State Growth Management and Housing Prices*

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Objective. In the United States, growth regulations aimed at environmental protection and better-quality urban areas have become very popular since the 1960s. Although many studies have examined the housing-price effects of local and regional growth management regulations, none has examined the effects of a state law. Past research has also tended to be cross-sectional, rather than longitudinal, and has frequently ignored alternate hypotheses that could explain housing-price trends. The research presented in this article examines the housing-price effects of Florida's Growth Management Act of 1985. *Methods.* Using secondary source data from all 67 counties of the state for the period 1980–1995 and employing pooled time-series analysis techniques I test the hypothesis that the Act had an inflationary effect on single-family house prices. *Results.* After controlling for alternate hypotheses such as population, income, and size of house, I find a statistically significant increase in the price of single-family houses attributable to statewide growth management. Also, the demand-side and supply-side price inflationary effects of growth management are similar in magnitude. *Conclusions.* Since higher housing prices could become the Achilles heel of growth management programs and thwart their implementation, I suggest a few ways some of the price inflationary effects may be reduced.

Over the past four decades, growth management regulations have become increasingly popular at local and state levels in the United States (Fischel, 1990; Smith, 1993; Weitz, 1999). These regulations are meant to protect environmentally sensitive lands, improve the quality of urban areas, and promote fiscally prudent land-use patterns and practices (Kelly, 1995; Knaap, 1985; Nelson, 1992; Nelson et al., 1995). However, scholars fear that such laws may raise housing prices (Fischel, 1990; Lillydahl and Singell, 1987), and many researchers have examined this possibility in local and regional contexts in California and at a smattering of locations elsewhere in the United States. Yet no study has examined the effects of a state growth law over an entire state's housing prices. If housing prices do increase, public

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SOCIAL SCIENCE QUARTERLY, Volume 87, Number 1, March 2006

support for growth regulations may decrease. Those regulations may then lose political support and not be implemented; thus, potential benefits from growth management programs may be foregone.

Florida enacted the Local Government Comprehensive Planning and Land Development Regulation Act (Florida Statutes, §§ 163.3161–3161.3215) in 1985. Commonly known as the Growth Management Act (GMA), this law mandates state-supervised local development planning across the state. The GMA has allegedly raised housing prices in Florida. The research reported here investigates this claim. Its findings could inform debates and policy interventions in Florida and other places with growth management regulations, especially the 12 other U.S. states with similar laws.

This article is organized in four parts. In the first, I review the theoretical reasons for expecting growth regulations to increase housing prices, present examples of existing research, and highlight their shortcomings. In the second part, I describe Florida's GMA, reasons for suspecting price inflationary effects from it, and present some evidence of such effects. In the third part, I describe my research design and findings, which I discuss in detail in the last part.

Current Knowledge

Theory

Growth management regulations can restrict an area's population growth by limiting the number of new residential permits allowed each year. By setting urban growth boundaries, or by applying restrictive criteria for converting nonurban land to urban uses, such regulations can curb the supply of land for urbanization. These restrictions limit the supply of new housing, creating a scarcity effect that drives up housing prices.

Growth management regulations may require that developers either pay for or construct their own offsite infrastructure instead of having local governments do so as they have for much of the last century (Nelson et al., 1995; Nicholas, 1992). Developers usually recover these additional costs by raising housing prices. New regulations can increase the time and effort needed for regulatory compliance, and thereby increase project costs (Lowry and Ferguson, 1992; Rice Center for Community Design and Research, 1979). These two effects are higher production cost effects.

Land supply restrictions, requirements to pay for offsite development, and the higher front-end costs of complying with regulations may force some developers out of regulated jurisdictions and into unregulated ones (Lowry and Ferguson, 1992). This may decrease competition in the regulated areas and thereby inflate housing prices. I term this a reduced competition effect.

Growth regulations can require higher-quality development (Frank, 1989). If minimum level-of-service criteria for facilities are imposed, they can increase the price of new housing. With the higher price, however,

comes higher quality for the consumer. This is an amenity effect. Growth regulations may check degradation of natural and urban environments even if they do not improve them. This renders additional value to land and property in regulated jurisdictions, increasing housing prices through an anticipated amenity effect (Fischel, 1990; Navaro and Carson, 1991).

Each of the six effects listed can individually or in combination increase housing prices. The first four of these six effects are supply-side regulatory effects and, if detected, perhaps need policy responses. The last two are housing-related benefits that consumers could receive from growth regulations; of these, amenity effects may be tangible, anticipated amenity effects may not. Price escalations from amenity and anticipated amenity affects are demand driven and perhaps do not need policy responses.

