which is very close to the guesstimate reached using the hedonic price model.[67]

While measuring traffic congestion effects yields estimates in a reasonably narrow range, the same cannot be said for air pollution effects. Indeed, of all the non-marketed goods currently being valued by economists, air pollution has sparked the most controversy. The controversy is rooted in the wide divergence of estimates yielded by the three basic methods currently in use to measure pollution effects.

The first method values *direct* effects; it involves the simple addition of lost earnings and medical bills due to disease associated with air pollution. This 'direct effects' method, favored by polluters and defendants in damage assessment cases, ignores such intangibles as pain and suffering, effects on visibility, difficult to quantify damage to materials and property, and other costs for which victims are typically sent no 'bills.'[68] Results from this method yield what is generally regarded as lower bound estimates.

A second approach is the hedonic price model.[69] Several problems exist with applying this method to air pollution. It is difficult to correctly specify the model so that it fits properly across Standard Metropolitan Statistical Areas; misspecification problems inevitably arise when the model is fit for a single SMSA. It is likewise difficult to statistically separate the effects of specific pollutants such as nitrogen dioxide and total suspended particulates because they tend to be collinear; this is important from the standpoint of control strategies, e.g., reduced traffic congestion would have a greater effect reducing nitrogen dioxide levels than TSP. Further complicating matters, there is an ongoing debate about the appropriate functional form to use; different forms can yield different estimates.

A third method to measure air pollution effects involves the use of contingent valuation surveys. One type of survey commonly used values *general* air pollution improvements; as with traffic congestion, the results typically track hedonic pricing fairly well. However, a second type of air pollution CV study, favored by environmentalists and plaintiffs in damage assessment cases, involves adding the willingness to pay of individuals for *specific* ailments associated with pollution such as headaches, coughing, and asthma. This type can yield large upper bound estimates for two reasons.

Since various symptoms such as coughs and headaches are closely associated, significant double counting can occur. At the same time, marginal willingness to pay curves for reducing air pollution typically are sharply declining so that the first increment of reduction has a much higher value than later increments. The method, however, typically uses the first increment of reduction in assessing costs.

Recognizing the controversy over estimation of air pollution effects, we can refer to several different existing studies to posit a range of guesstimates. We wish to emphasize that, as with all other guesstimates, a San Diego-specific study would yield much more reliable estimates.

One study performed by Portney et al. (1989)[70] used the direct effects method to examine air pollution effects in the South Coast Air Basin of the greater Los Angeles area. The results of this study suggest benefits of $650 per household for implementing a comprehensive Air Quality Management Plan. This plan would significantly improve Los Angeles area air quality from its current very poor condition to good.

This estimate is, however, likely to considerably *overstate* any benefits of improved air quality in San Diego:[71] Any improvement from growth controls would likely be measured as a smaller change from 'fair' to 'good' rather than from 'poor' to 'good' because San Diego air quality is significantly better than that of Los Angeles.

A more appropriate 'ruler,' therefore, might be another study of the South Coast Air Basin by Brookshire et al. (1982)[72] which used both CV analysis and hedonic price estimation. This study showed that CV analysis and hedonic price estimation yield estimates reasonably close to one another. The survey results from six Los Angeles-area cities with air quality most similar to that of San Diego suggest than an improvement in air quality from 'fair' to 'good' would yield a fairly broad range of annual benefits, from $67 to $336 per household, depending on where the respondents lived.[73]

Turning to parks and open space, we can demonstrate how the resourceful analyst sometimes can find one of several 'off the shelf' ways to inexpensively guesstimate amenity levels. One such way is to rely on existing survey data. The San Diego Association of Governments (SANDAG) conducted a park and open space survey. From this survey, we calculate that the median San Diegan household is willing to pay about $27 per household for parks and open space acquisition. This may, however, be a low estimate because of how a large majority of San Diegans apparently view the assignment of property rights for parkland: the survey clearly showed that the vast majority of San Diegans believe it is the responsibility of developers to set aside and pay for parkland as part of their right to develop.

Should survey data not be available – or too expensive for the analyst to gather – a second innovative way is to examine voting data. While this 'election returns' method requires an electoral decision on a bond issue, such decisions are often a common part of today's political landscape, particularly in faster growing areas.

In San Diego, one such vote involved proposed approval of a $94 million bond issue for the expansion and renovation of two regional parks, Balboa Park and Mission Bay. If approved this bond issue would have cost the average household a little less than $30 per year. Since almost 2/3rds of the electorate voted to approve the bond issue, this suggests that the median household is willing to pay about $30 per year, a guesstimate close to the SANDAG survey result.

