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Spatial effects and house price dynamics in the USA

Jeffrey P. Cohen[a], Yannis M. Ioannides[b,*], Win (Wirathip) Thanapisitikul[b,1]

[a] Center for Real Estate, University of Connecticut, Storrs, CT 06269, United States
[b] Department of Economics, Tufts University, Braker Hall, Medford, MA 02155, United States

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ABSTRACT

While an understanding of spatial spillovers and feedbacks in housing markets could provide valuable information for location decisions, little known research has examined this issue for the US Metropolitan Statistical Areas (MSAs). Also, it is unknown whether there can be differences in the spatial effects before and after a major housing “bust”. In this paper we examine spatial effects in house price dynamics. Using panel data from 363 US MSAs for 1996 to 2013, we find that there are significant spatial diffusion patterns in the growth rates of urban house prices. Lagged price changes of neighboring areas show greater effects after the 2007–08 housing crash than over the entire sample period of 1996–2013. In general, the findings are robust to controlling for potential endogeneity, and for various spatial weights specifications (including contiguity weights and migration flows). These results underscore the importance of considering spatial spillovers in MSA-level studies of housing price growth.

1. Introduction

Spatial effects in economic phenomena have recently attracted particular attention by economists. For instance, during periods of housing booms, house prices in metropolitan areas in the Northeast of the US show distinct patterns as they appreciated at similarly high rates, while house prices in metropolitan areas in the Midwest did not experience comparably high appreciation rates during those same periods. Thus, house price dynamics might have spatial features. Spatial features of the housing bust associated with the Great Recession of 2007–2009 are currently receiving particular attention. This paper looks empirically at such spatial aspects in house price dynamics in more detail and by utilizing data that include several housing market booms and busts including the Great Recession.

A contribution of this paper is our focus on spatial effects in assessing the impacts of lagged Metropolitan Statistical Area (MSA for short) house price growth. Another contribution is our use of MSA to MSA migration panel data to assess the importance of other MSAs’ house price growth on a particular MSA’s contemporaneous house price growth. We also demonstrate that in the periods following the Great Recession of 2007–09, the spatial effects appear to be stronger than before the crisis. These spatial spillover results can have important implications for both residential and business location decisions.

While our focus here is on MSA level house price growth, economists have studied the role of space in house price dynamics at various levels of aggregation. Some studies look at

* Corresponding author. fax: +1 617 627 3917.
E-mail addresses: Jeffrey.Cohen@business.uconn.edu (J.P. Cohen), Yannis.Ioannides@tufts.edu, yioannid@tufts.edu (Y.M. Ioannides).

[1] Associated with Tufts University, when the research started, now with Lazada.co.th.

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spatial effects at the level of submarkets within a particular MSA. The fact that different urban neighborhoods are often developed at the same time, dwellings in them may share similar structural characteristics and neighborhoods may offer similar amenities, suggest that house prices may react similarly to exogenous shocks. Basu and Thibodeau (1998) confirm this intuition by using data from submarkets within metropolitan Dallas. Also working at a similar local level, Clapp and Tirtiroglu (1994) estimate a spatial diffusion process in house price for towns in the Hartford, CT, MSA. They find that lagged house price changes in a submarket affect the current house price of a contiguous submarket positively and more strongly than the lagged house price changes for noncontiguous submarkets. However, such evidence of spatial effects at the submarket level of aggregation may be MSA-specific, and the conclusions for a single MSA may not necessarily be valid for other MSAs. Further, there could be spatial effects between submarkets that are geographically contiguous and belong to the same economic area and housing market, but not in the same MSA.

A second level of aggregation at which economists have examined spatial effects is at the US Census division. Pollakowski and Ray (1997) find that although house prices in one division are affected by lagged house prices in other divisions, there is no clear spatial diffusion pattern that describes such processes. That is, lagged house price changes of adjacent Census divisions do not provide greater explanatory power in explaining current house prices than those in non-adjacent divisions. However, when those authors look at house prices within the greater New York's primary metropolitan statistical areas (PMSAs), they find evidence of spatial patterns consistent with that by Clapp and Tirtiroglu (1994).

