

DO STATE GROWTH MANAGEMENT REGULATIONS REDUCE SPRAWL?

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Thirteen states in the United States have adopted state growth management legislation that aims to preserve environmentally sensitive areas, improve the quality of urban areas, and reduce urban sprawl. Although there is a considerable amount of literature describing such policies, there is very little that examines the effectiveness of such policies. The author researched the efficacy of state growth management laws in controlling urban sprawl by examining the change in urban densities in 49 states over a 15-year period. He found that growth-managed states generally experienced a lesser density decline than states without growth management. However, regression analysis revealed that state growth management programs did not have a statistically significant effect in checking sprawl. The author concludes with several suggestions for modifying state regulations to curb sprawl more effectively.

Keywords: *state growth management; sprawl*

In the past decade, urban sprawl has become a salient issue in public and political discourse across the United States. Most planners and policy makers see sprawl as causing the loss of prime agricultural and environmentally sensitive lands, deterioration of central cities, increased automobile dependency, and greater social inequality (Burchell 1997; Downs 1999; Ewing 1994; Goldsmith 1999; Squires 2002). Some urban scholars disagree and see benefits—such as more housing and job choices—from sprawl (Gordon and Richardson 2000; Kahn 2001; Staley 1999; Steiner 1994). In 1999, popular magazines such as *Time* and *Newsweek* ran feature stories on sprawl and efforts to combat it. That same year, the U.S. government announced a federally funded “Smart Growth Initiative” to combat urban sprawl.

Hawaii, Oregon, Florida, New Jersey, and five other states have had *state* growth management legislation in place for several years. These state laws

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are aimed at protecting environmentally sensitive areas, reducing urban sprawl, and improving the quality of urban development (Kelly 1993). More than half of the nation's state governors have made references to growth management and smart growth in their state of the state addresses in the new millennium (Kozel and French 2000). About a dozen state legislatures are considering enacting such legislation—some more aggressively than others, such as Michigan's legislature, where in February 2003, the governor described sprawl as "the plague upon the land" (Schneider 2003, 1).

Several scholars have examined issues pertaining to growth management policies such as reasons for adopting such policies, types of policies adopted, their efficacy in preserving environmentally sensitive areas, and their effects on local and regional housing markets. Some researchers have examined the effects of *local* growth management policies on sprawl (for example, Pendall 1999; 1000 Friends of Washington 1999); however, little attention has been given to the effects of *state* growth management policies on urban sprawl. The research reported here is a first step in this direction.

This article is organized in six parts. In the first three parts, I provide background information on state growth management regulations, describe the basis for this study, and review the existing literature on the effects of state growth management policies in controlling urban sprawl. In the latter three parts, I explain the research methodology, present the findings, and discuss policy implications.

STATE GROWTH MANAGEMENT REGULATIONS

RATIONALE

Growth management regulations have been adopted at local, regional, and state levels. Of the three levels, it is perhaps easiest to clearly establish adverse consequences of growth in small, localized areas, generate enough political support for measures to reduce them, and then implement such regulations. Therefore, since the early 1960s, many cities and counties have adopted growth management regulations. Perhaps the best known of these communities is the town of Ramapo, New York, which in 1969 adopted an ordinance to permit development using a points-based system. Linked to an 18-year capital improvements plan, this ordinance was hailed by growth management advocates of the time as a model ordinance but vilified by opponents for its exclusionary effects in keeping lower-income families out of Ramapo and deflecting development to other urban areas within the region (Levy 1994). The highly publicized and polarized debate on Ramapo's

ordinance highlights fundamental problems with local legislation—they may not be sensitive to regional needs, could have exclusionary effects, and may exacerbate growth-related problems in the surrounding areas. Thus regional and statewide growth regulations are more intuitively appealing, for they can provide mechanisms to balance local needs with regional or state needs.

State growth management programs have distinct advantages. They could require all communities within a state to adopt growth management practices and thereby ensure that benefits of growth management accrue to communities across the state. The state can assume review powers over local development policies. State legislation can help reduce the possibility of negative spillovers from growth-regulated cities to those that are not. The state can provide financial and administrative support to make such regulations work. Because local governments receive about 40% to 45% of their annual budgets from state governments (Fisher 1994), state regulations would receive serious attention from most local governments.

EVOLUTION OF STATE GROWTH MANAGEMENT PROGRAMS

Hawaii adopted a state Land Use Law in 1961 that empowers a State Land Use Commission to determine the location, use, and timing of new development across the state. Even though the passage of this law predated much of the growth management debate in the contiguous states, its objectives of preserving environmentally sensitive areas and preventing haphazard development are similar to those of later growth management laws. For this reason, Hawaii's land use law is regarded as the first statewide growth management legislation (Kelly 1993).