Using the election returns method, we also can infer from a recent election in San Diego what residents are willing to pay for an increase in jail and court capacity to accommodate growth. San Diego voters have approved a half cent sales tax increase for criminal justice improvements; this works out to an additional $138 per household.[74]

While the building blocks for a reasonable guesstimate of parks, open space, and criminal justice facilities in San Diego are readily available, such is clearly not the case for the congestion of the area's many beaches. Unfortunately, no comprehensive study of beach congestion exists for *any* major city along the *entire* West Coast. The best we can do here – and it is clearly speculative – is refer to a contingent valuation study done by McConnell (1977) of East Coast beach use.[75] This study suggests that individuals might be willing to pay about $20 per year to avoid the increased beach congestion associated with projected population growth in San Diego.

Standing once again on more solid ground, we guesstimate that San Diego households are willing to pay $80 per year to reduce the likelihood of water shortages. Since this guesstimate is based directly on a CV survey that was done very recently in Southern California, it is likely to be reasonably reliable.[76] This guesstimate is also very close to a guesstimate of $84 per household based on forecast expenditure data from a SANDAG report.[77]

To complete our list, we can rely on additional published forecast expenditure data to construct guesstimates for sewer, solid waste disposal, electricity, natural gas, police, libraries, and schools.

According to the SANDAG report, annual forecast expenditures per household to serve new growth are approximately $34 for sewerage, $25 for solid waste disposal, and $232 for electricity and natural gas facilities.

Similarly, the San Diego Chief of Police has stated that he needs to raise the police to population ratio from 1.6 officers per 1000 residents to 2.0 in order to maintain the historical level of service. A City of San Diego report indicates that forecast expenditures per household to achieve this goal would range from $50 to $130.[78] That same reprot indicates that for the construction of new library facilities, capital costs alone (excluding operations and maintenance expenses) would add another $34 per year to household costs. At the same time, forecast expenditures for new school construction to support projected population growth (again excluding O + M) adds roughly another $50 per household per year. The advantage of using forecast expenditures is simplicity. However, there are two important policy issues embedded in their use.

The first issue: how shall expenditures to accommodate growth be financed? Under a 'cross-subsidy' option, existing residents might be required to pay through increases in taxes, rates, and fees and through the issuance of bonds or, alternatively, through a decline in available public services should the funds not be raised. Under an alternative marginal cost pricing or 'growth pays it full share' option, developers and new homebuyers, new business and new industries might be levied impact fees, assessments, or other exactions to finance the requisite facilities.

It follows from this observation that, under the cross-subsidy option, the forecast expenditures presented above for the provision of public facilities and infrastructure associated with growth represent an upper bound on the costs likely to be imposed on existing residents. In contrast, under option two, existing residents would not have to bear the financial burden of growth at all. It perhaps goes without saying that it is between these two poles that the political drama over growth and growth controls is played out.

The second issue deals with a pitfall inherent in using forecast expenditures in lieu of other, *utility-theoretic* methods such as CV and hedonics. In particular, the forecast expenditure method yields an estimate of the costs associated with providing facilities and infrastructure so that amenity levels – and utility – remain unchanged. On the other hand, the CV and hedonic methods monetize the changes in utility from moving from one amenity level to, say, a lower amenity level (as a result, for example, of growth).

The danger of using the forecast expenditure method arises when the costs of maintaining an amenity level in the form of higher taxes and exactions are *greater* than the amount individuals would be willing to pay or accept for such maintenance. In the absence of a utility-theoretic method to determine how individuals actually value the benefits of the expenditures, decisionmakers might decide to undertake those expenditures even though their constituents would be better off, in monetary and utility terms, with an alternative such as lower taxes and lower amenity levels.[79] The basic lesson from this observation is that it is appropriate and desirable from an efficiency and welfare perspective for policy analysts and decisionmakers to use utility-theoretic methods such as CV and hedonics whenever budgets permit rather than to simply rely upon forecast expenditures.

In summary, totaling the guesstimates yields an average annual cost per household of about $1,300 to $2,300 or roughly $500 to $900 million per year for the city.