Prior Studies

A considerable amount of research has examined the effects of growth management regulations at local and regional levels—a representative sample is presented here.[1] By analyzing data from nine counties in the San Francisco Bay area for the period 1977 to 1979, Dowall and Landis (1982) found that growth control regulations caused statistically significant price increases. Schwartz, Hansen, and Green (1984) compared 1970 and 1976 housing-price data and found a similar effect: higher prices in growth-controlled Petaluma than in uncontrolled Santa Rosa. Mercer and Morgan (1982) also found that growth controls had a statistically significant effect on housing prices in Santa Barbara County.

When he examined the change in the average new housing price between 1969 and 1976 in 100 Californian communities, Elliot (1981) found that growth-rate restrictions resulted in price increases 35 percent higher over unregulated communities, and development-quality stipulations increased prices 20 percent over unregulated communities. Zorn, Hansen, and Schwartz (1986) found that in Davis, growth regulations increased new housing prices more than 8 percent over that of comparable housing in unregulated areas. By comparing the impacts of growth controls on housing prices in Sacramento, Fresno, and San Jose, Landis (1986) found that land-use controls increase housing prices more in less competitive markets than in more competitive markets.

Using 1980 average residential land-price data for 45 urban areas, Rose (1989) found a statistically significant though moderate support for the hypothesis that land-use restrictions raise residential land prices. Examining the impacts of the growth regulations in Montgomery County, Maryland, Pollakowski and Wachter (1990) found inflationary price effects. Nelson (1986) studied the impact of Salem, Oregon's urban growth boundary. He

[1]See Fischel (1990) and Smith (1993) for an extensive review of the literature.

found that parcels inside the boundary were priced about 45 percent higher than parcels outside. Knaap (1985) found a similar effect caused by the urban service boundary adopted in Portland, Oregon, as did Correll, Lillydahl, and Singell (1978) in their study of Boulder, Colorado's greenbelt.

All the above studies found that growth regulations had an inflationary effect on housing prices; however, other studies did not find this effect. In an analysis of seven Californian mid-size communities with growth controls, Landis (1992) showed that between 1980 and 1987, median home prices of growth-regulated communities did not increase significantly above those in unregulated communities—in fact, in some of them the prices actually increased more slowly after the communities adopted growth controls. In a comparative cross-sectional analysis of the effect of growth-control legislation on the production of affordable housing in several California communities, Glickfield and Levine (1992) did not find a negative effect.

Four shortcomings can be noticed in the existing research. First, evidence on the effects of growth management regulations on the price of housing is mixed—many studies found inflationary effects, some did not. Therefore, existing research cannot adequately inform debates in Florida about this issue. Second, thus far studies have examined effects on counties, cities, or metropolitan areas that are surrounded by unregulated jurisdictions. In these situations, households priced out of regulated markets can relocate in surrounding unregulated areas. This safety valve is not available when an entire state is regulated; therefore, existing literature may not adequately inform policymakers in states with statewide regulations.

Third, as Schwartz, Zorn, and Hansen (1986), Deakin (1989), Feiock (1994), and Feiock and Stream (1997) contend, most of these studies use either cross-sectional research designs or do not have control groups. In cross-sectional designs, the choice of the time points significantly influences the results. Many of these studies chose experiment endpoints that may not have allowed sufficient time to elapse for effects to be noticeable or stable (see, e.g., Glickfield and Levine, 1992; Schwartz, Hansen, and Green, 1981). In fact, Landis (1992) contends that because temporary housing-supply shortages and concomitant price increases happen frequently in expanding economies, findings from cross-sectional analyses should not be given serious attention. Time-series analysis of data from a sufficiently long time period can address both these issues, yet none of the studies thus far has done that.

In studies that do not use control groups there is no way of knowing if growth management caused the price increases or whether other factors did (see, e.g., the studies by Dowall, 1979; Schwartz, Hansen, and Green, 1981).[2] One notable omission is a control for changing incomes (Nelson et al., 2002).

[2]Schwartz, Hansen, and Green (1981), for example, use Santa Rosa and Rohnert Park as controls when examining housing-price effects of growth controls in Petaluma. However, these two areas do not have as intense an interaction with the San Franciscan economy as does Petaluma; further, Rohnert Park itself adopted some growth controls toward the end of the experimental period. Clearly, the controls used were not very good; better controls may

Fourth, most existing studies have examined growth control regulations that had clear numerical restrictive goals. Although this was and still is popular in many California communities, very few communities elsewhere in the United States have adopted such a restrictive approach. Thus, findings from most of the existing research have limited applicability to other locations.