In 1970, 9 years after Hawaii, Vermont adopted Act 250, a land use law that established a statewide development permitting system with substantial control at the regional level. In 1973, 3 years after Vermont and 12 years after Hawaii, Oregon enacted state growth management legislation. In 1985, after years of experimentation with numerous regional growth management programs (such as the "Areas of Critical State Concern" and "Development of Regional Impact") and local programs adopted by individual jurisdictions, the state of Florida adopted a comprehensive state growth management legislation that combined many features of earlier laws and mandated all local governments to prepare growth management plans for guiding local development (DeGrove 1984, 1989).

These four pioneering states were followed by New Jersey in 1987, Rhode Island in 1988, Georgia in 1989, Washington state in 1990, and Maryland in 1992. After a brief hiatus, Arizona and Tennessee in 1998 and, more recently,

Colorado and Wisconsin, also adopted state growth management (or smart growth) regulations. Such laws were debated at length in the 1998-1999 legislative sessions in New Mexico, North Carolina, Minnesota, Iowa, Illinois, Ohio, Virginia, Pennsylvania, New York, New Hampshire, and Massachusetts (Salkin 1999). Several new governors—both Republican and Democrat—elected to office in 2002 have publicly committed to addressing sprawl and conserving precious landscapes (Smart Growth America 2003). In the 1971 book *The Quiet Revolution in Land Use Control*, Bosselman and Callies wrote,

The tools of the revolution are the new laws taking a wide variety of forms but each sharing a common theme, the need to provide some degree of state and regional participation in the major decisions that affect the use of our increasingly limited supply of land. (p. 1)

Judging by the number of states that have state growth management regulations or are considering adopting them, it seems that the Quiet Revolution has come of age.

TYPES OF STATE GROWTH MANAGEMENT LAWS

In the past four decades, state sponsorship of local and regional planning has taken several different forms. Therefore, there is some scholarly debate about what constitutes a state growth management program. Weitz (1999) presents this debate; identifies various parameters that could be used to identify state growth management programs; and concludes that 10 states, Florida, Georgia, Hawaii, Maine, Maryland, New Jersey, Oregon, Rhode Island, Vermont, and Washington, have state growth management programs. In addition, he argues for the inclusion of California in this list on the basis of the numerous regional and local land use regulations there, even though it does not have a state program like the others.

In states with growth management programs, local governments are either mandated or strongly encouraged to plan. Often the process of local planning and the plans themselves are subject to state and, in some cases, regional review. These plans are often required to (1) contain specific elements that need to be planned for, such as infrastructure, environmental protection, and economic development; (2) ensure availability of adequate infrastructure to service new development; (3) be consistent with state and regional plans; and (4) have measures that protect natural and agricultural resources (Nelson et al. 1995). In other words, growth management planning tends to be comprehensive, concurrent, consistent, and conservation oriented. This approach

is intuitively appealing and can reasonably be expected to fulfill the objectives of regulating sprawl, preserving environmentally sensitive areas and farmland, and reinvigorating existing cities.

In many growth management states, a state agency is used to advance state interests in local growth management efforts. Typically, such agencies prepare rules, offer technical assistance, and review and comment on locally prepared plans. However, the level of state oversight differs from program to program. Table 1 presents information to highlight the similarities and differences between state growth management programs that existed in 1997.

BASIS FOR THIS STUDY

WHY FOCUS ON SPRAWL?

Even though there are variations among the growth management regulations of various states, they have common objectives that include controlling urban sprawl, preserving farmland, protecting environmentally sensitive areas, increasing density to make public transit viable, and reducing urban energy consumption. Urban sprawl poses a challenge to achieving each of the other objectives, and success in controlling sprawl is a prerequisite for and indication of other benefits.

DEFINING AND MEASURING SPRAWL

Downs (1999) presents a very comprehensive definition of sprawl, suggesting that it is

(1) unlimited outward extension of development, (2) low-density commercial and residential settlement, (3) leap frog development, (4) fragmentation of powers over land use among many localities, (5) dominance of transportation by private automotive, (6) lack of centralized planning and control, (7) widespread strip commercial development, (8) great fiscal disparities among localities, (9) segregation of types of land use in different zones and (10) reliance on the trickle down or filtering process to provide housing to low-income households. (p. 956)

Galster et al. (2001) contend that any land use pattern that has low values on one or more of eight distinct dimensions of land use patterns—density, continuity, concentration, compactness, nuclearity, diversity, proximity, and centrality—is sprawl. Pendall, Fulton, and Harrison (2000, 3) state, “Sprawl, by our definition, is a shorthand term for relatively low population per acre.”

