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Affordable Housing and Urban Sprawl Policy Choices in York County, Maine: A System Dynamics Approach

John Voyer

School of Business
University of Southern Maine
96 Falmouth Street, Box 9300
Portland, ME 04104-9300

207-780-4597 phone / 207-780-4662 fax
voyer@usm.maine.edu

Abstract

York County, Maine, is filled with typical New England home rule towns (they have high control over local decisions). It is experiencing a lack of affordable housing and too much urban sprawl. After a thorough examination of the situation in a typical York County town, including a causal loop diagram based on interviews with knowledgeable informants, a system dynamics model is used to test five possible policies for the town: the status quo (large house lots and modest construction levels), smaller house lots, a cap on construction, increased construction, and smaller house lots and increased construction. The policy testing shows that the “status quo” is not a terrible policy, that the “smaller lots” has some things to recommend it, but that the combination of smaller lots and increased construction gives the best mix of outcomes—better housing affordability and less urban sprawl. Implications for policy and future modeling are discussed.

Keywords: Affordable housing; urban sprawl; Maine; municipal public policy

INTRODUCTION

Founded in 1636, York County in Maine is one of the oldest counties in the United States (York County, Maine 2004). It is located in extreme southwestern Maine in a coastal region bordered by New Hampshire to the west and southwest, the Atlantic Ocean to the east, and the Ossipee and Saco rivers to the north (Encyclopaedia Britannica 2004; see map in Figure 1). Its southernmost town, Kittery, is approximately 60 miles (96 kilometers) north of Boston, Massachusetts. The county has a land area of 991 square miles (2567 square kilometers), its estimated population in 2001 was 192,700, and its rate of home ownership in 2000 was 72.6% (U.S. Census Bureau 2004c). York County’s estimated median household income in 2000 was \$46,081, ranking it first among Maine’s counties (U.S. Census Bureau 2004a) and well above the estimated state median of \$37,589, and even above the U.S. estimated median of \$41,990 (U.S. Census Bureau 2004b).

By many measures York County appears to be affluent and relatively problem-free. However, there is a lurking problem—lack of affordable housing. “In the summer of 2002 the National Association of Homebuilders proclaimed the Portsmouth-Kittery [New Hampshire]

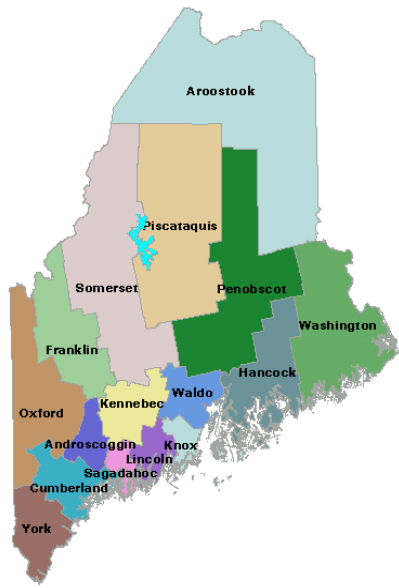


Figure 1 Map of Maine's Counties

(Note York Country at lower left)
 Source:
<http://www.state.me.us/sos/kids/government/counties.htm>

area—which includes Berwick, Eliot, Kittery, South Berwick, and York [in York County, Maine]—as one of the ten least affordable regions in the country—and the only one in the top ten outside of California” (Maine State Housing Authority 2002, p. 12). In 2003, Maine ranked 9th in the United States in the rate of house price appreciation, and York County, with its proximity to Boston, no doubt was responsible for much of that ranking (Office of Federal Housing Enterprise Oversight 2003, p. 9). Related to the affordability problem is one of “sprawl,” or housing development that is perceived to be excessive. This is related because the high price of houses leads prospective homeowners to build further and further out from existing development. In 1940, York County was more than half rural. By 2000, the entire county was either suburban/urban or “emerging suburb” (Maine State Planning Office 2004).