Florida's GMA

Florida's GMA was the direct result of a combination of several factors. Foremost of these was the phenomenal growth in the state's population from about 3 million in 1950 to about 11 million by 1985. This post-World War II population growth triggered rapid and extensive urbanization, much of which used land inefficiently and perpetuated urban sprawl. Growth also resulted in environmental problems like contamination of freshwater reservoirs and extensive destruction of wetlands (Carter, 1974). The growing environmental movement in the country in the 1960s and 1970s gave a fillip to statewide debate and discussions about these problems (DeGrove, 1984). Several state laws to address these issues were enacted in the late 1970s and early 1980s. However, these had limited success (DeGrove, 1989; Rubino and LaRosa, 1994). Desperate to see some positive results and appalled at the pace of degradation of natural and urban environments, the state legislature passed the GMA in 1985.

The GMA integrated, strengthened, and improved existing growth regulations. It also instituted a top-down planning framework with considerable state supervision (Rubino and LaRosa, 1994) that is widely regarded as very comprehensive and with significant potential to regulate growth (Gale, 1992; Weitz, 1999). It mandated development planning at the local level using comprehensive plans that (1) incorporated growth management principles, (2) were locally adopted, and (3) were approved by the state's Department of Community Affairs, the GMA's implementing agency.

The three growth management principles that local plans need to incorporate are concurrency, comprehensiveness, and consistency. Concurrency requires that all infrastructure necessary for a development be available by the time construction is complete and the development ready for use. Local plans need to consider and address a broad range of issues, such as economic development, housing, and historic preservation, as per the principle of comprehensiveness. Finally, local plans need to be consistent with all other relevant local and regional plans and with the state comprehensive plan as per the principle of consistency. Unlike several local and regional growth regulations (such as those used in many California communities), the GMA does not stipulate population growth limits or development ceilings such as

have revealed different results. Problems with choice of controls also characterize the Landis (1992) and Dowall and Landis (1982) studies that also used excessively dissimilar control groups.

the number of building permits or the number of square feet of commercial space permissible annually.

The state specified a schedule for plan adoption by the counties based on their levels of urbanization in 1985, and provided local governments with financial and technical support to aid plan preparation.[3] The GMA authorized state sanctions against local governments that do not comply with its provisions, such as curtailment of state financial support. Thus the GMA put in place an implementation-oriented system that sought to encourage optimal utilization of available infrastructure while curbing urban sprawl and deficit financing of urban growth.

Potential Effects of the GMA on Housing Prices

GMA-mandated local planning can increase housing prices in several ways. First, in fulfilling concurrency and consistency requirements, local plans could restrict the conversion of nonurban land for urban uses either directly through local urban growth boundaries and growth limits, or indirectly through environmental and agricultural land protection requirements. This scarcity effect would raise the price of new land for urbanization and of existing serviced land in infill sites, and in turn raise housing prices.

The GMA encourages use of impact fees to finance development. Consequently, impact fees have been used to pay for the construction of roads, streetlights, sanitation systems, and other capital-intensive projects (Legislative Committee on Inter-Governmental Relations, 1997; Nelson et al., 1995). Often, impact fees need to be paid at the onset of project development (Legislative Committee on Inter-Governmental Relations, 1997; Nicholas, 1992), a significant hurdle for small and medium-sized builders that could force them to either leave the jurisdiction or the industry (Denslow et al., 1994). Thus both a production cost effect and a reduced competition effect can occur from impact fee usage, and raise housing prices.

Ensuring that new development abides by local comprehensive plan requirements (and those of zoning and land-development regulations that complement the plan) consumes considerable amounts of developer time and effort, and several weeks or months of plan review by local governments. Thus house-price inflation from higher production cost effects is likely.

The GMA's concurrency requirements are implemented through level-of-service standards for water supply, roads, stormwater drainage, wastewater treatment, parks and open spaces, and other such urban services. These would raise production costs but some of the additional costs are for increased amenities—so an amenity effect is plausible. Finally, implementation of the GMA signals the state's willingness to check degradation of its urban and natural environments. This could cause an anticipated amenity effect and raise

[3]In 1986, the state budgeted about $3 million for this.

housing prices. In summary then, growth management in Florida could have supply-side and demand-side inflationary effects on housing prices.

Florida's GMA applies to the entire state. When the entire state is regulated, as noted earlier, demand can be displaced only out of the state—a much lower possibility. Given the state's peninsular shape, climate, and tax environment,[4] presumably very little residential growth is deflected away from the state—a reasonable assumption since the state's yearly population growth rates have not changed since the 1970s.

In state legislative debates before GMA's adoption, concerns about inflationary housing-price effects were well articulated. In response, planning for housing was included as one of the mandatory elements of local comprehensive planning processes. Legislators hoped that this would alleviate inflationary price effects if they did occur—a reasonable hope since some studies (e.g., Landis, 1986; Miller, 1986; Pollakowski and Wachter, 1990) do show that affordable housing programs may offset the inflationary effects of growth regulations.

