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Endogenous gentrification and housing price dynamics ☆

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ABSTRACT

In this paper, we begin by documenting substantial variation in house price growth across neighborhoods within a city during city-wide housing price booms. We then present a model which links house price movements across neighborhoods within a city and the gentrification of those neighborhoods in response to a city wide housing demand shock. A key ingredient in our model is a positive neighborhood externality: individuals like to live next to richer neighbors. This generates an equilibrium where households segregate based upon their income. In response to a city-wide demand shock, higher income residents will choose to expand their housing by migrating into the poorer neighborhoods that directly abut the initial richer neighborhoods. The in-migration of the richer residents into these border neighborhoods will bid up prices in those neighborhoods causing the original poorer residents to migrate out. We refer to this process as "endogenous gentrification". Using a variety of data sets and using Bartik variation across cities to identify city level housing demand shocks, we find strong empirical support for the model's predictions.

1. Introduction

It has been well documented that there are large differences in house price appreciation rates across U.S. metropolitan areas.[1] For example, according to the Case–Shiller Price Index, real property prices increased by over 100% in Washington DC, Miami, and Los Angeles between 2000 and 2006, while property prices appreciated by roughly 10% in Atlanta and Denver during the same time period. Across the 20 MSAs for which a Case–Shiller MSA index is publicly available, the standard deviation in real house price growth between 2000 and 2006 was 42%. Such variation is not a recent phenomenon. During the 1990s, the Case–Shiller cross-MSA standard deviation in house price growth was 21%.

While most of the literature has focused on trying to explain cross-city differences in house price appreciation, we document that there are also substantial *within*-city differences in house price appreciation. For example, between 2000 and 2006 residential properties in the Harlem neighborhood of New York City appreciated by over 130%, while residential properties less than two miles away, in midtown Manhattan, only appreciated by 45%. The New York City MSA, as a whole, appreciated by roughly 80% during this time period. Such patterns are common in many cities. Using within-city price indices from a variety of sources, we show that the average *within*-MSA standard deviation in house price growth during the 2000–2006 period was roughly 20%. Similar patterns are also found during the 1990s and 1980s. As is commonly discussed in the popular press, these large relative movements in property prices within a city during city-wide property price booms are often associated with changing neighborhood composition. Returning to the Harlem example, a recent New York Times article discussed how Harlem residents have gotten richer during the period when its house prices were substantially appreciating.[2]

Our goals in this paper are threefold. First, we set out to document a new set of facts about the extent and nature of within-city house price movements during city-wide housing price booms. The house price appreciation for the city as a whole is just a composite of the house price movements within all the neighborhoods of the city. Therefore, understanding the movements in house prices across

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[1] See, for example, Davis et al. (2007), Glaeser et al. (2008), Van Nieuwerburgh and Weill (2010), and Saiz (2010).

[2] See the article "No Longer Majority Black, Harlem Is In Transition" from the January 5th, 2010 New York Times.

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neighborhoods within a city is essential for understanding house price movements for the entire city. Using a variety of different data sources, we show that there are substantial differences across neighborhoods within a city with respect to their house price growth when the city as a whole experiences a housing price boom.

Moreover, we show that there is a systematic pattern in this variation. In particular, we document three facts that are robust across time and data sources with respect to within-city house price movements. First, during city-wide housing price booms, neighborhoods with low initial housing prices appreciate at much greater rates than neighborhoods with high initial prices. Second, the variation in housing price appreciation rates among low housing price neighborhoods is much higher than the variation in housing price appreciation rates for higher housing price neighborhoods. Finally, we show that the larger the city-wide housing price boom, the greater is the difference in housing price appreciation rates between low house price and high house price neighborhoods. Regardless of the interpretation we give to some of these facts in later sections, we feel these facts alone are an interesting contribution to the literature on spatial variation in housing price growth.

Our second goal is to develop a spatial model of a city that links within-city neighborhood housing price dynamics with gentrification. We represent a city as the real line and each point on the line is a location. Agents are fully mobile across locations and there is a representative firm that can build houses in any location at a fixed marginal cost. The key ingredient of the model is that agents are heterogeneous in their income and all agents prefer to live close to richer neighbors. The relevance of such a neighborhood consumption externality in determining house prices is supported by the recent empirical work of Bayer et al. (2007) and Rossi-Hansberg et al. (2010). We show that there exists an equilibrium with full income segregation where the high income residents are concentrated all together and the low income residents live at the periphery. The sorting, as in Becker and Murphy (2003), is the result of the neighborhood externality where all agents are willing to pay more to live closer to rich neighbors. Poorer residents are less willing to pay high rents to live in the rich neighborhoods, so in equilibrium they live farther from the rich. Within the model, house prices achieve their maximum in the rich neighborhoods and decline as one moves away from them, to compensate for the lower level of the externality. For the neighborhoods that are far enough from the rich, there is no externality, and house prices are equal to the marginal cost of construction.