TABLE 1: Important Features of State Growth Management Programs

<i>State</i>	<i>Date Set Up</i>	<i>Planning by Communities</i>	<i>Principal Plan Review Authority</i>	<i>Amendment of Original Plan</i>	<i>Approval of Amendments</i>
Hawaii	1961	State prepares	State	Amendments as required	State amends
California	1965	Mandatory	Local government	Amendments by local agencies	No state role, some regional role
Vermont	1970	Voluntary	Regional body	Amendments as required	No state role, regional consensus required
Oregon	1973	Mandatory	State	Amendments at will by local agencies	State can challenge amendments
Florida	1985	Mandatory	State	Two major amendments per year	State approval required
New Jersey	1986	Mandatory	Regional body	Amendments at will by local agencies	Limited state role, regional consensus required
Maine	1988	Mandatory	State	Amendments at will by local agencies	State reviews and comments
Rhode Island	1988	Mandatory	State	Four major amendments every year	State approval required
Georgia	1989	Voluntary	Regional body	Only one major amendment recommended every five years	Limited state role, regional consent required
Washington	1990	Mandatory for fast-growing areas	Local government	Only one major amendment recommended every five years	No state role
Maryland	1992	Mandatory	State	Limited	State approval required

SOURCE: The information in this table is derived from Bollens (1992), DeGrove (1994), Gale (1992), Kelly (1993), Porter (1997), and Weitz (1999).
 NOTE: Only states that had adopted state growth management programs prior to 1997 were considered growth-managed states in this analysis because data from the U.S. Department of Agriculture's National Resources Inventory (NRI) on urbanized land after 1997 are not currently available.

From these definitions, it can be seen that the literature on sprawl tends to blur differences between characteristics, consequences, and causes of sprawl. Nonetheless, there seems to be some agreement that large-scale conversion of agricultural land to urban uses and low-density urban development represent sprawl. Thus, density would be a natural measure of sprawl. The 1000 Friends of Washington's (1999) *Sprawl Report Card* informing on the effectiveness of sprawl control policies in 33 Washington cities contends that "density measures offer the clearest measures of sprawl" (p. 4), and Lopez and Hynes (2003) use population density in urban census tracts to create a metropolitan sprawl index.

REVIEW OF PERTINENT LITERATURE

Much of the research about the consequences of growth management policies has been conducted at the city, county, or regional level. Very few studies have been attempted using the state as a unit of analysis. One reason for this is that till the 1980s, very few states had statewide growth management policies. It was only in the late 1980s and 1990s that numerous states enacted statewide growth management policies. Perhaps because policy effects take a few years to become manifest, a cross-sectional study of state policy impacts was not easily possible prior to the late 1990s. Furthermore, comparable data for all the states are not easily available.

Healy and Rosenberg (1979), analyzing the effects of Hawaii's growth management act, found that in a 10-year period between 1964 and 1974, the Land Use Commission permitted numerous extensions of the urban boundaries that it had established in 1962, in the process converting 30,000 acres of rural land to urban uses, a 25% increase in total urban land in the state. But Callies (1992) contends that between 1962 and 1992, only 5% of the land that was classified under the rural or conservation zones was lost to urbanization.

Analyzing the effects of Vermont's growth management act of 1970, Strong (1977, as cited in Kelly 1993) found that the act had not helped in farmland preservation. Healy and Rosenberg (1979) concluded that the act was successful in regulating residential sprawl but not in stopping commercial sprawl. DeGrove (1984) contended that the act's potential to control sprawl had not been realized. In 1988, the *Report of the Governor's Commission* (Governor's Commission on Vermont's Future 1988) expressed concerns about lack of planning benefits from the 1970 act and suggested several changes that resulted in Act 200, a statewide planning act extending the scope of the 1970 act.

Ketcham and Seigal (1991), in examining the implementation of plans within the Portland, Oregon, area, found that some of the smaller communities within Portland's growth boundary had failed to update their plans, had approved developments inconsistent with state-mandated plans, and thus were lax in regulating sprawl. Moore and Nelson (1994), in assessing the efficacy of Oregon's growth management act, contend that it has been successful in increasing urban densities within the Portland area; however, they also found that new development in many of the smaller communities in the state was located outside urban growth boundaries. But Kasowski (1991, 126) says, "Make no mistake about it: the fact that much of the countryside is still largely rural can be attributed to Oregon's statewide land use planning program, which restricts development to areas within urban growth boundaries."

Nelson (1999), in comparing Florida and Oregon, two states where local comprehensive planning is mandatory, with Georgia, where comprehensive planning at the local level is voluntary, contends that both Florida and Oregon have been able to better reduce sprawl, reduce conversion of cropland for urbanization, minimize tax increases, consume less energy, and increase public accessibility to transit better than Georgia. Pelham (1992) argues that the concurrency principle of the Florida legislation—which requires all infrastructure needed to service new development to be available before it is occupied—would restrict new development and limit it to areas with existing infrastructure capacity, thereby reducing sprawl.

The existing research, then, is largely anecdotal, is not comparative (except for Nelson's [1999] study), and is equivocal about the efficacy of growth management regulations (with a few studies contending that such regulations do reduce sprawl and others arguing that they do not). An empirical and cross-sectional study could help measure benefits accrued from such regulations and provide a basis to improve future policies and programs.