The state of Maine has had an affordable housing statute on its books since 1989. In addition, a statute passed that same year requires each town or city in Maine to prepare a Comprehensive Land Use Plan, one of whose provisions requires that least ten percent of “new residential development” over any given five-year period be affordable housing. A provision added in to that statute in 2001 is intended to prevent urban sprawl. Unlike most other regions of the United States, counties in New England states like Maine provide a limited number of services—typically sheriff’s departments (a sort of “county police”), courts and jails (Richert 2003). Typically, implementation of affordable housing and growth management policies, which appear to have been ineffective in York County, is left to municipal governments.

Of the 29 municipalities in York County, only two are cities that have city councils, city managers and mayors. The rest are towns, which make major policy decisions using annual town meetings, where all eligible voters turn out to decide ballot questions on the spot. In between these town meetings, elected townspeople called selectmen gather to make decisions, which are then implemented by town managers and their staffs. Policy decisions about housing are made by town meetings, but the opinions of selectmen carry weight. Evidence shows that two typical policies carried out by towns in York County were caps on housing permits and large house lots (O’Hara 1997). We will see that these policies have significant implications both for affordability of housing and growth management (or mismanagement).

RESEARCH OBJECTIVES AND METHODS

In early 2003, a non-profit group called York County Affordable Housing asked for a system dynamics model to study the affordable housing problem in the county. The aim was for the model to be used by Boards of Selectmen in the various towns in York County, to help them get a better feel for the consequences of their policy decisions. The model discussed in the present paper was the result of that request. The purpose of the model is to see if there are any

policies that can be followed by York County towns that might ameliorate the affordable housing situation.

Three experts in York County's housing situation made themselves available for interviewing. One was the Executive Director of York County Affordable Housing, one was a top staff member from another non-profit that was directly involved in providing affordable housing to towns in the county, and one was a county-based banker familiar with lending to agencies involved in providing affordable housing. Using their expertise and available data from the state and county, these informants provided reference modes (discussed in the following subsection) that highlighted the problems mentioned earlier.

Income and median house price reference modes are based on full county data. The population reference mode is based on an "average town" in York County. Because the purpose of the model was to assist selectmen in individual towns, it too is based on an average town. The interviewees also developed a causal loop diagram, which will be discussed in the results section later. Lastly, a system dynamics model was developed and was used for policy testing. Because of time constraints, the model examines only single-family housing in the typical town; modeling of rental units will come in the future. This is not a serious deficiency, however, since in 1999 and 2000 Maine ranked *last* among the fifty states and the District of Columbia in the rate of multifamily construction (O'Hara 2001, p. 8). While this is undoubtedly part of York County's problem, and perhaps part of the solution, its investigation must await future modeling.

Reference Modes

Figure 2 shows the reference modes for population, income and median house price. Town population and median income both tracked in a moderate upward trend during the period from 1989 to 2002. Median house price, by contrast, reflected the volatility typical of housing markets, dipping severely from 1990 to 1992, dipping moderately from 1992 to 1995, rising moderately from 1995 to 1999, and finally ending the period by rising significantly from 1999 to 2002. Figure 3 shows the county's "affordability index"—the ratio of median income to the income needed to live in affordable housing. Affordability in the county rose steadily from 1989 to 1994, and then declined steadily from 1994 to 2002, with the decline appearing to accelerate near the end of the period. It was this lengthy and sharpening decline in affordability that led to the modeling request from York County Affordable Housing.

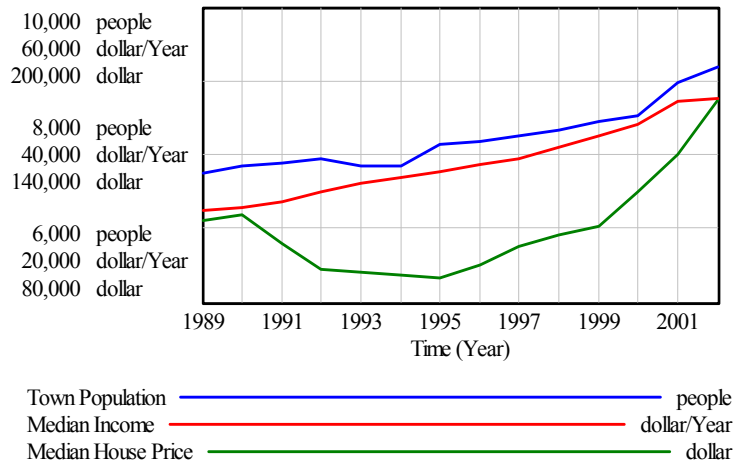


Figure 2 Reference Modes for Town Population, Median Income and Median House Price