Preliminary Evidence of Effects

First, the average annual house-price appreciation rate in Florida from 1981 to 1990 was 2.99 percent, about 67 percent of the national inflation rate. But from 1991 to 1995, when all jurisdictions in the state had GMA-mandated plans, the annual house-price appreciation rate increased to about 80 percent of the inflation rate; this suggests a link between GMA-mandated local planning and higher housing prices. Second, in 1990 Florida had 1.61 million housing-cost-burdened households, that is, people who spent more than 30 percent of their income on mortgage or rent payments (Department of Community Affairs, 1998). Just five years later, in 1995, there were 2.21 million housing-cost-burdened households—a 25 percent increase.

Muller (1989) contends that the GMA is a significant factor inhibiting availability of affordable housing in Florida, while the Florida Fair Housing Report (Department of Community Affairs, 1997) states that land-use regulations have had adverse effects on affordable housing in the state. Thus, based on theory and some data, there is a perception in Florida that the GMA has inflated housing prices.

Research Design and Findings

An interrupted time-series analysis is ideally suited for assessing policy effects (Cook and Campbell, 1979; Mohr, 1995). Such a design avoids two critical shortcomings of cross-sectional research designs: nonrepresentative time points and insufficient time for policy effects to manifest themselves.

[4]Florida does not have a personal state income tax and is in the lowest decile in effective per-capita taxes among all U.S. states.

Additionally, in longitudinal designs the characteristics of the study group before the intervention serve as controls for postintervention events, thus addressing the problem of appropriate controls that is commonly found in comparative research.

This research uses data from 1980–1995, a 16-year period. The choice of 1980 as the experiment's start date was guided by the need to distance observations from the unique effects of the 1970s energy crisis but still provide several observations before the 1985 adoption of the GMA. The choice of 1995 as the experiment end date was guided by the need to get several observations after 1990—the year by which GMA mandated all counties to adopt development plans. The unit of analysis is the county. Data from all of Florida's 67 counties was pooled together. By doing this, the design captures effects from the entire state so that leakages from one county to another, if any, are also accounted for in the analysis. Finally, the hypothesis tested is that implementation of GMA-mandated local plans had a statistically significant effect in increasing the price of single-family homes in the state.

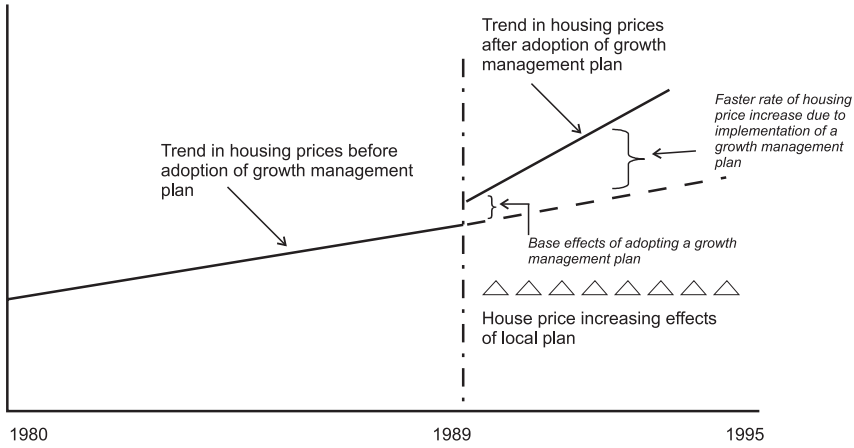
Since growth management can have supply-side and demand-side effects, simultaneous estimation of demand and supply equations is necessary. Although three-stage least squares techniques are commonly used to estimate supply-demand models, the data set used here has pooled information. Seemingly unrelated regression (SUR) techniques account for heteroskedasticity and provide much better estimates than other techniques for such data (Sayrs, 1989); therefore, SUR techniques were used in this analysis.

Experimental Variables

The experimental stimulus is the implementation of GMA-mandated development plans. Counties were required to adopt such according to a state-determined schedule. Although some counties sought and received extensions, by 1990 about 60 percent of the state's population lived in growth-regulated areas (Denslow et al., 1994); by 1992, the entire state was regulated. Since the date of plan adoption varies by county, so does the commencement of the experimental intervention. One experimental variable captures the base effects of having such a plan. This variable is set at "0" for all years prior to plan adoption; at "1" in the year of adoption and subsequent years for each county. Because these plans are supposed to guide local development after their adoption, it is reasonable to assume that there are incremental effects, that is, the more years of growth management, the greater the price-inflationary effects by the end of the experimental period. A second variable (set at "1" one year after plan adoption, at "2" two years later, etc.) captures these incremental effects of implementing such plans. Figure 1 illustrates the hypothesized effects. Both the experimental variables

FIGURE 1

The Housing-Price Effects of Growth Management Planning in a Florida County



are used in the demand and supply equations to capture the demand-side and supply-side effects of growth management.