RESEARCH METHOD

In this study, I employed two methods using data on 49 states (i.e., all states except Alaska) at three time points (1982, 1992, and 1997) from the National Resources Inventory (NRI) of the U.S. Department of Agriculture. In the first method, NRI data was used to compute percentage change in the amount of developed land¹ in 49 states between the years 1982 and 1997.² This computation includes all census-classified urban land and commercial and transportation lands outside urban areas; it excludes all federally owned lands, rural lands, forests, mountains, canyons, lakes, protected wetlands,

croplands, and so on. Next, using urban population data from the census,³ percentage change in urban population density between 1982 and 1997 in each state was determined.

In the second method, using multiple regression techniques, an attempt was made to ascertain the effect of state growth management regulations on urban density comparing changes in urban densities of states with growth regulations in place before 1997⁴ to those without. Although the mere presence of state growth regulations sets a state apart from those that do not have such laws, the effect of these regulations would be dependent on the length of time that regulations have been in place. Therefore, two experimental variables were used in two separate (yet similar) statistical models: presence of growth management regulations (using a dummy variable coded 0 for states without growth regulations and 1 for states with them) and length of time that state regulations were in effect (a simple scale variable).

Several other factors can affect urban density trends, and not controlling for them could cause biased results. First, macroeconomic conditions in the country can have an effect on urban trends and characteristics. Between 1982 and 1997, these conditions varied considerably but can be divided into two clear phases: a period of no-growth or slow growth between 1982 and 1992 when the nation went through two cycles of economic depression and one of rapid growth from 1992 onwards as the economy expanded. To control for this, the data was first split into two for the periods between 1982 and 1992 and 1992 and 1997, then pooled together, and a dummy variable was used set at 1 for the first period and at 2 for the second.

When urban population increases, urban areas often become denser. In each of the states, urban population changed considerably over the 15-year period of this study, with very significant increases in some and moderate increases in others. These population increases may be responsible for higher density. Therefore, a change-in-urban-population variable was included in the models.

In growth-regulated states, land markets operate with some constraints. But even in states without growth legislation, supply of undeveloped land for urbanization is regulated through a variety of policies such as agricultural protection zoning and agricultural conservation districts. The 1980 National Agricultural Lands Study found 22 states had some type of agricultural protection zoning (Coughlin 1991). More states now have such measures and the Sierra Club's 1999 *Sprawl Report* found that all states have some form of agricultural protection zoning and districting. The *Sprawl Report* also provides information on the effectiveness of each policy in each state. Because these programs could reduce the conversion of undeveloped land for urban uses and increase urban densities, two dummy variables—set at 1, 2, or 3 and

corresponding to low-, moderate- or high-effectiveness—were included as controls.

The actual density at the beginning of each period could affect the percentage change in density in that period. To control for this effect, a scale variable with the actual density in 1982 (for the 1982 to 1992 period) and 1992 (for the 1992 to 1997 period) was included in the models. Many states have open space protection programs that could help control sprawl. A correlation analysis showed significant correlation between open space protection programs and growth management variables. Therefore, data on open space protection programs were not included in the models.

FINDINGS

Results from the simple analysis of NRI data are presented in Table 2. From the table, it can be seen that between 1982 and 1997 in the 48 contiguous states and Hawaii considered together, the amount of urban land increased by 39.3% whereas urban densities decreased by about 13%. In the growth-managed states, urban land increased by about 49% and urban densities decreased by 9.5%. In states without growth management regulations, the amount of urban land increased by about 37% whereas the densities decreased by about 16%. Thus, over a 15-year period, both in states with growth management regulations and those without, the amount of urban land increased substantially whereas urban densities decreased considerably. Yet there is one difference between the two groups of states—the decrease in urban densities in the growth-managed states was less than two-thirds that of states without growth regulations.⁵

Among the growth-managed states, Hawaii, Florida, Maine, New Jersey, and Oregon are widely held to be the most regulated states (Weitz 1999). Of these, in Hawaii, urban land increased by 21%, the least increase among all growth-managed states. Barring the midwestern and Great Plains states (Nebraska, Kansas, Iowa, Illinois, North Dakota, South Dakota, and Wyoming) and Connecticut in the Northeast, this was the smallest percentage increase among all states in the nation. Hawaii's urban density actually increased by almost 6.5% between 1982 and 1997, the highest increase among the growth-managed states.