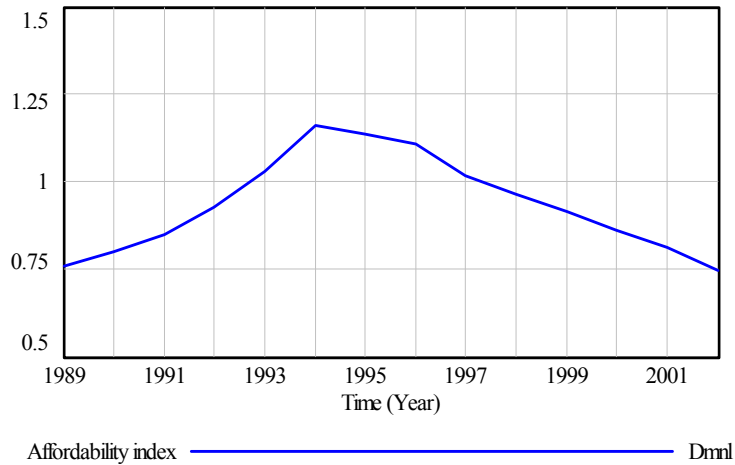


Figure 3 Reference Mode for Affordability Index

RESULTS

Causal Loop Diagram

The causal loop diagram obtained from the clients was extensive, and not all of it was modeled. The part that was modeled is shown in Figure 4. (The parts not modeled dealt with town budgets and the effects of affordable housing on town schools. These portions of the causal loop diagram await future modeling.) The diagram has two balancing loops and one reinforcing loop.

Balancing loop B1, “Price brake on in-migration,” says that as the median price of a house rises, migration into the town will decline, reducing the number of households and the occupancy rate, which reduces demand and therefore the median house price. This loop shows how people balance demand with supply by “voting with their feet.” If housing prices are too high in a town, people will not move into that town, demand will drop, and ultimately its house prices will stabilize.

Balancing loop B2, “Market meets housing need,” is the flip side of loop B1. As house prices rise, contractors are encouraged to construct more house units. Ultimately, this reduces the occupancy rate, and prices stabilize. This loop shows how contractors balance supply with demand by entering a town’s market with new construction. As with any market, all this entry will eventually decline as prices stabilize and the motivation to enter diminishes.

If the two balancing loops in this diagram are classic examples of microeconomic behavior, the reinforcing loop R1, “Out-migration leads to crowding,” is perhaps an example of the deleterious effects of situations like the one in which the typical York County town finds itself. This loops says that as prices rise, people do not migrate into the town. This stabilizes the number of households, dampening demand and discouraging house construction. This leads to a higher occupancy rate with its concomitant higher prices, further population stagnation, and so forth. This obviously contributes to less-affordable housing, but it might be added that a side effect of this does not directly affect the town, but certainly affects the county: people migrate to, and houses are built in, towns that are further on the periphery of the county’s developed area, leading to greater overall sprawl.