One of the main contributions of our model, and the basis for our subsequent empirical work, is to explore the dynamics of house prices across neighborhoods in response to city-wide housing demand shocks. Although there is no aggregate supply constraint and the city can freely expand, average house prices increase in response to an increase in city-wide housing demand because of gentrification. In particular, the neighborhoods that endogenously gentrify are the poor neighborhoods on the border of rich neighborhoods. For concreteness, we say that a neighborhood gentrifies when some poor residents are replaced by richer ones, increasing the extent of the neighborhood externality. For example, we consider a city hit by an increase in labor demand and a subsequent wave of migration (Blanchard and Katz, 1992). The richer migrants prefer to locate next to the existing richer households. As a result, they bid up the land prices in the poor neighborhoods that are next to the rich neighborhoods causing the existing poor residents to move out and the city as a whole to expand.

To sum up, our mechanism implies that unexpected permanent shocks to housing demand lead to permanent increases in house prices at the city level although the size of the city is completely elastic. This happens because gentrification bids up the value of the land in the gentrifying neighborhoods. Moreover, our model predicts that, in response to a positive city-wide housing demand shock, land prices in poor neighborhoods that are in close proximity to the rich neighborhoods appreciate at a faster rate than both richer neighborhoods and other poor neighborhoods. We also find that average price growth within the city is affected both by the size of the housing demand shock and by the particular shape of preferences, technology, and income distribution within the city.

Our third goal is to provide explicit evidence showing that our endogenous gentrification mechanism is an important determinant of within-city variation in house price growth in response to city-wide housing demand shocks. We do this in multiple ways. To begin, we provide an additional fact about within-city neighborhood house price appreciation during city-wide housing booms. In particular, we show that, as our theory predicts, among all the poor neighborhoods it is the poor neighborhoods that are next to the rich neighborhoods that appreciate the most during city-wide housing booms. This result holds in the 1980s, 1990s, and 2000s and holds using a variety of different measures of neighborhood housing price appreciation. Moreover, these results are robust to including controls for distance to the city's center business district, the average commuting time of neighborhood residents, and proximity of the neighborhood to fixed natural amenities such lakes, oceans, and rivers. Again, these results are consistent with the first order predictions of our model.

We then use a Bartik-style instrument to isolate exogenous city level housing demand shocks (Bartik, 1991) and show that it is the housing prices in poor neighborhoods next to rich neighborhoods that appreciate the most in response to the exogenous city-wide housing demand shocks. Our Bartik shock predicts expected income growth in a city between periods t and $t+k$ based on the initial industry mix in that city at time t and the change in industry earnings for the entire U.S. between t and $t+k$. For example, in response to a one standard deviation Bartik shock, poor neighborhoods within the city which directly border a rich neighborhood have housing prices that appreciate roughly 7.0 percentage points (compared to a mean appreciation rate of 24.0%) more than otherwise similar poor neighborhoods within the city that are more than 3 miles away from rich neighborhoods. Again, these results hold controlling for distance to the center business district and proximity to fixed natural amenities within the city.

Finally, we explicitly show that the neighborhoods that appreciate the most during the exogenous city-wide housing demand shock also gentrify. Gentrification – the out migration of poor residents and the in migration of rich residents – is the key mechanism for the within-city house price dynamics we highlight. For this analysis, we again explore the within-city response to a Bartik-style shock. In particular, we show that in response to an exogenous city-wide demand shock, poor neighborhoods close to rich neighborhoods experience larger increases in neighborhood income, larger increases in the educational attainment of neighborhood residents, and larger declines in the neighborhood poverty rate than do otherwise similar poor neighborhoods that are farther away from the rich neighborhoods. For example, average neighborhood income grows by roughly 1.7 percentage points (compared to a mean growth rate of 14.9%) more in response to a one standard deviation Bartik shock for poor neighborhoods that border the rich neighborhoods than it does for otherwise similar poor neighborhoods that are more than 3 miles away from the rich neighborhoods. Lastly, we highlight that during both the 1980s and 1990s, most of the poor neighborhoods that did in fact gentrify by some ex-post criteria were neighborhoods that were directly bordering existing rich neighborhoods.

As noted above, a key ingredient in our model is the existence of neighborhood consumption externalities in that individuals get utility from having rich neighbors relative to poor neighbors. Although, we do not explicitly model the direct mechanism for the externality, we have many potential channels in mind. For example, crime rates are lower in richer neighborhoods. If households value low crime, individuals will prefer to live in wealthier neighborhoods. Likewise, the quality and extent of public goods may be correlated with the income of neighborhood residents. For example, school quality – via peer effects, parental monitoring, or direct expenditures – tends to increase with neighborhood income. Finally, if there are increasing returns to scale in the production of desired neighborhood amenities (number and variety of restaurants, easier access to service industries such as dry cleaners, movie theaters,