In spite of state growth management regulations, Georgia's urban land increased by almost 75%, the highest among the 49 states analyzed here. In Florida, notwithstanding concurrency and compactness requirements of its growth legislation, urban land increased by about two-thirds—about one and a half times the average national increase. Oregon, much admired for its

TABLE 2: Results from Simple Analysis of National Resources Inventory (NRI) Data (in percentages)

	<i>Change in Urban Land, 1982-1997</i>	<i>Change in Urban Density, 1982-1997</i>
States with state growth management regulations		
California	35.66	2.26
Florida	63.12	-6.66
Georgia	75.23	-19.83
Hawaii	21.08	6.46
Maine	53.53	-35.80
Maryland	40.07	-11.13
New Jersey	45.92	-24.65
Oregon	32.11	-2.02
Rhode Island	21.83	-15.82
Vermont	35.62	-19.32
Washington	49.16	1.45
States without state growth management regulations		
Alabama	46.62	-23.31
Arizona	52.12	17.71
Arkansas	28.52	-9.25
Colorado	33.47	4.33
Connecticut	19.70	-11.57
Delaware	42.11	-10.19
Idaho	34.22	3.07
Illinois	19.76	-11.25
Indiana	27.13	-15.16
Iowa	9.42	-5.82
Kansas	12.03	2.99
Kentucky	57.89	-31.51
Louisiana	34.62	-23.37
Massachusetts	49.74	-28.46
Michigan	36.83	-24.47
Minnesota	30.15	-6.21
Mississippi	38.11	-20.68
Missouri	24.09	-11.39
Montana	29.79	-15.31
Nebraska	10.49	2.57
Nevada	42.59	55.21
New Hampshire	66.59	-28.20
New Mexico	63.57	-17.01
New York	27.01	-19.37
North Carolina	69.71	-19.52
North Dakota	13.35	0.01
Ohio	35.27	-23.02
Oklahoma	23.60	-11.12

(continued)

TABLE 2 (continued)

	<i>Change in Urban Land, 1982-1997</i>	<i>Change in Urban Density, 1982-1997</i>
Pennsylvania	55.89	-36.20
South Carolina	67.83	-25.05
South Dakota	15.30	3.38
Tennessee	67.26	-29.03
Texas	40.99	-2.47
Utah	38.66	6.89
Virginia	48.86	-8.58
West Virginia	65.34	-45.46
Wisconsin	26.35	-11.17
Wyoming	13.73	-5.24
Group characteristics		
National average	39.30	-13.02
Average of states with state growth management regulations	49.16	-9.50
Average of states without state growth management regulations	36.69	-15.77

growth legislation, increased its urban land by almost a third with a decrease in urban density. Washington's urban land increased by almost a half; however, unlike in Florida and Oregon, this increase was accompanied by an increase in density.

Among the growth-managed states, in Florida, Maine, Oregon, and Rhode Island, the state is the principal plan review and approval authority for new development plans. Among these four, urban densities clearly decreased to a much lower extent in Oregon and Florida (2% and 7%, respectively) than in Maine and Rhode Island. Perhaps part of the reason is that in Maine, the initial state-approved plans can be amended at will by local governments, and state role pertaining to amendments is limited to reviewing and commenting. In Rhode Island, even though state approval is required for amendments, plans can be modified as many as four times a year (compared to twice a year in Florida). This lesser degree of state involvement may account for the greater density decline.

In New Jersey, Vermont, and Georgia, plan approval happens at the regional level through negotiated consensus among local governments within each region using state and regional planning criteria. A consensus-based approach has a significant potential liability. In the words of Martin Bierbaum, former associate director of the State Planning Commission of

New Jersey, "To achieve widespread consensus among all participating stakeholders, the plan could become a collection of special interests without direction or clear policy focus" (as quoted in Gale 1992, 434). In New Jersey, Georgia, and Vermont, not only has the percentage increase in urban land been substantial (45.9%, 75.2%, and 35.6%, respectively), so has the percentage decrease in urban density (24.7%, 19.8%, and 19.3%, respectively). Bierbaum's words, it seems, were prophetic. In Georgia's bottom-up planning approach, the state plan has to conform to local and regional plans; Georgia also had the highest percentage increase in urban land among all states. These trends suggest that greater state oversight of local plan making and amending may help decrease the conversion of land for urban uses and in increasing urban density.

The duration that growth management regulations have been in place seems to have an effect on increasing urban densities—the longer the time, the lesser the density decline. Hawaii and California, with legislation in place for more than 30 years, saw increases in urban densities. And Oregon and Florida, both with older legislation than New Jersey, Rhode Island, Georgia, Washington, Maryland, and Tennessee, saw lesser decreases in urban densities than the latter.

Among states without growth management legislation, Colorado, Idaho, Kansas, Nebraska, North Dakota, South Dakota, and Utah all saw increases in urban land, but with modest increases in urban densities. Arizona, much maligned for urban sprawl in and around Phoenix and Tucson, experienced a 52% increase in its urban land; but simultaneously its urban density increased by almost 18%. Likewise, in Nevada, urban land increased by 43% with a density increase of about 55%. Both these states experienced density increases without state growth management legislation. In some of these states, the federal government owns a significant percentage of the land. For example, in Utah, 65% of the land is owned by the Bureau of Land Management and the Department of Defense. Likewise, in Arizona (45%), Colorado (36%), and Idaho (62%), much of the land is owned by eight federal agencies. Lack of privately owned land may place a constraint on urban expansion and help check sprawl.