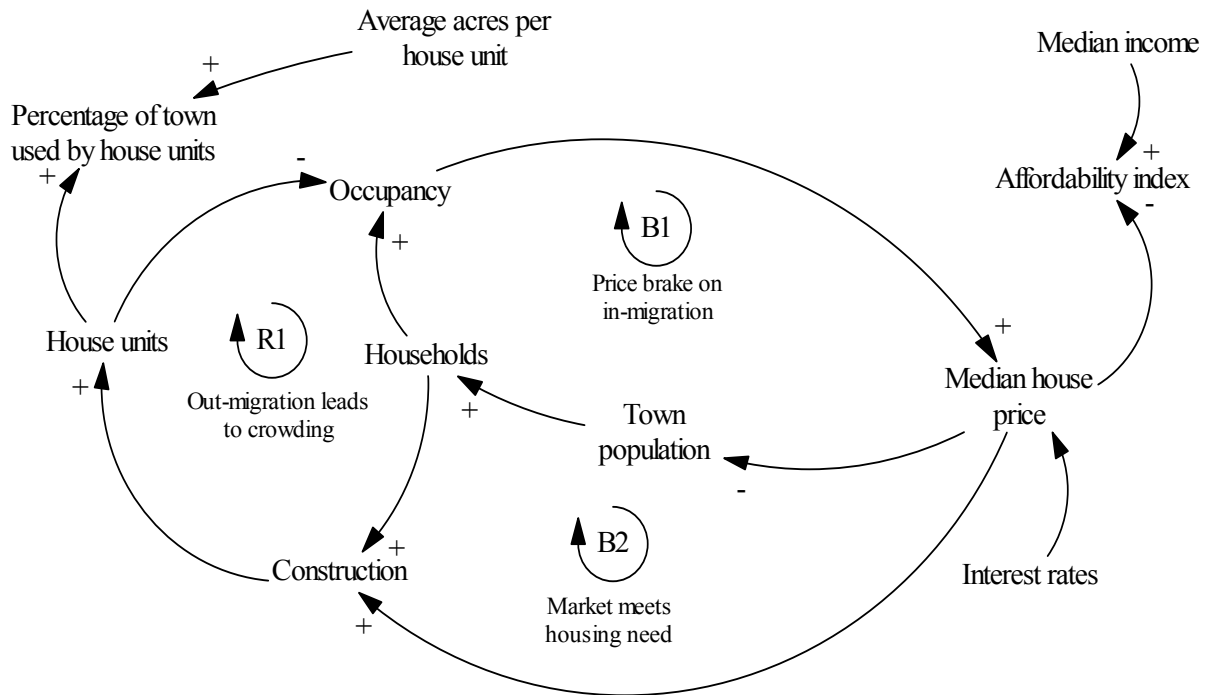


Figure 4 York County Causal Loop Diagram

Policy-Testing Results from Model

Using this causal loop diagram and relevant data, a 114-equation system dynamics model was created. The model was calibrated to data, and as shown in figures 5 through 9, it produced values that were reasonably close to the actual data for median income, population, houses, households and occupancy for the years 1989 to 2002.

