Brendan O'Flaherty

Commentary

Edward Glaeser and Joseph Gyourko present a good paper, but the paper is not what it claims to be, at least for lay readers who do not interpret words literally. For most people, "affordable housing" has something to do with housing for the poor. This conference, according to the program, aimed to "explore . . . strategies easing the housing problems of low- and moderate-income families." This connection very likely takes liberties with the English language, but the connection has been made, and it makes good sense to respect it.

Therefore, arguments for affordable housing policies ought to show either that poor people would be better off as they perceive it, or that the poor would be better off according to some metric not tied to desire/satisfaction. (Thus, housing policies for poor people are targeted not only at high supply prices or at poverty, but also at intrahousehold or inter-household externalities—just as homeowner tax preferences are.) Although Glaeser and Gyourko acknowledge that such a link probably can be made—a contention that I think is plausible—they do not make it, and so they leave the paper incomplete as an affordable housing paper as the term is commonly (and probably mis-) understood.

The paper's real interest lies in the finding that in some cities, land is very expensive—more expensive than people appear willing to pay for it. This finding makes Glaeser and Gyourko's study important in that it is likely to spur a great deal of further research.

Basically, Glaeser and Gyourko fit an hedonic equation:

$$P = \alpha S + \beta L ,$$

where S represents structure and L land. The authors find that $\alpha > c$, the known construction cost of structure in some metropolitan areas. They conclude that zoning is holding up the price of land, and provide evidence that zoning is more restrictive in areas where the difference is greatest.

The step from $\alpha > c$ to "zoning is the problem" is a very big one. There is an instructive analogy in the study of household economics. Different methods (for example, replacement versus opportunity cost) produce radically different estimates of the hourly value of time devoted to household work. But that does not imply that a government policy, perverse or not, is causing the discrepancy. I think the consensus now is that the theories that imply no discrepancy are the ones that are wrong, even in the absence of government intervention. Similarly, we should look further at why the combination of Glaeser and Gyourko's statistical methods and accepted urban economics theory fails to work before concluding that government policies are the only possible explanation. (The correlation—absent regional dummies—between high estimated land prices and restrictive zoning, although suggestive, is certainly not definitive. Jewelry stores with more expensive wares spend more on security, but we do not think that the security expenditures are driving the value of the jewelry.)

Brendan O'Flaherty is an associate professor of economics at Columbia University.

Thus, we can look at two kinds of possible alternatives to the zoning conclusion—statistical and theoretical.

1. Statistical Alternatives

When examining this type of alternative, there might be omitted variable errors, collinearity problems, or measurement issues. To consider omitted variable errors, suppose that the true model is

$$P = \alpha S + \beta L + \gamma b,$$

where b represents some other attribute, such as proximity to a train station or a school, or a scenic view. Neoclassical theory would lead us to think that the covariance between S and b would be positive and that the covariance between L and b would be negative. Both of these covariances imply that α should be too big and that β should be too small. The Glaeser and Gyourko regressions have very poor measures of amenities and location.

In a note to their paper, Glaeser and Gyourko speculate that covariances might very well go in the opposite direction—that neoclassical urban theory might be wrong. This adds to the possibilities for new theories.

Collinearity problems could arise if land and structure, or aspects of structure, were correlated. This is not unlikely, since the aspects of structure that the authors measure include the presence of a garage and the number of rooms. I will give a not terribly implausible example below that shows how this collinearity can lead to serious underestimates of β.

Finally, the estimation procedure relies on construction costs and depreciation being the same in all metropolitan areas. There are several reasons why construction costs can differ, aside from differences in construction laws and regulations. Weather is one: colder climates entail more insulation, more solid windows and doors, and greater interest and scheduling costs due to winter delays. Notice that this supply interpretation works in the opposite direction from the demand-side January temperature used by Glaeser and Gyourko to measure amenities. Labor is another source of variation: because wages vary between metropolitan areas and wages are a substantial part of building costs, the cost of building identical structures will vary between metropolitan areas. Other inputs, such as electricity, also vary in price.

Depreciation is also likely to vary, because the rate at which houses depreciate depends on economic decisions about maintenance, repair, and home improvement. Demand shocks that make housing in certain metropolitan areas more expensive may be correlated with greater home maintenance and home improvement expenditures. A thirty-five-year-old Cape Cod with 1,700 square feet in New York may, on average, be a very different house in ways unobservable to the econometrician in a similar house in Dallas.

2. Theoretical Alternatives

The basic premise of the Glaeser and Gyourko paper is that if you know the square footage of a lot, the price per square foot of land, and the construction costs of the structure, you know everything you need to find the price that would prevail in a market without zoning. This idea is probably wrong, although Glaeser and Gyourko are probably correct in interpreting this premise as an implication of standard urban economics. There are several reasons for this.