RESULTS FROM REGRESSION ANALYSIS

The results of the regression analysis are presented in Table 3. Only two variables have statistically significant effects. The first is change in urban population, and its effect, as expected, is quite substantial. The other significant variable is agricultural zoning. More than a decade ago, Coughlin (1991, 183) asserted that agricultural zoning mechanisms have widespread use and

TABLE 3: Results from Regression Analysis

<i>Variable</i>	<i>Standardized Coefficient</i>	<i>T-Value</i>	<i>Probability</i>
Experimental variable			
Absence/presence of state growth management	-0.130	-1.765	.081
Other variables			
Change in urban population	0.678	10.109	.000*
Macroeconomic environment	0.058	0.883	.379
Agricultural protection districting	-0.083	-1.097	.276
Agricultural protection zoning	0.334	5.124	.000*
Urban density	0.063	0.816	.417
Adjusted $R^2 = .578$			
Model significance = .000*			
Experimental variable			
Number of years of state growth management	-0.114	-1.278	.205
Other variables			
Change in urban population	0.681	10.054	.000*
Macroeconomic environment	0.063	0.941	.349
Agricultural protection districting	-0.075	-0.970	.335
Agricultural protection zoning	0.374	4.875	.000*
Urban density	0.070	0.822	.413
Adjusted $R^2 = .571$			
Model significance = .000*			

NOTE: The dependent variable is the percentage change in density. $N = 98$.

* $p < .01$.

contended that they hold the “most promise for protecting the nation’s farmland.” The findings of this regression analysis substantiate his claim; they also suggest that agricultural zoning can be used not only as a defensive mechanism to preserve farmland but perhaps also as a proactive mechanism to check urban sprawl. Hawaii and California are the only two states where agricultural zoning is closely integrated with growth management planning; this may explain why these states increased their urban densities.

Regression analysis findings also show that the state growth regulations in general do not seem to be very effective in checking sprawl: Neither the presence of growth regulations nor the duration that they have been in force has a statistically significant effect in reducing urban sprawl. These results support the *Sprawl Report*’s contention that most state growth regulations have only a moderate effect in preserving environmentally sensitive areas and regulating urban sprawl (Sierra Club 1999). These results may seem inconsistent with the finding from the simple analysis that growth-managed states as a group

experienced lesser density decreases than the states without growth regulation. However, growth-managed states experienced greater population increases than the other states. Population growth has a density increasing effect: The simple analysis did not control for this effect, whereas the regression analysis did. Therefore, in reality, there is no contradiction between the two findings.

DISCUSSION AND POLICY IMPLICATIONS

This research has found that urban areas have expanded considerably whereas urban densities have decreased substantially between 1982 and 1997. These findings confirm Pendall, Fulton, and Harrison's (2000) claim that urban densities have declined significantly in the past two decades. Although state growth management regulations do seem to have made an impact in reducing urban sprawl, the impact is not significant—a finding that is surprising given their potential. Controlling urban sprawl is a prerequisite for realizing some of the other potential benefits of growth regulations, such as cost efficiencies in the provision of urban public goods and services, making transit options viable, reducing commuting trip lengths, and decreasing urban energy consumption and air pollution levels. The limited effect of state regulations on checking sprawl suggests that other benefits are perhaps not accruing.

What could have caused such weak effects? One possible reason is this. State-mandated measures need to be implemented at the local level. If at the local level there is no political support for the state-mandated measures, regardless of how significant and comprehensive those measures are, their implementation will be weak. This is certainly the case in Florida, where, in spite of state growth management law, local development planning in many jurisdictions is guided by the desire for more growth. In states such as Georgia, where adoption of growth management plans at the local level is voluntary, very few jurisdictions adopt such plans (Nelson 1999). On the other hand, California's density increased by 2.3%, partly attributable to aggressive local and regional planning.

Do the observations from this research suggest a need for focusing attention exclusively on local growth regulations? As Pendall (1999) and others show, local regulations generally tend to promote sprawl and have negative extra-jurisdictional effects. Repealing state regulations and adopting local ones only instead may be a regressive move. Perhaps states should start moving from just having a state legislation in place to improving its imple-

mentation at the local level, for this is where the rubber meets the road, and it could spell the difference between success or failure in managing growth.

Would growth management at the regional level work? Regional growth management strategies can help resolve problems of extrajurisdictional effects while ensuring some oversight over local policies. One of the major problems with local implementation of growth controls is the highly politicized nature of local land development debates. A regional approach may provide a desirable distance from this while simultaneously ensuring that planning happens at a level close to implementation. Yet this research shows that a regional approach to growth management has not necessarily helped in reducing urban sprawl in three states that emphasize such an approach: New Jersey, Vermont, and Georgia, where densities declined by 24.6%, 19.3%, and 19.8%, respectively, versus the average of 9.5% for all growth-regulated states. Perhaps the fact that the region, not the state, has primary review authority over growth management planning may be inhibiting sprawl-regulating efforts in these states. With a higher degree of state oversight, these states may see more positive results from growth management planning.

