

Rent Shifts in American Rental Housing Markets, 2000-2009: Directional Heterogeneity in Distance Decay Patterns

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Abstract

This paper investigates the spatial effects operating in rental housing markets of selected US cities. It is well known that spatial effects in addition to neighborhood and housing attributes influence prices in urban housing markets. However, dealing with spatial effects is often confined to choosing the best specification from the large array of available spatial econometric models (the spatial lag, spatial error, or spatial Durbin model, and more extensive higher-order variants). Typically, there is not sufficient attention for disentangling distance, direction, and spillover effects resulting from small-scale dependencies. In addition, the literature provides only scant evidence of explicit theoretical foundations for the various components of spatial effects.

This paper begins by conceptualizing the separate and joint effects of distance, direction and spillovers on urban rents and rent changes, going back to the theories of Alonso, Muth and Mills. Their seminal work stipulates that an intra-urban spatial equilibrium is attained by high housing prices in the central business district in combination with high amenity values and low commuting cost. Later extensions of their work have pointed to the polycentric nature of cities (Henderson and Mitra) and the existence of “sectors” along the main transportation corridors (Hoyt).

In the empirical analysis modern variants of spatial process models will be used; however, with special attention for the impact of directionality and spatial heterogeneity. The directionality aspect of urban rent surfaces has been successfully analyzed using geostatistical techniques, but has so far not been incorporated in spatial econometric models focusing on spatial dependence patterns. In this paper a system of polar (rather than Cartesian) coordinates is utilized to model

the impact of directional heterogeneity given one, or at least a limited number of, localized employment centers such as the Central Business District in urban areas.

The conceptualization of spatial dependence and directional heterogeneity is used as a basis for the empirical analysis of rents and rent changes in selected urban housing markets. Four cities are selected:

- Chicago, as a representative of monocentric, high-density cities whose basic structures were established in the nineteenth and twentieth century;
- Phoenix, as a representative of young, low-density cities with unbridled suburbanization and urban sprawl;
- Portland, as a representative of cities with strict growth control measures; and finally,
- Indianapolis as a representative of a city with little political fragmentation and no physical barriers constraining outward expansion.

The model specifications allow for distance effects, directional bias, and small-scale spatial dependencies that can be captured as spatial cross-regressive, spatial error, and/or spatial lag effects. The set of explanatory variables includes in addition: characteristics of the rental housing properties, the availability of land, building costs, growth boundaries or other types of government regulation, heterogeneous populations, location-specific amenities, and access to transportation technologies with differential transportation and commuting costs. The estimation is based on data for census tracts (block groups), taken from the 2000 Decennial Census and the 2009 American Community survey.

Preliminary results suggest that non-spatial variables associated with baseline rents, vacancy rates, residents' average length of stay and some racial and ethnic characteristics of the population have negative impacts on rents and rent shifts. Moreover, we find significant variation in rents and rent shifts associated with both distance and direction from local employment centers. These effects are particularly strong in cities where natural boundaries and or government regulation creates "artificial" local shortages. This warrants the conclusion that hedonic pricing and urban rent models incorporating strict omnidirectional dependence patterns based on distance alone are likely to result in biased and/or inefficient results.