Dependent Variable

It is commonly assumed that all families aspire to own a single-family home (Drier, 1982), and many federal, state, and local housing policies are aimed at facilitating and increasing single-family homeownership (Applebaum and Drier, 1990; Goetz, 1993). Therefore, this research examines effects on single-family owner-occupied home prices only.

The dependent variable in both equations is the median sale price of single-family owner-occupied homes. I use median sale values based on repeat sale price information obtained from property appraiser data.[5] Repeat sale price information is acknowledged to be a more accurate measure than ordinary median sale prices (Gatzlaff and Ling, 1994) and property appraiser data provide better price information than multiple listing service data.

[5]In their 1997 study, Archer et al. used county property appraiser data archived with the Florida Department of Revenue per a state mandate. The archives contain detailed information (more than 72 variables) pertaining to the last two sale transactions of every parcel of land in the state, including 3 million single-family residential owner-occupied parcels. Using statistical filters, Archer et al. selected parcels that were sold in normal arm's-length transactions at least twice between 1980 and 1995 with sale prices greater than $1,000. In 1995, there were 188,227 such transactions statewide. These were then analyzed to determine median single-family home sizes, and after adjusting for changes in housing quality—such as an addition of a bathroom—used hedonic modeling to estimate median constant-quality single-family home prices.

Control Variables in the Supply Equation

Supply prices of housing can be affected by the quantity supplied, the size of the house, fiscal policy factors such as tax treatment of investment in construction and development, and national trends in house prices. Since I used sale prices of new and old houses for the dependent variable, for quantity of housing supplied I used the number of sale transactions in each year. The size of the median single-family home in the United States grew from about 1,600 square feet in 1980 to 1,920 square feet in 1995 (National Association of Home Builders, 1999), a 20 percent increase. The percentage of very large homes (i.e., those above 2,400 square feet) among new single-family homes also increased significantly—from about 15 percent to 28 percent—over the same period. Comparable data for Florida reflect national trends (see Archer et al., 1997). Thus, increasing house size could explain some of the price increase. To control for this I incorporated information about median house size for each county in each year. National trends data for median single-family home sale price was included in the equation to control for nationwide production price changes that may have affected sale prices of Florida homes.

The Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA) had a significant effect on funds availability for construction projects. The FIRREA mandated tighter limits on loan amounts for thrift institutions and prohibited them from making equity investments in real estate (Fergus and Goodman, 1994). It also increased financial institutions' asset and balance requirements for most types of mortgage credit. Banks were specifically discouraged from real estate lending. These restrictions significantly reduced the availability of capital for land-development and construction projects, thereby increasing the cost of capital (Parzinger, 1992). Developers could pass on the additional cost to consumers through price increases. FIRREA's effects were accounted for by using a dummy variable set at 0 from 1980–1988 and at 1 from 1989–1995.

Control Variables in the Demand Equation

Demand prices can be affected by quantity supplied, income, population growth, and tax treatment of investment in the construction industry, as well as by mortgage interest rates. As in the supply price equation, the number of sale transactions was used as a proxy for quantity supplied. Clearly, population and income are two of the most important demand factors (Nelson et al., 2002). Between 1980 and 1995, all Florida counties witnessed steady population growth, though at varying rates. Using number of households—since housing is consumed by households—as an independent variable helps control for population-based house-price effects over time and across counties at each point in time. Since the GMA does not seek to control

population, nor is population limitation a parameter for measuring planning efficacy in the GMA framework, population is an exogenous variable in this experiment.

Income and homeownership rates are positively correlated. Moreover, since housing consumption has a positive income elasticity of demand, higher incomes could result in a greater demand for homeownership as well as a willingness to pay more for it. This in turn could increase housing prices. Therefore, income changes within the same county at different points of time, and between counties at any point of time, could explain housing-price variations. A control variable for this demand-side effect is included in the equation using median household income for each county at each time point.

The Tax Reform Act of 1986 (TRA) extended the depreciation lifetime of rental property and raised tax rates for capital gains from real estate transactions (Roistacher, 1990). This reduced capital inflow for new rental housing construction (Applebaum and Drier, 1990), and decreased the number of multifamily housing starts nationally from about 515,000 in 1985 to 140,000 in 1991 (Poterba, 1992). This increased rents[6] and made homeownership more attractive to renters, which, quite possibly, increased the demand and price for homeownership.[7] TRA's effect was accounted for by using a dummy set at 0 for 1980–1985 and at 1 from 1986–1995.