First, all relevant costs of a house are not incurred on the lot. The costs of roads, sewers, gas and electric, telephones, cable, and other infrastructure are quite hefty relative to the costs of a private structure—roads are going to account for at least 20 percent of land in a new development, and the materials used in them are not cheap. In equilibrium, the (marginal) cost of new developments is going to be the replacement cost of existing houses, so the price of installed infrastructure is going to be part of the price of land—even without zoning. On the other side, some part of the capitalized value of property taxes is going to be subtracted from a house's value. Infrastructure pricing practices, like taxes, may vary between metropolitan areas. Combined with the uncertainty about structure costs introduced by variations in construction costs and depreciation, these add up to a hefty uncertainty about the value of land.

Second, lumpiness and selection present problems. There are serious increasing returns to scale in housing, for example, from the 2/3 rule, the sharing of utility connections, and the sharing of furniture. The restriction to single-family detached houses further reduces the possibilities for using very small pieces of land. This means that small pieces of unused land are not going to be very valuable.

Consider a simple example. Suppose land is only one dimension, you are a profit-maximizing developer without any zoning constraints, and the marginal product of a plot of land of size x is $x - x^2$. Assume you are working with a plot of land of size z. If $z = 3/4$, or any multiple, you will build one house (or

the multiple), and the usual optimizing condition of marginal equals average will hold. But if z is not a multiple of 3/4, marginal will not equal average at the optimum. Let $D(z)$ = average profit minus marginal profit, assuming optimal-sized lots. Then for $z < 1$,

$$D(z) = z\,(2/3\,z - 1/2),$$

which rises to 1/6 at $z = 1$. In general, $D(z)$ goes up and down, crossing zero at 3/4 n for every n, and decreasing in amplitude as n increases. But for small n—the likely condition for small developers with physical constraints and existing buildings around them—marginal is likely to be very different from average. It could be bigger or it could be smaller. The hedonic equation measures at best the marginal value of land, while the construction-cost measures back out the average.

Third, land is not a quantity. I am not indifferent between my 5,000 contiguous rectangular square feet of New Jersey and 720,000 randomly chosen square inches spread across the face of the earth.

One distinction that matters is frontage versus depth (assuming that plots are roughly rectangular, which is endogenous). Frontage is more costly to construct and is probably more valuable because it sets the minimum distance to neighbors. Depth is less valuable. Land area is the product of the two, and there is probably more variation in depth than in frontage. If that is the case, the hedonic is picking up the less valuable dimension.

To see how this can be compounded by collinearity, suppose a community has two kinds of houses—those with garages and those without. Houses with garages are on lots with greater frontage, otherwise all structures are identical. Frontage is much more valuable than depth. All houses of each type have the exact same frontage, but depth varies randomly. An hedonic regression with the presence of garages and the square footage of the lot would conclude that land was valueless, or close to it, no matter what it was really worth. The value of frontage would show up in the coefficient on garages.

Land also varies in topography and physical characteristics. Some land is just lousy to build on or live on (due, for instance, to the presence of rock outcroppings, steep slopes, or bad swamps). People who want land for less valuable purposes (privacy rather than construction) are likely to end up holding such land. Differences in lot size within a community therefore are also likely to reflect differences in bad rather than good land. This is similar to the frontage scenario.

Fourth, with two dimensions and physical obstacles, the optimal subdivision problem becomes very difficult. In operations-research terms, it is a suitcase problem. One interesting result of these difficult problems is that "greedy algorithms"—the sort of myopic hill-climbing you could expect from a bunch of independent developers—usually do not produce optimality. So it is not clear that in the absence of zoning, optimal subdivisions would occur. Without optimal subdivisions, there is no chance that marginal cost will equal average cost even with regard to a large problem.

Finally, even if neighborhoods were constructed originally with marginal cost equal to average cost of land on every lot, they would not stay that way for long. Unanticipated shocks would destroy this equality and change optimal density. Of all the ways to increase density in an existing neighborhood, increasing the number of single-family homes on existing single-family land is the most drastic and the most expensive. To make small changes, you have to move all of the existing houses. This is not easy: the arrangement of houses and lots in a neighborhood is not likely to change much unless everything is torn down. Thus, the equality of marginal and average cost of land upon which the Glaeser and Gyourko paper is based will not be observed very often in neighborhoods more than a few years old, even in the best of all possible cases.

3. Summary

Glaeser and Gyourko are probably correct in observing that excessive zoning in certain jurisdictions makes life worse for poor people who do not live there. In that regard, their paper did not dramatically change my view. The paper's actual contribution is much more novel and much more fundamental: the authors have raised very deep questions about how urban economists think about land and land markets. It will probably be a long time before these questions are answered properly.