Based on the levels of government that are involved in the plan-making process, whether plan submittal to state agencies is for approval or information, whether local plans need to be consistent with other land use policies, and on the stringency of sanctions for noncompliance, Gale (1992) categorizes eight state growth management environments into four categories: (1) *state dominant* such as in Oregon, Florida, Maine, and Rhode Island, where all local development plans have to be approved by the state agency; (2) *regional-local cooperative*, where the state role is secondary to that of regional authorities, as in Vermont and Georgia; (3) *state-local negotiated*, as in New Jersey; and (4) a *fusion model* in Washington state, where local planning is mandated by the state but the state has limited review authority. In Oregon, Florida, Maine, and Rhode Island (with a state-dominant model), densities declined by 2%, 6.7%, 35.8%, and 15.8%, respectively, against the average of 9.5% for all growth-managed states. In Vermont and Georgia (with the regional cooperative model), density declined by 19.3% and 19.8%, whereas in New Jersey (with the state-local negotiated model), density declined by 24.7%. But in the fusion model state—Washington—density *increased* by 1.5%, in spite of a 49% increase in urban land.

What sets Washington apart from the other seven states that Gale (1992) discusses? Its growth management program resembles the state-dominant model than any other. But unlike Oregon, Florida, Maine, and Rhode Island (which use the state-dominant model), Washington mandates growth management planning only for fast-growing counties, allows these counties to allocate a portion (up to 0.5%) of real estate transfer taxes to fund local

capital improvements, and requires agency plans in growth-managed counties to conform closely with local comprehensive plans. In focusing policy intervention on fast-growth counties only, Washington (1) ensures that its growth management program is tailored to the requirements of the areas that need it rather than being a one-size-fits-all program prescribed for all counties and (2) reduces political opposition from slow-growth counties that may not need growth management. By allowing growth-managed counties to have a new and continuous revenue stream, Washington has built in a unique fiscal incentive and is the only growth-managed state to do so.⁶

Based on the findings of this research and the above discussion, elements of state growth management programs that may help control sprawl seem to be (1) a mandatory requirement for local planning (like in Florida), at least in the fast growth counties (as in Washington); (2) encouraging actual implementation of local plans through requiring agencies to program and develop consistent with local plans (as in Washington and California); (3) providing local governments financial incentives for growth management planning (as in Washington); (4) limiting the number of amendments to local plans (as in Florida); and (5) integrating strong agricultural land preservation elements into their growth management programs (as in Hawaii). Having several of these features in a state growth management program may increase its effectiveness in checking sprawl.

Concurrency requirements have been often cited as a growth management tool with considerable potential to make urban areas more compact and have been incorporated into growth management laws of several states. In Florida, strict local enforcement of state-mandated concurrency requirements pertaining to levels of service and capacity of roads, has had the unintended effect of pushing development away from moderate-density built-up areas that have roads with low levels of service to peripheral and rural areas with higher-level-of-service roads that have greater capacity—thereby facilitating sprawl (Steiner 1998). Thus, well-intentioned policies can sometimes go awry. However, such policies, if implemented at the regional level with state oversight, can perhaps deliver the goods: Road concurrency assessing levels of service of roads at the regional level based on state-determined criteria may prevent leapfrog development.

Most U.S. jurisdictions have zoning laws that predate growth management planning and still have a significant effect on land use and the built environment. In all states except Oregon, local zoning regulations contain *maximum density* stipulations that restrict, say, single-family developments to four units per acre. Such standards were set over half a century ago, when most urban areas were congested and had poor-quality buildings and inadequate infrastructure. In that context, encouraging low-density development

was one of the best ways to ensure safe and sanitary living conditions. The American urban landscape is radically different today. New neighborhoods are no longer densely packed. Perhaps it is time to modify zoning regulations to incorporate *minimum density* rules—that, say, require new single-family residential developments to have at least five units per acre—with suitable infrastructure standards. Because developers' and builders' profits are larger by unit of constructed area than by parcel area, most of them would try to build as many units as possible (though limited by infrastructure availability, building bylaws, and consumer preferences). This could result in more compact yet adequately serviced neighborhoods. A revision of local zoning regulations along these lines may be mandated under the aegis of a state growth management law; alternately, a state can modify the state-zoning-enabling act—which allows cities and counties to frame and adopt zoning regulations—to reflect this new policy.