As a final comment, if housing prices are rising and amenity levels are falling in the face of the rapid growth San Diego is experiencing, it is logical to look at changes in real per capita income for any evidence of gains from growth. In fact, real per capita income in San Diego relative to the U.S. has been steadily falling over the past decade; once substantially above the national real per capita median, San Diego is now substantially below that median. In contrast, cities like Boston and San Francisco with stable popula-

tions and an education and job structure similar to San Diego have experienced significant increases in real per capita income.

Conclusions

If growth control policy analysis is to be useful to policymakers, it must evolve beyond the simple analytics of measuring housing price effects and their impact on the poor. Within the context of a much more careful consideration of welfare implications, it must examine the full range of amenity effects associated with growth controls and assess their distributional consequences.

This new second generation of comprehensive growth control policy analysis must also focus more carefully on such issues as: the effectiveness of growth controls in bringing population growth into balance with economic development, the extent to which controls might generate 'spillover' and thereby export rather than solve problems, optimal policies to prevent exclusion of the poor, and effective pricing and taxing methods and strategies to alleviate the political gridlock that occurs over growth due to the pincher effect of tax limitations and rising marginal costs for public services.

Notes

1. See for example, Mark Baldassare, *Trouble in Paradise: The Suburban Transformation & Its Challenges* (New York: Columbia University Press 1986).
2. This 'growth revolt' has already spread to a number of other states, including Massachusetts, Maine, Vermont, New Jersey, Virginia, and Florida.
3. Such studies include Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 46–57. For a review of the literature, see William Fischel, 'Do Growth Controls Matter?' unpublished manuscript, November 22, 1988.
4. A number of studies which focus on scarcity effects nonetheless allude to the possible importance of amenity effects. For example, Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 47 remark 'if growth controls change ... amenities ... demand will change accordingly and prices will rise.'
5. In one of the few studies to acknowledge the possible net positive benefits of controls, Thomas Cooley and C. J. LaCivita, 'A Theory of Growth Controls,' *Journal of Urban Economics* 12 (1982): 145 offer this assessment: 'Because of the prevalence of inefficient pricing and financing policies for public services ... growth controls may be a crude way of promoting a more efficient allocation of population.'
6. This narrow focus is embodied in the following quote by Seymour Schwartz, David Hansen, and Richard Green, 'The Effect of Growth Management on the Production of New Housing,' *Land Economics* 60 (February 1984): 110–114 'The important questions policymakers want answered are: What is the effect of the growth control program on the availability of lower-priced housing, and how are the housing prospects of moderate income families affected? (p. 110)'
7. This implicitly assumes that population is increasing at an equal or faster rate. The distinc-

tion between scarcity and amenity effects is attributable to H. E. Frech in Johnson (1982, pp. 260–61). In this context, a scarcity effect translates into a shift in the supply curve while an amenity effect results in a shift in the demand curve.

8. See Seymour Schwartz, David Hanson, and Richard Green, 'Suburban Growth Controls and the Price of New Housing,' *Journal of Environmental Economics and Management* 8 (1981): 303–320 and Schwartz et. al., op. cit., for details.
9. Jennifer Wolch and S. A. Gabriel, 'Local land-development policies and urban housing values,' *Environment and Planning A* 13 (1981): 1272 provide a summary of 50 Bay Area cities with some form of land use controls.
10. Growth rate restrictions included outright caps and implicit caps via limits on the extension of services such as water and sewer while quality restrictions included restrictions on density and lot sizes. According to Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 47, 'In generic form, growth control can be represented as a governmental limitation on the supply of housing units.'
11. For discussion, see Jennifer Wolch and S. A. Gabriel, 'Local land-development policies and urban housing values,' *Environment and Planning A* 13 (1981): 1253–1276 who argue that such spillover effects often lead communities to retaliate with growth controls of their own.
12. These benefits were viewed in a zero-sum context: even if residents in a community with controls benefited, for example, from reduced congestion, residents in surrounding uncontrolled communities were thought to be worse off.
13. Job creation and unemployment became an immediate issue, however, when controls were proposed for big cities.
14. It is now widely recognized that employment opportunities and the rate of job creation are the most important determinants of the net rate of population growth (or decline) in a city or region and that controlling the rate of job creation can, in fact, control population growth.
15. See, for example, White (1975) who argues that existing residents use zoning to require that new residents pay as much or more property taxes as the cost of providing them with public services.
16. See Thomas Cooley and C. J. LaCivita, 'A Theory of Growth Controls,' *Journal of Urban Economics* 12 (1982): 136–37 for a rigorous treatment.
17. See, for example, Paul Davidoff and Linda Davidoff, 'Opening the Suburbs Toward Inclusionary Land-Use Control,' *Syracuse Law Review* 22 (1971): 509.
18. Perhaps the most analytically sophisticated of the exclusion studies is Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 46–57, which found that government programs in Davis were only partially successful in preventing exclusion.
19. For a discussion of the legal implications of exclusion, see Schwartz et al., op. cit. (1984, p. 113–14) and Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 46. Schwartz et al. emphasize the importance of growth control analysis as it effects both the controlled community as well as the wider region.
20. Interestingly, many studies acknowledge amenity effects but do not attempt to estimate them [e.g., Michael E. Gleeson, 'Effects of an Urban Growth Management System on Land Values,' *Land Economics* 55 (1979): 350–365; and Gerrit Knaap, 'The Price Effects of Urban Growth Boundaries in Metropolitan Portland, Oregon,' *Land Economics*, 61 (1985): 26–35].
21. In the wake of Proposition 13, many communities instituted 'Cost-Revenue Impact Studies' to assess the net fiscal costs of new development. These studies typically indicate that growth doesn't pay for itself. For discussion, see David Dowall and John Landis, 'Land-Use Controls and Housing Costs: An Examination of San Francisco Bay Area Communities,' *AREUEA Journal* 10 (1982): 74–75.