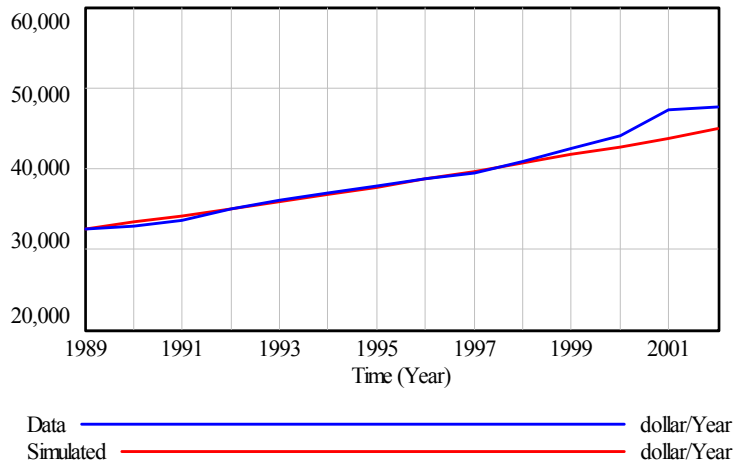


Figure 5 Comparison of Actual to Simulated Median Income

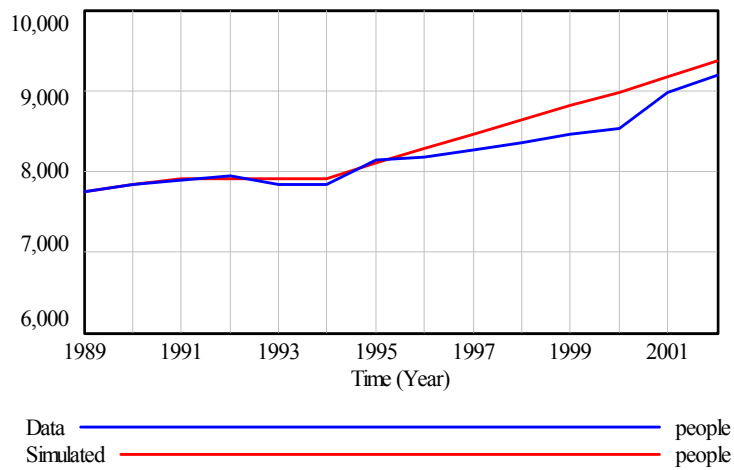


Figure 6 Comparison of Actual to Simulated Town Population

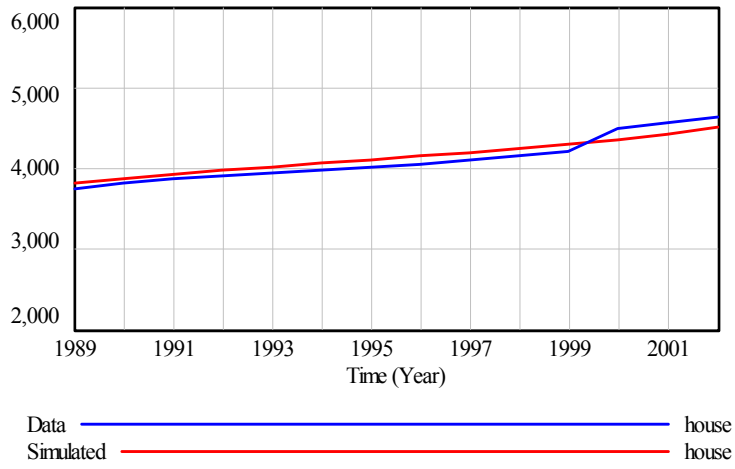


Figure 7 Comparison of Actual to Simulated House Units

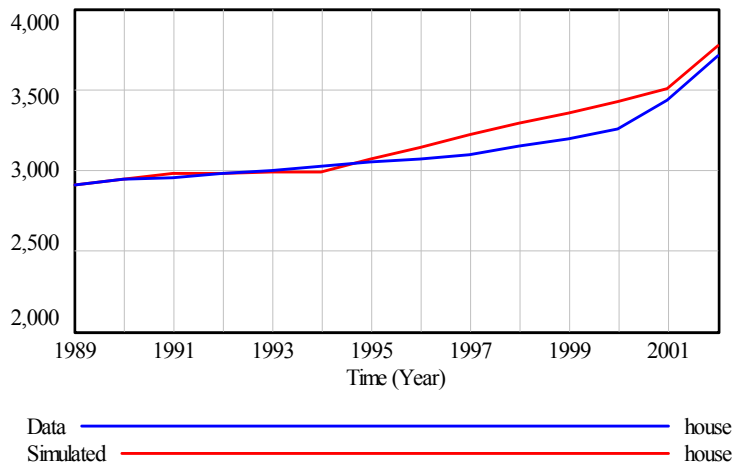


Figure 8 Comparison of Actual to Simulated Households

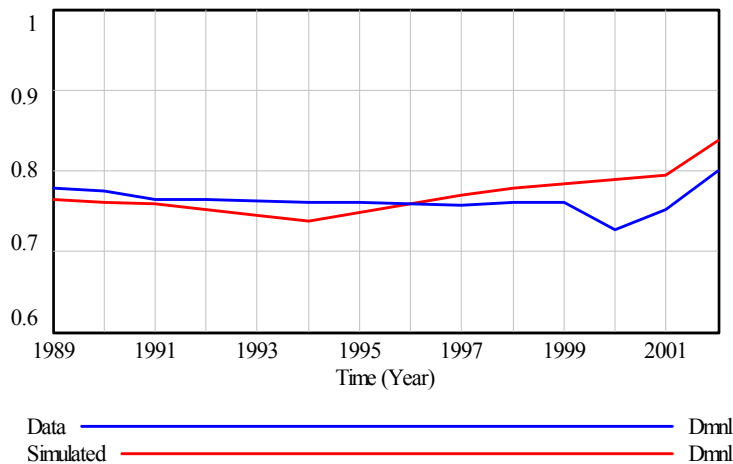


Figure 9 Comparison of Actual to Simulated Occupancy

The model was then used to test the effects of five policies, each of which would be started in 2005 and run to 2013:

1. **The status quo.** This policy keeps the house lots at 2 acres (.8 hectares) and maintains construction at 50 houses per year.
2. **Smaller lots.** This maintains construction at 50 houses per year, but allows lots as small as .5 acre (.2 hectares).
3. **Construction cap.** This keeps house lots at 2 acres but cuts allowable construction to 25 houses per year.
4. **Increased construction.** This keeps house lots at 2 acres but allows construction to rise to 75 houses per year.
5. **Smaller lots and increased construction.** This policy reduces the lot size to .5 acres and increases construction to 75 houses per year.

Results of these policy tests are shown in Figures 10, 11 and 12. Figure 10 shows the effects of all five policies on sprawl. Figures 11 and 12 show the effects for median house price and affordability, respectively. (The “status quo” and “smaller lots” policies are combined in the two figures, as are the “increased construction” and “smaller lots and increased construction” policies, since their effects on median house price and affordability are similar. Only the “construction cap” policy is unique in its effect on price and affordability.)

Status quo. This policy results in a mix of good and bad outcomes. One good outcome is shown in Figure 11, which shows how this policy results in a lower median house price. Figure 12 shows a similar good outcome for affordability, which improves from about .6 to about 1.9. However, these are offset by the bad outcome shown in Figure 10, which shows that the status quo policy results in more sprawl, with over 47% of the town covered by house units.