Many local communities do not have adequate resources—both money and skilled personnel—for effective compliance with state growth management mandates. Some states, such as Florida, provide state assistance to local communities to kick-start growth management planning. However, continued assistance is necessary for noteworthy results. Porter (1997) notes that many states adopted their laws without well-defined administrative rules and criteria for measuring compliance and success. Lack of programmatic clarity is a well-documented impediment to effective implementation of other policies: It is likely so for state growth management policies also and needs to be addressed. Finally, because issues pertaining to land use tend to be very contentious, an effective dispute resolution mechanism should be set up as an alternative to expensive and long-drawn-out litigation that can stymie growth management efforts. Oregon and Rhode Island have set up land use appeals boards manned by judges who adjudicate land use cases only. Florida has set up an elaborate administrative mediation process. In Oregon and Florida, the dispute resolution mechanisms have been extensively used. Other states can perhaps learn from the experiences of these two states.

LIMITATIONS OF THIS STUDY AND DIRECTIONS FOR FUTURE RESEARCH

Given the considerable differences between the 49 U.S. states, any comparative research is bound to have methodological shortcomings. This research is no exception. Although some of the differences between the states are accounted for by the independent variables, clearly many are not. Another limitation is that the mere presence of a state regulation does not automatically mean that its objectives are actually being met in policies

implemented at state, regional, and local levels. Accurately measuring implementation would require examination of all development decisions at these levels to check their consistency with state growth objectives—a task beyond the scope of this research.

Future research should examine the factors that affect local and regional implementation of state regulations in one state or comparing states with different types of state growth management programs. Lopez and Hynes (2003) contend that sprawl in metropolitan areas of the southern states is different from sprawl in the rest of the country. Based upon this lead, it may be useful to explore variations in effectiveness of state regulations in different regions of the country—Northeast, Midwest, West, and the South. The effect of geographical barriers—water in Hawaii, desert and mountains in California—as well as the impact of large-scale federal ownership of land on the efficacy of state growth programs need to be examined. Several states adopted state growth regulations after 1997. The NRI's first update on land use patterns after 1997 will become available in the near future. That will enable researchers to revisit this study with data on a larger number of growth-managed states. Finally, this research only explored the efficacy of state growth laws in checking sprawl. Because the debate on the costs and benefits of sprawl has not been conclusively settled yet, research on this issue—perhaps using indicators such as air pollution, economic development, equality of opportunity for all races, and physical health—is urgently needed.

In conclusion, this research presents one of the first empirical evaluations of the effects of state growth regulations on urban sprawl and uses cross-sectional data spanning a 15-year period. The information about urban land and density presented in this article provides planners and policy makers in each state with vital information about land consumption trends. The findings show that states with state growth regulations have, in general, experienced a lesser density decline between 1982 and 1997 than other states. However, state growth management programs have not performed as expected and did not have a statistically significant effect on checking sprawl. A high degree of state oversight and well-defined requirements and incentives may facilitate better local and regional implementation of state growth management programs and increase their efficacy in checking sprawl.

States with growth management legislation could use the findings of this study to improve growth management planning, whereas states such as Illinois, Ohio, and New York that are contemplating first-time adoption of state growth laws could use this study to formulate better approaches. For those researching growth management issues, this article provides a reference point to build upon as the literature on policy evaluation in this substantive planning area evolves and as better data become available.

Finally, today's sprawled urban landscape has developed over a 60- to 70-year period with considerable support from several types of federal and local policies. To expect a sudden reversal of this trend with state growth management laws alone is wishful thinking. Well-designed state growth management regulations must be supplemented by federal and local policies with similar objectives before we see significant and widespread results.

NOTES

1. The National Resources Inventory (NRI)-defined urban lands are a better measure of sprawl than census-defined urban lands because NRI includes land occupied by interstate truck stops, Walmarts, and other nonurban commercial developments that often form the nuclei for urban sprawl. Detailed definitions and information on NRI land classification can be found online at http://www.nrcs.usda.gov/technical/NRI/1997/summary_report/body.html#revised.

2. NRI data are currently available only for 1982, 1987, 1992, and 1997.

3. Population data for intercensal years, if unavailable, were estimated by interpolation. Because nonurban commercial and transportation lands do not have a resident population, including these areas in the urban density computation does not compromise the calculations.

4. The following states were considered growth-managed in this analysis: Hawaii, Vermont, Oregon, Florida, New Jersey, Maine, Rhode Island, Georgia, Washington, and Maryland. California was also considered a growth-managed state, although it does not have state growth management legislation. This is because it has numerous policies that promote local and regional planning that include a mandate for a state development plan law (1961), planning by cities and counties (1965), California-Nevada Tahoe Regional Planning Compact (1969), for zoning ordinances to be consistent with comprehensive plans (1971), and the state coastal program (1973). Arizona, Tennessee, Colorado, and Wisconsin, which adopted state growth management legislation after 1997, were not.

5. However, a simple difference of means test (not reported here) found the difference between the two groups to be statistically insignificant.

6. Vermont increased the real estate transfer tax from 0.5% to 1.25% in the late 1980s, with the additional amount assigned for implementation of growth management plans. But in 1991, it converted this entitlement program to a competitive one, considerably reducing its utility.

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