22. As Thomas Cooley and C. J. LaCivita, 'A Theory of Growth Controls,' *Journal of Urban Economics* 12 (1982): 137 point out: '... the marginal cost of an additional resident is financed either by increasing the total amount of the property tax... or by accepting a lower level of public service.'
23. The linkage can be achieved in a variety of ways ranging from market mechanisms such as development impact fees to permit allocation systems.
24. Critics of growth controls frequently charge that housing restrictions result in large increases in the number of people per individual household. However, this is a little addressed empirical question.
25. Employment opportunity is generally recognized as the single most important determinant of in- or out-migration from a region.
26. It is important to distinguish between job creation and the unemployment rate. In a local economy, the unemployment rate is difficult to control in the short run and impossible to control in the long run because, with mobile factors, it always tends towards the national rate. Put simply, less jobs created don't always translate into a higher unemployment rate and very often the reverse is true.
27. Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 46–57.
28. This point is made in Gerrit Knaap, 'The Price Effects of Urban Growth Boundaries in Metropolitan Portland, Oregon,' *Land Economics* 61 (1985): 26. The economist's preferred solution is a Pigouvian tax to 'internalize' the externality, but such a tax typically is not politically or legally feasible.
29. It is useful to note that growth controls typically do not reduce housing supply in an absolute sense but merely slow down the rate of expansion.
30. For example, David Dowall and John Landis, 'Land-Use Controls and Housing Costs: An Examination of San Francisco Bay Area Communities,' *AREUEA Journal*, 10 (1982): 68 argue that: '... those responsible for such restrictive controls often act entirely out of self-interest, for as the price of new housing rises, so too do the prices of existing housing – in the process providing existing landowners with windfall profits.'
31. A benefit may still accrue if the owner uses his or her increased equity to purchase other goods. Thomas Cooley and C. J. LaCivita, 'A Theory of Growth Controls,' *Journal of Urban Economics* 12 (1982): 141.
32. Thomas Cooley and C. J. LaCivita, 'A Theory of Growth Controls,' *Journal of Urban Economics* 12 (1982): 140 also argue that if the homeowner 'trades up' or borrows on his increased equity, he or she may benefit from a wealth effect but these effects are likely to be small.
33. Restraining population growth may reduce the crime rate relative to an unconstrained growth pattern if population growth also increases density in lower income neighborhoods. See Irving Hoch, 'Factors in Urban Crime,' *Journal of Urban Economics* 1 (1974): 184–229.
34. School overcrowding imposes a variety of costs including reduced student performance, the degradation of central facilities such as lunch rooms and gymnasiums, and increased crime and drug abuse.
35. The use of the hedonic price model to measure urban amenities is discussed in Timothy J. Bartik and V. Kerry Smith, 'Urban Amenities and Public Policy,' in *Handbook of Regional and Urban Economics, Volume 2* (New York: North Holland, 1986).
36. Zorn et al. (1986, p. 226) allude to this problem as well as a companion problem of obtaining sufficient data.
37. Ozone is an invisible pollutant that raises morbidity and mortality rates typically without general public awareness of how changes in the growth rate and pollution levels might alter those rates.
38. George Tolley and John Crihfield, 'City Size and Place as Policy Issues,' in *Handbook of Regional and Urban Economics, Volume 2* (New York: North Holland, 1985) provides an

excellent comprehensive discussion of the various tools to measure amenity effects.