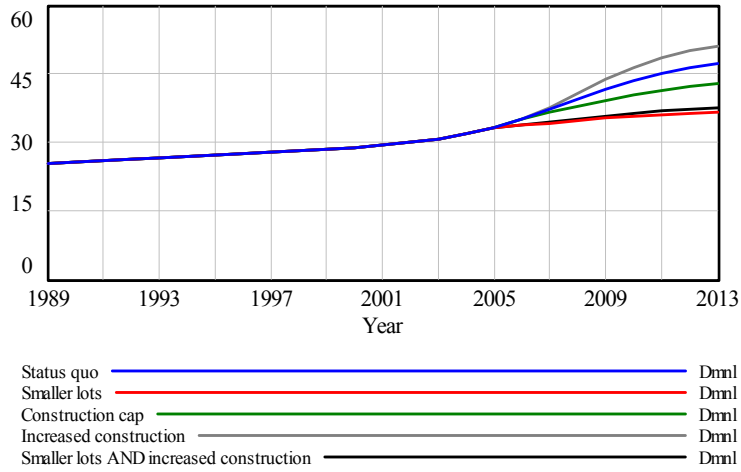


Figure 10 Percentage of Town Covered by House Lots Under Various Policies

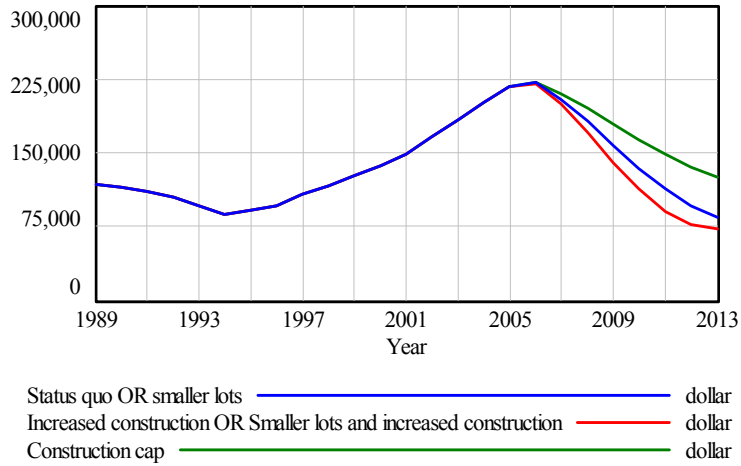


Figure 11 Median House Price Under Various Policies

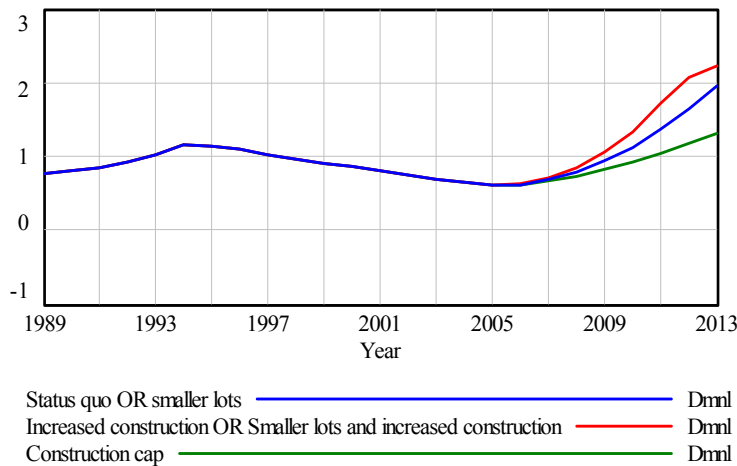


Figure 12 Affordability Index Under Various Policies

Smaller lots. Figure 10 shows one good outcome from this policy—less sprawl, the least of all the policies tested. The results for median house price (Figure 11) and affordability (Figure 12) are identical for those of the “status quo” policy. So this policy has some merit—it raises affordability and reduces sprawl. Implementing this policy would be similar to the many “cluster housing” policy suggestions that have been made in recent years (e.g., O’Hara 1997).

Construction cap. By limiting the number of house units constructed in a town, this policy definitely reduces sprawl, actually more so than the “status quo” or “increased construction” policies (Figure 10). Unfortunately, as Figures 11 and 12 show this policy has the least favorable effect on median house price and affordability index. The very thing that helps with the sprawl problem—a limit on the number of houses—produces a shortage of supply that raises prices. This very common policy is really not a very good one from the standpoint of affordability.

Increased construction. It is probably not surprising that this policy has the second-worst effect on sprawl (Figure 10), since it would entail a higher number of large-lot house units.

The upside of the policy is that its increase in housing supply results in lower prices (Figure 11) and a better affordability index (Figure 12). This may be similar to what happens in York County towns that are on the periphery of the developed area. They get a surge of construction because they have relatively low prices, but doing so contributes to sprawl. This policy is helpful from the standpoint of affordability, but is probably not a truly viable policy because of its effect on sprawl.

Smaller lots and increased construction. This policy moderates sprawl, but not quite as much as the “smaller lots” policy alone (Figure 10), since it results in more house units being constructed. It is as effective as the “increased construction” policy at reducing the median price (Figure 11) and improving the affordability index (Figure 12). This policy seems optimal, in that it achieves both policy objectives—it reduces price (by increasing the supply of housing) and it manages sprawl the most effectively (by having the increased construction be on smaller lots).

DISCUSSION AND CONCLUSION

The present paper illustrates one thing for sure—if York County, Maine, is to solve the twin problems of lack of affordable housing and sprawl, Boards of Selectmen in its towns must abandon their traditional policies, which typically feature large lot sizes and occasional construction caps. The caps can alleviate sprawl, and perhaps reduce pressure on town services, but at the cost of a lower amount of affordable housing. Increased construction can help the affordable housing problem, but the large lot sizes exacerbate sprawl. While it is beyond the scope of the model used in the present paper, there is reason to believe that caps also exacerbate sprawl regionally, when the resulting high house prices encourage prospective homeowners to build in neighboring towns. What is needed is a two-pronged policy of increased construction and smaller lots.

One objection that is frequently voiced by Boards of Selectmen is that increased construction will lead to excessive population in the town. But Figure 13 shows that the policy recommended here would, when compared to the “status quo” policy, increase the town’s population by only about 60 households or approximately 150 residents. Another frequent objection is that houses on smaller lots will decrease property values. But there is evidence that even attached apartments can support house prices (Nelson and Bell 2003, p. 6), so it seems unlikely that well-planned subdivisions of small-lot houses would be detrimental. As Nelson and Bell (2003) argue, well-planned affordable housing can increase a town’s housing choices and make its housing more desirable, and may even increase the pool of buyers for more expensive housing.