Given mixed results from previous research on spatial diffusion patterns in house prices at different aggregation levels, this paper has the following aims: one, to examine house price interactions at the MSA level of aggregation across the entire continental US; two, to bring geographic and economic distances into the analysis in addition to adjacency as measures of proximity.

The paper employs the consolidated house price index, which has been published (since March 1996) by the Office of Federal Housing Enterprise Oversight (OFHEO). The data cover almost 400 MSAs across the entire US, with data for all MSAs going back to 1995 (Calhoun, 1996). We use these data along with appropriate geographic information to study house price dynamics across the entire US at the MSA level of aggregation and to compare the results with other levels of aggregation.

The organization of this paper is as follows: Section 2 reviews the existing literature; Section 3 introduces the econometric models used in this study; Section 4 describes the data and methodology; Section 5 presents the results and impulse response diagnostics, and Section 6 concludes.

2. Literature review

The modern view of housing emphasizes its role as an asset in household portfolios (Henderson and Ioannides, 1983). Economists predict that asset prices in informationally efficient markets react rapidly to new information. Over the last 20 years, however, empirical studies have established that this might not be the case for housing markets (Rayburn et al., 1987; Guntermann and Norrbin, 1991). Economists have come to believe that households may be backward-looking in housing markets. Therefore, past house price changes can be used to explain future prices changes. Case and Shiller (1989) use their own house price indices for four major cities and find that 1-year house price lag in a city is statistically and economically significant in forecasting that city's current house price.

Informational inefficiency in housing markets, as exhibited by temporal and spatial persistence in house prices, is not surprising when one considers the potential frictions affecting real estate markets. For instance, real estate markets do not clear immediately after a shock to the economy. The process of matching buyers with sellers of existing houses takes time. It also takes time for developers to bring new houses to the market, after an increase in demand, and to liquidate inventories when demand weakens. Speculative inventory holding is very costly. Transaction costs in housing markets are also higher than other asset markets. Case et al. (2005) find that selling costs, such as 5–6% brokerage fees nominally charged in the US, combine with the physical and the psychological costs of moving (e.g. moving across neighborhoods and changing schools) to generate substantial transaction costs. Such costs limit arbitrage opportunities for rational investors, and thus lead to pricing inefficiencies.

Brady (2014) reviews some recent studies on spatial aspects of housing prices that have incorporated Vector Autoregressions (VAR) as an approach to model simultaneity.[2] In earlier work, Anselin (2001) and Pace et al. (1998) introduce general methodologies for incorporating the time dimension in spatial models.[3] These papers followed Clapp and Tirtiroglu (1994), which was one of the pioneering works on spatial effects in house price dynamics that we referred to earlier, using house price data from Hartford, CT. These authors regress excess returns, defined as the difference between the return of a submarket within an MSA and the return at the MSA level, on the lagged excess returns of a group of neighboring towns and on a "control group" of non-neighboring towns. The authors find that estimated coefficients were significant for excess returns in neighboring towns, but insignificant for non-neighboring towns. Their results suggest that house price diffusion patterns exist within an MSA and are consistent with one form of a positive feedback hypothesis, where individuals would be expected to place more weight on past price changes in their own and neighboring submarkets and less weight on those further away.

Pollakowski and Ray (1997) also examine house price spatial diffusion patterns, but at a much higher aggregation level. Using vector autoregressive models with quarterly log house price changes from the nine US Census

[2] These include Pesaran and Chudik (2010), Holly et al. (2011), Beenstock and Felsenstein (2007), and Kuethe and Pede (2011).

[3] One advantage of our approach over the approaches of Pace et al. (1998), Anselin (2001), and others who utilize a VAR approach is that ours is well-suited for a study where contemporaneous spatial lags are not present. Our approach is also parsimonious, which is helpful in estimating versions of the model with time lags that contain several types of spatial lags.