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**Article**

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NBER Reporter Online

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National Bureau of Economic Research (NBER), Cambridge, Mass.

*Suggested Citation:* Gyourko, Joseph (2009) : The supply side of housing markets, NBER Reporter Online, National Bureau of Economic Research (NBER), Cambridge, MA, Iss. 2, pp. 10-12

This Version is available at:

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# The Supply Side of Housing Markets

Joseph Gyourko\*

For a long time there has been an imbalance in what we know about housing markets—we understand much more about housing demand than housing supply. This has been driven in part by policy interests, although data availability also has played a role. Fortunately, this knowledge gap has begun to narrow in recent years, allowing for a much better understanding of housing markets in general. Given the importance of housing in the economy, and the recent dramatic swings in home prices, better insights into the residential market are very helpful, both to policymakers and to households.

Economists understand that supply, not just demand, is critical to understanding housing markets. High prices always reflect the intersection of strong demand and limited supply. If demand in a market is weak, then prices cannot be high, no matter what the supply. And, if supply is unrestricted, then prices cannot be much higher than production costs, no matter what the demand. In practice, the strong negative correlation between housing permits and the level of house prices across markets makes clear that supply-side conditions matter.<sup>1</sup> The highest price markets tend to have the least permitting. If demand alone differed across markets, then we would expect to see abundant new construction in the costly markets. We do not, and the most intense new construction occurs in lower priced markets, indicating that supply conditions vary across markets. In particular,

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supply appears to be restricted in many high price metropolitan areas.

Prices have escalated relative to production costs in various markets over time, with the temporal and spatial patterns roughly as follows: in 1970, there was no metropolitan area (including New York City and San Francisco) in the United States in which average house prices exceeded fundamental production costs by more than 20 percent. Fundamental production costs are defined as the sum of the physical costs of construction for a basic, modest quality home, plus a 20 percent land share, plus a 17 percent gross profit margin on structure and land costs for the builder (which is typical over the cycle). By the 1980 census, mean house prices had become much higher than production costs in the major metropolitan areas along the coast of California. A similar phenomenon occurred during the 1980s in many east coast markets running from Washington, D.C. to Boston. The 1990s saw the expansion of this pattern to a very few interior markets, such as Austin and Denver. Even so, average house prices are still quite close to fundamental production costs in most metropolitan areas.<sup>2</sup>

## Local Regulation and the “Zoning Tax”

Local building regulations and zoning codes could explain at least part of this pattern. Essentially, local regulation acts as a “zoning tax”—raising the price of housing above what it would be in the absence of supply restrictions.<sup>3</sup> The research approach to gauging the size of the zoning tax has been to estimate the marginal cost of producing a home and then compare

that cost with the actual market value of the house. More specifically, standard neoclassical economics indicates that the price that households are willing to pay for an extra square foot of lot size (the intensive margin) should equal the price of land underlying existing homes (the extensive margin). If this were not the case, and homeowners did not value the land on their plots very much, then they could subdivide and sell off part of their plot to someone else.

Our calculations suggest that effective zoning tax rates are quite high in many coastal markets, sometimes reaching over 50 percent, because actual market prices far exceed the hedonic estimates of the value of an extra square foot of land.<sup>4</sup> However, the same analysis indicates that in most markets the zoning tax is minimal, which is consistent with elastic housing supplies in many interior markets. If new supply is forthcoming in sufficient magnitude to readily satisfy new demand, then local regulation does not really bind, and prices cannot be influenced much by whatever rules are on the books.

While the qualitative nature of those results probably accords with the priors of most economists, it turns out to be very difficult to precisely measure the impact of local regulation on prices. For one thing, the increasing complexity of the local regulatory environment makes accurate measurement difficult. Another key constraint is that accurate comparison requires knowledge of land prices. More specifically, one needs to be able to compare the “free market” price of land with existing values. The problem is that there are virtually no observed trades of residential land parcels.<sup>5</sup>

There are various estimation strategies to deal with this latter issue, but another option is to study a market in which no additional land is required to produce an extra housing unit. Edward Glaeser, Raven Saks, and I did just that in our analysis of the condominium market in Manhattan.<sup>6</sup> For single family homes, new production necessarily includes costs associated with acquiring and preparing the land on which the marginal home sits. In the case of multifamily structures, land and other site preparation costs often do not increase much, if at all, with small increases in the size of the building. The marginal cost of building up is accurately measured by the physical construction costs of an extra floor, because no new land is needed to add another floor of condominium units. In our study of the Manhattan market, Glaeser, Saks, and I documented very large gaps between the market price of condominiums and the marginal cost of producing another floor of such units. Over the roughly two decade period for which we had data (from 1984–2002), unit prices were roughly twice fundamental production costs, indicating a zoning tax rate of about 50 percent for that market.