39. In this case, CV may be thought of as a tool to simulate a referendum on growth control measures which might influence amenity effects.
40. Gary Becker, 'A Theory of the Allocation of Time,' *Economic Journal* 75 (1965): 493–517.
41. It should be emphasized that there are other techniques to measure virtually all of these effects, but the issue of which technique is *most* appropriate remains a matter of considerable debate. For discussion, see Robert Cameron Mitchell and Richard T. Carson, *Using Surveys to Value Public Goods* (Washington, D.C.: Resources for the Future, 1989).
42. The use of forecast expenditures has a firm legal foundation: The relevant case, which has had a profound effect on the development of growth control legislation is that of *Nollan v. Coastal Commission* (U.S. 107 S.Ct.3141 (1987)). It empowers political jurisdictions to charge new development projects their full proportionate share of the marginal social costs associated with the project.
43. Training in the field of urban economics may also be a factor. While environmental economists are quite comfortable using CV, travel cost, and other methods to measure amenity effects, many urban economists are not.
44. These predictions are developed in detail in Robert Engle, Peter Navarro, and Richard Carson, 'Growth Controls in An Open Economy,' University of California at San Diego Discussion Paper (1989).
45. The open economy approach in urban economics is reasonably well developed. See J. Vernon Henderson 'General Equilibrium Modeling of Systems of Cities,' in E. S. Mills, ed., Handbook of Urban Economics (1986) on systems of cities and the literature of optimal city size. Its use in growth control papers (with the exception of e.g., Tolley and Crihfield op. cit. and George Tolley, Philip Graves and John Gardner (1979), *Urban Growth Policy in a Market Economy*, New York Academic Press) has been much more limited.
46. Of course short run dislocations might occur if a severe limitation were unexpectedly imposed on a local economy, and an analysis of the impacts and length of the adjustment process would be analytically quite useful to policymakers contemplating the merits of the measure.
47. Glenn Blomquist, Mark C. Berger, and John P. Hoehn, 'New Estimates of Quality of Life in Urban Areas,' *The American Economic Review* 78 (1988): 89–104 represents an empirical implementation of this approach using a hedonic model.
48. Economies of amalgamation are best reflected in changes in real income – something which has been virtually unstudied in existing growth control analyses.
49. The only comprehensive study undertaken thus far of the effectiveness of such programs is that of Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 46–57 which examined Davis, California. The study found that 'the programs were only partially successful.' p. 57.
50. Former Mayor of San Diego, Senator Pete Wilson (R-CA) was responsible for the 'finest city' label while his successor Roger Hedgecock was elected partly on the basis of his promise to prevent the 'Los Angelization' of the City.
51. The group briefly discussed various potential socioeconomic impacts but did not analyze them.
52. This coalition consisted of six of the City's most prominent developers, three leading pro-development land use attorneys, and representatives from the Building Industry Association, the Carpenter's Union, and San Diego Gas & Electric.
53. See, for example, David Dowall and John Landis, 'Land-Use Controls and Housing Costs: An Examination of San Francisco Bay Area Communities,' *AREUEA Journal* 10 (1982): 67–93.
54. Center for Real Estate and Urban Economics, 'The Impacts of Residential Growth Controls on San Diego's Housing Market and Employment Base,' *Final Report*, prepared for The San Diego Citizens Advisory Committee on Growth and Development and The City of San Diego, 1988.