Data and Modeling Notes

Only secondary source data was used in this study. Number of households in each county from 1980–1995 was computed using population and household-size data available in the Florida Statistical Abstract—the official data source for state and local programs. The counties' dates of plan adoption come from the Florida Department of Community Affair's plan adoption database. Archer et al.'s (1997) *The State of Florida's Housing* report provided information on median values of single-family home prices, home sizes, and household incomes.[8]

Preliminary diagnostic tests revealed heteroskedasticity and first-order autocorrelation. Heteroskedasticity is expected in pooled analyses and the SUR technique corrects for this. Autocorrelation is common in longitudinal data and was corrected by incorporating a first-order autoregressive term in

[6]Poterba (1992) estimates a 10–15 percent increase in long-term rents.

[7]Follain and Ling (1988) contend that before the 1986 Act, the relative costs of owning or renting were approximately equal, especially for low-income families, but that after 1986 it became cheaper for all families (regardless of income) to own rather than rent.

[8]To estimate median household incomes, Archer et al. (1997) developed an equation combining several factors, such as past income growth rates, unemployment rates, and persons over 25 years old with at least a high school diploma, using data from several sources including the Bureaus of Census, Economic and Business Research, and Labor Statistics, and the Department of Education. They refined this equation using household income data from the 1980 and 1990 Census. More details can be found in Archer et al. (1997:105–06).

each equation. In pooled cross-sectional data, often county-specific dummies (set at 1 for a county and at 0 for all other counties) are used to control for fixed effects. This could not be done here because of matrix singularity.[9] The basic forms of the demand and supply equations are below.

Supply equation

$$P_{st} = C_1 + aQ_{st} + bT_{89} + cS_t + dGM + eGMY_t + fNatP_t + gAR(1)$$

Demand equation

$$P_{dt} = C_2 + hQ_{dt} + iN_t + jI_t + kT_{86} + mMORT_t + nGM + pGMY_t + gAR(1)$$

where:

P_{st} and P_{dt} are the supply and demand prices, respectively, of a single-family house in year "t."

Q_{st} and Q_{dt} are the supply and demand quantities, respectively, of single-family houses in year "t."

N_t, I_t, and S_t are the number of households, median household income, and median size of a single-family house, respectively, in year "t."

T_{86} and T_{89} represent the effects of the Tax Reform Act of 1986 and the FIRREA Act of 1989, respectively.

$NatP_t$ is the national median price of a single-family home in year "t."

$MORT_t$ is the interest rate on a conventional 30-year, 20 percent down home mortgage in year "t."

GM captures the base effect of adoption of a growth management plan.

GMY_t represents the number of years that growth management laws have been in effect in year "t."

AR(1) is a first-order autoregressive term, and C_1 and C_2 are constants.

The complete results of the statistical analysis are presented in Table 1. The two equations are statistically significant and each explains over 75 percent of the price variations.

Supply equation

$$P_{st} = 39520.89 + 2.79Q_{st} + 11.17T_{89} + 0.10S_t + 5022.42GM + 4381.85GMY_t + 0.031NatP_t + 0.82AR(1)$$

Demand equation

$$P_{dt} = 40066.46 + 2.67Q_{dt} + 0.01N_t + 0.15I_t + 181.66T_{86} - 55.46MORT_t + 4809.20GM + 4292.46GMY_t + 0.82AR(1)$$

In each equation, both the base effects of adoption of GMA-mandated plans as well as the cumulative effects of implementation of such plans are statistically significant. Thus, adoption and implementation of

[9]When 66 dummy variables were added to the equations to control for fixed effects of the 67 Florida counties, matrix singularity prevented model convergence.

TABLE 1

Results of Statistical Analysis

	Coefficient	S.E.	*t* Statistic	Prob.
Supply equation constant	39520.89	2849.123	13.8713	0.0000*
Quantity (supply)	2.7921	0.3184	8.7711	0.0000*
FIRREA of 1989	11.17453	475.4721	0.023502	0.9813
Median house size	0.0999	0.5270	0.1896	0.8496
Base effects of GMA plan in supply equation	5022.417	1509.893	3.326341	0.0009*
Incremental effects of GMA plan implementation in supply equation	4381.8450	473.1451	9.2611	0.0000*
National median house price	0.0312	0.0188	1.6629	0.0965
First-order autoregressive term	0.8231	0.0167	49.167	0.0000*
Demand equation constant	40066.4610	2641.2990	15.1692	0.0000*
Quantity (demand)	2.6683	0.3208	8.3186	0.0000*
Number of households	0.0016	0.0033	0.4939	0.6214
Median income	0.1537	0.0540	2.8457	0.0045*
Tax Reform Act of 1986	181.6859	490.1055	0.3707	0.7109
Mortgage interest rate	−55.4626	89.4051	−0.6203	0.5351
Base effects of GMA plan in supply equation	4809.1980	1461.5290	3.2905	0.0010*
Incremental effects of GMA plan implementation in supply equation	4292.4640	449.7375	9.5444	0.0000*