Whether any given regulatory tax can be justified on efficiency grounds is a tough question to answer. In urban economics, a distinguished literature on zoning, which emphasizes the need for land use controls to internalize the social costs of new development, strongly suggests that the optimal tax rate is positive. However, in our analysis of Manhattan, Glaeser, Saks, and I conclude that there is no set of negative externalities (whether aesthetic, congestion, or fiscal related) that could come close to justifying the 50 percent zoning tax in that market. Manhattan is among the easier markets to analyze in this respect because it is not credible (in my opinion, anyway) for its residents to claim that adding a few more housing units will destroy the unique, bucolic nature of the island. That claim might be true in

a low-density suburb with a two-acre minimum lot size restriction, where the utility loss to existing residents could be very high. This is not to say that any claim of high costs from new development should be believed at face value — only that it is difficult in some settings to rigorously apply standard cost-benefit techniques to the problem.

### **Housing Supply and the Nature of Urban Growth**

More broadly, theory and the data indicate that the supply side of housing markets is mediating both urban growth and decline. Whether housing supply is elastic or inelastic plays a huge role in defining what urban success looks like.<sup>7</sup> If supply is elastic, then strong demand shows up in growing populations amid much home building. This is the story of the rise of the Sunbelt. However, latent demand is strong in many large coastal markets such as Boston, New York, and San Francisco, even though population growth is relatively low, and very few net new housing units are built in these areas. In this version of urban success, growing demand gets reflected in high land prices.

This may have important social and economic implications that clearly are worthy of further study by economists. The urban agglomerations along our coasts are thought to be the most productive in the nation. Effectively restricting entry into these areas by not allowing much housing production necessarily pushes growth to other markets that may not be as productive.<sup>8</sup> To the extent that binding local land use controls raise house prices, financial constraints also facilitate more spatial sorting along income lines. This already is evident across communities within metropolitan areas. Chris Mayer, Todd Sinai, and I have suggested that it is occurring across metropolitan areas, with some becoming “superstars” that can have higher long-run average appreciation

rates as long as supply is sufficiently restricted and the nation keeps generating enough rich people with some taste for these superstar markets.<sup>9</sup>

Restrictive supply also helps define the nature of urban decline. Glaeser and I show that the durable nature of housing, combined with the fact that the supply schedule is inelastic when demand falls below fundamental production costs, largely explains the fact that urban decline is so long and steady in nature.<sup>10</sup> The negative demand shocks experienced by markets such as Detroit lead to very low house prices that help hold people. The durability of housing makes population loss a very slow process. Our work also suggests that cheap housing is relatively more attractive to the poor, which helps to account for the high poverty concentrations in declining markets.

### **Housing Supply and Housing Bubbles**

Understanding the supply side of housing markets also is helpful in making sense of housing bubbles. According to the model of housing bubbles proposed in a recent paper with Glaeser and Albert Saiz, bubbles are more difficult to start and sustain in less constrained markets with elastic housing supplies.<sup>11</sup> In the major house price run-up of the 1980s, high real price appreciation only occurred in markets with inelastic supply. One of the unique features of the most recent boom is that enormous price growth occurred in elastic markets, such as Phoenix and Las Vegas, which produced increasingly larger amounts of housing during the price run-up. The best indicator of a bubble I know of is a wide and growing gap between house prices and fundamental production costs in a market with elastic supply. The data also show that before the recent bubble, mean prices in these elastically supplied markets almost always were very close to production costs. Hence, we should expect prices

to fall to the level of production costs in these particular markets. The state of demand, not supply, will largely determine which happens to prices in the most inelastically supplied markets.

### Directions for Future Research

While much has been learned about housing supply in recent years, much remains to be done. Data collection involving measurement of the local regulatory environment should be at the top of the “to do” list. Glaeser and a group of Harvard students have amassed a wealth of information on zoning and land use controls over time for much of the Greater Boston area.<sup>12</sup> This type of detailed description of the local environment is incredibly time consuming, and will be hard to replicate, but it would be very useful to have similar pictures of other markets. Anita Summers, Saiz, and I took a different path in creating the Wharton Residential Land Use Regulation Index.<sup>13</sup> This involved a national data collection effort. The benefit of our data is that they cover over 2,000 communities across all major metropolitan areas. The cost is that valuable detail on the local environment had to be sacrificed to generate the much larger number of observations. We are re-surveying our communities now, so that research on changes over time soon will be possible.