55. The results indicate, quite anomalously, that housing prices would actually fall in at least three of the seven districts and possibly four under the 4,500 unit cap.
56. These criticisms include the failure to conduct appropriate specification tests for functional form [Robert Halvorsen and Henry O. Pollakowski, 'Choice of Functional Form for Hedonic Price Equations,' *Journal of Urban Economics* 10 (1981): 37–49], insufficient regression diagnostics to detect multicollinearity and heteroskedasticity [Peter Zorn, David Hanson, and Seymour Schwartz, 'Mitigating the Price Effects of Growth Control: A Case Study of Davis, California,' *Land Economics* 62 (1986): 52], an outdated research design to measure control effects [Seymour Schwartz and Peter Zorn, 'A Critique of Quasiexperimental and Statistical Controls for Measuring Program Effects; Application to Urban Growth Control,' *Journal of Policy Analysis and Management* 7 (1988): 491–505], left-out variables, and misspecified variables.
57. The authors cannot be blamed for this failure because they did what the City and CAC directed them to do for their own political purposes. The only mistake CREUE can really be accused of is agreeing to conduct a study which was underfunded and required in too short a time frame.
58. This criticism was voiced by one of the deans of growth control policy implementation, Robert Freilich, in a memo to the City Council in his capacity as consultant.
59. If the same level of per capita expenditures maintains A, then we are assuming that there are no costs to growth. Indeed, if there are economies of scale there may well be gains.
60. The amount that current residents would be willing to take in compensation for a decline in A should be used if it is less than the amount necessary to maintain A.
61. See Irving Hoch, 'Factors in Urban Crime,' *Journal of Urban Economics* 1 (1974): 184–229 for an examination of this particular problem.
62. This is simply a reflection of the fact that the assimilation capacity of the air basin for pollution has been reached. Stated another way, there are declining marginal returns to a fixed capital stock.
63. This is a situation which occurs with most of the amenities listed in Table 2: expenditures are forecasted to go up in an effort to maintain a level of service A but the level of increase will be insufficient to maintain A in the face of rapidly increasing marginal costs.
64. These guesstimates are based on the difference in amenity levels that might be experienced under forecast growth under the planning status quo versus slower growth given successful implementation of a comprehensive second generation growth management plan.
65. While the San Diego Association of Governments has estimates on the projected increase in the number of heavily congested miles, there are no official estimates of the change in average commute time. Voters of San Diego County recently approved a ½ cent sales tax increase (roughly $100 per household per year) for traffic improvements. Originally, voters were told this sales tax increase would *improve* the level of service, but it is now openly admitted that all this money will do is slow down the rate of increase in traffic congestion. Moreover, illustrating how growth can lead to cross-subsidization of new residents by existing residents, much of the money is projected to be spent to open up new areas for development.
66. For this and all other amortization calculations, we assume a 20-year horizon and an interest rate of 10%.
67. This may be compared to a January 1990 study by The Road Information Program (TRIP), a Washington-based, non-profit organization. The study calculated that growing traffic congestion costs the average California motorist about $1,200 a year in wasted time and gasoline.
68. For a treatment of how interest groups choose particular assumptions to minimize or maximize estimates of economic impacts in the legal and political arenas, see Richard Carson and Peter Navarro, 'Fundamental Issues in Natural Resource Damage Assessment,' *Natural Resources Journal* 8 (1989): 815–836.
69. See, for example, Phil Graves, James C. Murdoch, Mark A. Thayer, and Don Waldman, 'Hedonic Prices and Urban Air Quality,' *Land Economics* 64 (1988): 220-233 for an

examination of the robustness of hedonic price estimates for air pollution.

70. Paul R. Portnoy, David Harrison, Jr., Alan J. Krupnick, and Hadi Dowlatabadi, 'To Live and Breathe in L.A.,' *Science and Technology* 5 (1989): 68–73.
71. It may, however, understate the benefits in Los Angeles.
72. David S. Brookshire, Mark A. Thayer, William D. Schultze, and Ralph C. d'Arge, 'Valuing Public Goods: A Comparison of Survey and Hedonic Approaches,' *American Economic Review* 72 (1982): 165–177.
73. The wide range of this guesstimate is partly explained by income level in each city: the willingness to pay for air quality improvements was typically higher in higher income communities, e.g., Irvine. This suggests that air quality is a 'normal good.'
74. This is a classic example of how taxes can be used to shift the burden of financing growth to existing residents.
75. See, for example, Kenneth E. McConnell, 'Congestion and Willingness to Pay: A Study of Beach Use,' *Land Economics* 53 (1977): 185–195.
76. Richard T. Carson and Robert Cameron Mitchell, 'Economic Value of Reliable Water Supplies for Residential Water Users in the State Water Project Area,' a report prepared for the Metropolitan Water District of Southern California (1987).
77. San Diego Association of Governments, Board of Directors, Agenda Report No.: R-17a, February 26, 1988.
78. City of San Diego Citizens Finance Committee Report, January, 1990.
79. For example, the reduction in amenities because of the failure to undertake the expenditures might be more than offset by the utility gained by the individual who, because of a lower tax burden, has more money to spend on other goods which yield a higher utility relative to the 'tax and build' option.