Another lesson of the present paper’s analysis is that York County, and indeed perhaps the entire state of Maine, needs to take a more regional approach to these problems. Unfortunately, this will be difficult to implement, since Maine has a very strong “home rule” ethic (Richert 2003) and a centuries-long tradition of local control (Bouchard 2003). (Home rule is the term for the state allowing the towns to have a high amount of control over local policy decisions.) That is, even when there are deleterious effects, Maine’s people and their politicians tend to prefer decisions made within small jurisdictions. As Richert puts it:

[The New England town’s] belief that home rule is not merely a principle of governance but the armor that keeps the external forces of change at bay is unshaken by the realities around them. Home rule in today’s small political jurisdictions packs plenty of political power but, with respect to the regional forces washing over towns, it is an illusion. (Richert 2003, pp. 2-3.)

As an example, a special state task force published a report in 2000 that called for changes in Maine statutes to compel smaller lot sizes in certain circumstances (Maine Task Force to Study Growth Management 2000). The recommendation has yet to be adopted. The point is that Boards of Selectmen in York County do have some things under their control. They *can* allow more construction in their towns, with smaller lot sizes. If selectmen can overcome their natural political inclination to view problems like affordable housing and sprawl as someone else’s, this policy will help solve these problems, both in the town itself and for the entire county. In that sense, the present paper provides support for policy making at the town level.

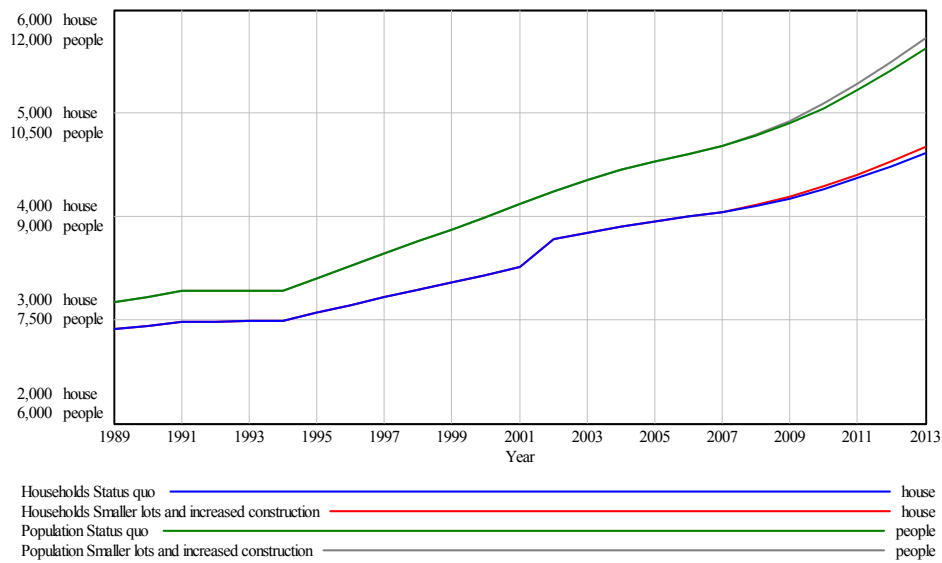


Figure 13 Households and Population Under “Status Quo” and “Smaller Lots and Increased Construction” Policies

Further research based on this model could also yield useful results. One useful extension would be modeling of multi-family housing units, which, even though they make up less than 30% of York County’s housing, play an important role in affordable housing. Examination of this housing segment would be particularly informative given Maine’s position at the bottom of the ranks of states constructing multi-family housing. Another useful line of future research would be to become more fine-grained in the examination of *types* of house units in the typical York County town, along the lines of what Forrester did in his Urban Dynamics model (Forrester 1969).

Even without these potential refinements, the model in its present state shows that towns in York County, Maine, do have some policy choices at their disposal. In particular, it shows that smaller lot sizes coupled with increased construction would have minimal negative effects on sprawl and quite positive effects on the amount of affordable housing. It will be interesting to see what effect the insights generated from this model will have on Boards of Selectmen in the county.

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