Supply Equation Characteristics			
R^2	0.779378	Mean dependent variance	52620.19
Adjusted R^2	0.777926	*SD* dependent variance	26757.45
S.E. of regression	12609.39	Sum squared residuals	1.69E+11
Durbin-Watson statistic	2.300352	Observations	1,071
Demand Equation Characteristics			
R^2	0.781707	Mean dependent variance	52620.19
Adjusted R^2	0.780062	*SD* dependent variance	26757.45
S.E. of regression	12548.58	Sum squared residuals	1.67E+11
Durbin-Watson statistic	2.308200	Observations	1,071

*Denotes statistical significance at the 0.01 probability level.

NOTE: Estimation method used: simultaneous estimation using Seemingly Unrelated Regression. Included observations: 1,072. Total system (balanced) observations: 2,142. Convergence achieved after: 1 weight matrix, 13 total coefficient iterations.

GMA-mandated plans has both supply-side and demand-side immediate and long-term effects. As noted earlier, two kinds of demand-side effects are possible: anticipated amenity effects and amenity effects. Amenity effects are actual improvements in the quality of new housing and of neighborhoods and urban areas from implementation of growth management plans. Since actual improvements are unlikely in the year of plan adoption, the base effect of adopting GMA plans in the demand equation is most likely an

anticipated amenity effect. Also, the coefficients of the growth management variables in the two equations have comparable values (though a bit higher in the supply equation). Apparently, then, the supply-side and demand-side inflationary price effects of growth management are similar in magnitude. Existing studies have not empirically tested the impacts of anticipated amenity and amenity effects, and almost all studies assume that price inflation from growth management is solely due to supply-side effects. Therefore, the findings of this study—that anticipated amenity effects and amenity effects have statistically significant price-inflationary effects, and that the supply-side and demand-side price-increasing effects of growth management are comparable in scale—are unique contributions to existing literature.

Solving the system of equations for equilibrium conditions and using ordinary least squares to estimate the reduced form parameters, the price effects of adoption of a growth management plan and for each year of plan implementation are found to be $1,219 and $1,002, respectively. In other words, the adoption of a growth management plan increases the median sale price of a single-family home by $1,219, and for each year this plan is in effect there is a $1,002 increase in price attributable to it. To better understand these impacts, consider price trends in Lee County in southwest Florida (see Table 2). Over the study period, this county had sale prices close to statewide median prices. It adopted its growth management plan in 1989, just as did many other counties. Between 1988 and 1989, the median single-family home price here increased by $4,018. Of this increase, $1,219 (or about 30.3 percent) was attributable to the adoption of a growth management plan. By 1995 (after the plan had been in effect for six years), the

TABLE 2

Price Effects of Growth Management Planning in Lee County, Florida

Year	Single-Family Home Price	Change in Price from Base Year	Price Change Due to	
			Plan Adoption	Plan Implementation
1988: Base year	$74,485	—	—	—
1989: Year of plan adoption	$78,503	$4,018	$1,219	—
1990: One year of plan implementation	$81,903	$7,418	$1,219	$1,002
1995: Six years of plan implementation	$91,440	$16,955	$1,219	$6,012

NOTE: Change in price from 1988–1995 was $16,995. Of this, $7,231 was attributable to growth management. Therefore, growth management accounted for 42.54 percent of the price change.

median sale price increased by $16,955. Of this increase, $7,231 (or about 42.5 percent) was attributable to growth management. Thus, the price effects from growth management are fairly significant.

Discussion

This research finds that Florida's GMA, despite its lack of numerical growth limits and promotion of planning for affordable housing, did have an inflationary effect on single-family housing prices. This finding is not compromised by randomly chosen time points (as in cross-sectional studies), by the problems of inappropriate controls, or by ignoring alternate hypotheses.

A good part of the price increase is consumer willingness to pay higher prices for amenity effects and anticipated amenity effects from growth management. That said, higher prices for single-family homes result in several dis-benefits. For renter households, these include reduced homeownership opportunities, higher rents, and fewer location choices. For homeowners, the dis-benefits include reduced housing mobility. Among renters and owners these negative effects are felt more by low- and moderate-income populations, who are also more likely to be persons of color (Nelson et al., 2002). For families facing higher housing costs, the benefits of a better environment (resulting from growth management) may not be enough to offset the dis-benefits of unaffordable housing.