Better estimates of local supply elasticities also are needed. Supply heterogeneity clearly is important, so we need to carefully measure its variation.<sup>14</sup> Next, it is important that research fully integrate heterogeneous supply into a well-specified general equilibrium model of housing market dynamics. There are efforts being made here, but much more remains to be done if we are to truly understand housing market changes, which are dynamic in nature.<sup>15</sup> Finally, we need to understand better why constraints

on supply develop in some markets, but not in others. There is interesting work on the political economy of this issue<sup>16</sup>, but again, much remains to be done.

<sup>1</sup> See Figure 2-11 in E. L. Glaeser and J. Gyourko, *Rethinking Federal Housing Policy*, The AEI Press, Washington, DC (2008).

<sup>2</sup> For more detail on the time pattern of house prices relative to production costs see E. L. Glaeser, J. Gyourko, and R. Saks, “Why Have House Prices Gone Up?” *American Economic Review*, Vol. 95, No. 2 (May 2005a), pp. 329–33, and “Why Is Manhattan So Expensive? Regulation and the Rise in House Prices,” *Journal of Law & Economics*, Vol. 48, No. 2 (October 2005b), pp. 331–70.

<sup>3</sup> This was the term that Glaeser and I used in our research, but it should be interpreted as applying to any local land use restriction, not just those related to zoning. See E. L. Glaeser and J. Gyourko, “The Impact of Zoning on Housing Affordability,” *Economic Policy Review*, Federal Reserve Bank of New York, Vol. 9, No. 2 (June 2003), pp. 21–39.

<sup>4</sup> For a more detailed discussion of how to implement this type of analysis, see E. L. Glaeser and J. Gyourko, “The Impact of Zoning on Housing Affordability.”

<sup>5</sup> For one exception to this, see the data on land values in the New York City market in A. Haughwout, J. Orr, and D. Bedoll, “The Price of Land in the New York Metropolitan Area,” *Current Issues in Economics and Finance*, April/May 2008, Federal Reserve Bank of New York.

<sup>6</sup> E. L. Glaeser, J. Gyourko, and R. Saks, “Why Is Manhattan So Expensive?,” *supra*.

<sup>7</sup> E. L. Glaeser, J. Gyourko, and R. Saks, “Urban Growth and Housing Supply,” *Journal of Economic Geography*, Vol. 6, No. 1 (January

2006), pp. 71–89.

<sup>8</sup> Glaeser and Tobio (2008) argue that the rise of the Southern Sunbelt markets largely is the result of allowing plentiful, cheap housing, not because of a better amenity set or fundamentally higher productivity. See E. L. Glaeser and K. Tobio, “The Rise of the Sunbelt,” *Southern Economic Journal*, Vol. 74, No. 3 (2008), pp. 610–43.

<sup>9</sup> J. Gyourko, C. Mayer, and T. Sinai, “Superstar Cities,” NBER Working Paper No. 12355, revised July 2006.

<sup>10</sup> E. L. Glaeser and J. Gyourko, “Urban Decline and Durable Housing,” *Journal of Political Economy*, Vol. 113(2) (2005), pp. 345–75.

<sup>11</sup> E. L. Glaeser, J. Gyourko, and A. Saiz, “Housing Supply and Housing Bubbles,” *Journal of Urban Economics*, Vol. 64, No. 2 (2008), pp. 693–729.

<sup>12</sup> E. L. Glaeser and B. Ward, “The Causes and Consequences of Land Use Regulation: Evidence from Greater Boston,” *Journal of Urban Economics*, Vol. 65, No. 3 (2009), pp. 265–78.

<sup>13</sup> J. Gyourko, A. Summers, and A. Saiz, “A New Measure of the Local Regulatory Environment for Housing Markets,” *Urban Studies*, Vol. 45, No. 3 (2008), pp. 693–729.

<sup>14</sup> A. Saiz, “On Local Housing Supply Elasticity,” Working Paper, The Wharton School, University of Pennsylvania, 2008.

<sup>15</sup> E. L. Glaeser and J. Gyourko, “Housing Dynamics,” NBER Working Paper No. 12787, December 2006, and S. V. Nieuwerburgh and P.-O. Weill, “Why Has House Price Dispersion Gone Up?” NBER Working Paper No. 12538, September 2006.

<sup>16</sup> F. Ortalo-Magne and A. Prat, “The Political Economy of Housing Supply,” Sticerd Working Paper TE/2007/512, June 2007.