Policy Implications of the Findings

The GMA did not set out to raise housing prices; this is an unintended but anticipated consequence. The GMA's framers had sought to alleviate possible inflationary effects by encouraging production of affordable housing. The findings here suggest that Florida's affordable housing production policies have thus far failed to meet the additional demands placed on them by the GMA's price inflationary effects.

If the problem of higher housing prices is not addressed, support for growth management might decline. Bernstein (1955) argued that regulatory policies (such as Florida's growth management legislation) inevitably experience a "cycle of decay" that reduces their effectiveness. Presenting evidence from environmental policies, Sabatier (1975) contended that such decay could be forestalled by sustained, broad-based, and well-organized support for the policies. High housing prices may not allow for such support to form for the GMA, prove to be its Achilles heel, and lead to its repeal. The GMA's price-escalating effects account for about half (or less) of the total price increase (see Lee County home values earlier). However, detractors of growth management, in arguing for GMA's repeal, blame the GMA for *all* housing-price increases. The findings here show such claims to be incorrect. Nonetheless, to sustain the

GMA, and reap all environmental and other benefits that could result from its continued implementation, state and local governments need to strengthen existing housing programs—and institute new ones. Together, these efforts could help offset supply-side price escalations from the GMA.

Reducing Scarcity Effects. Since the GMA sought to decrease urban sprawl and encourage compact urban development, it probably did reduce the supply of new land for urbanization. Higher development densities have helped alleviate some of the inflationary-price effects from growth management in Portland, Oregon (Nelson et al., 2002). To encourage development at higher densities, Portland incorporated minimum density—rather than maximum density—rules in its zoning ordinance. State and local governments in Florida can do likewise and help reduce price inflation from scarcity effects in new developments.

Reducing Production Cost Effects. Recognizing the time costs of complying with regulations, a few Florida counties set up expedited permitting programs in the late 1990s. These may help decrease the inflationary effect from higher production costs. Impact fees—another production cost—represent fiscal prudence by local governments and are desirable. But if these fees are charged on a per-unit basis (irrespective of the size of the unit) they may be regressive (Nicholas, 1992), with higher price effects on smaller housing units. Most impact fee programs in Florida use a per-unit fee structure (Legislative Committee on Inter-Governmental Relations, 1997) and perhaps need revision.

Keeping Markets Competitive. Counties may advance loans to small- and medium-sized developers to help pay for impact fee charges that are loaded at the front end of projects. These developers usually lack finances to pay impact fees before their projects generate cash inflows. For them, such loan programs may spell the difference between staying in and leaving the market or industry. Keeping them in the market may help reduce the inflationary effects of less competitive markets.

Increasing Affordable Housing Production. With the William E. Sadowski Affordable Housing Act of 1992, Florida created an affordable housing trust fund that has provided over $800 million for state and local affordable housing programs since its inception. The moneys for this trust fund come from an 11-cent tax on property title transfers. Increasing this amount could provide more money for affordable housing production. Simultaneously, local governments could institute linkage programs (such as San Francisco's jobs-housing linkage program in effect since 1981) that require developers to pay for affordable housing construction, and inclusionary housing

programs that provide incentives to developers to build and sell a certain proportion of units in housing developments at prices affordable to low- and moderate-income families.

Further Research

This research does not shed light on the relative weights of the three different types of supply-side effects, that is, scarcity, less competitive market, and higher production cost effects. Future research should also examine GMA-mandated planning's effects on housing-cost burdens of single-family homeowners, on the demands and prices of other types of ownership housing (such as condominiums and mobile homes), and on rents.

Conclusion

Florida's natural endowments are many and varied. When marketing Florida property in the 1950s, real estate companies often encouraged potential customers to "buy a piece of Paradise," which many did. Over four decades, fueled by increases in population and median income, a piece of Paradise has become more expensive. Since the late 1980s the GMA has, as this research finds, made it even more so. However, the price escalation was caused by both supply and demand factors related to the GMA. To some extent, demand-led price escalation is a testimony to the anticipated and achieved benefits from growth management planning. On the other hand, supply-side price-escalating effects need immediate, well-targeted policy responses. These could take at least two paths: one, to modify a few of the GMA's growth regulating measures to minimize their housing-price effects, and the other, to expand and provide more support for programs that produce affordable housing. Finally, policymakers in other states with growth management laws similar to Florida's can use the findings here to assess price-inflationary effects from their regulations and initiate ameliorative measures. Understanding the nature and scale of housing-price effects of growth legislation can help minimize negative externalities from such legislation and increase benefits from it to regulated communities.

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