The regional house prices in China: Ripple effect or differentiation

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ABSTRACT

The paper aims to investigate the ripple effect of house prices between 35 metropolitans in China, using a coefficient heterogeneity model with Panel Data and VAR model. The metropolitans are divided into panels by spatial location and regional economic level. The empirical results show that prices in most regions are generally consistent with the national average, but they have different responses to changes in national fundamentals. Particularly, there is a clear differentiation in North China and East China from other regions, as well as the region of a higher level economic development. Furthermore, the findings from Granger test and impulse response function with VAR model indicate that those regions are the source where a ripple effect is from. And the diffusion path is very clear between economic regions. This study has provided a better understanding of the formation and transmission of the ripple effect of house prices across regions and also important implications for central and local governments over market changes.

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1. Introduction

Although the prosperity of housing markets and the price levels are primarily determined by local economic fundamentals, they are also influenced by the national macro economy. And regional housing markets are not completely isolated. The spatial difference and dependency of house price changes generally exist. House prices differ spatially between the north and the south in Britain, where house prices rise typically first in the south-east and then spread over the rest of the country. It is called the "ripple effect" (Meen, 1999). The similar phenomenon is also found in the United States and other countries. Sometimes it is denoted as "house price diffusion" (Pollakowski & Ray, 1997). There is no explicit definition for "ripple effect" in extant studies, yet the common character in all the descriptions is that changes in house prices occur earlier and more extensively in one specific city or region and then spread out across the economy (Drake, 1995; Meen, 1999; Shi, Young, & Hargreaves, 2009; Ma & Liu, 2013). In most cases, it refers to the adjustment in house prices due to the housing demand which results in the correlation between the typical and the contiguous markets (Tsai, 2014). There are a few studies (e.g. Gray, 2012) noting that the spillover of house price growth is also likely to be based on inter district transmission. This is what this paper concerns in the context of the Chinese housing market. The presence of a ripple effect can be formulated as a unit problem. Balcilar, Beyene, Gupta, and Seleteng (2013) and Tsai (2014) use unit root tests to examine whether the relative price shows convergence to verify the existence of the ripple effect. If the ratio of metropolitan house prices to the national house price is stationary, they eventually reach a steady path driven by a common process. Similar methods with time series are used through co-integrate test between house prices. Factors such as migration and spatial arbitrage are seen as the cause of ripple effect (Gupta & Miller, 2012; Pollakowski & Ray, 1997). However, even if no spatial link exists between the housing markets, ripple effect is likely to be caused by regions' internal economic factors (Shi et al., 2009), or occur if the determinants of the house price follow similar patterns (Meen, 1999).

In the past twenty years, house prices in China have been rising significantly along with the rapid economic development and urbanization. Over the same period, the government has paid close attention to the market's peaks and troughs. The difference between regions was largely ignored until very recent years. A large number of studies put emphasis on the factors affecting house prices and the dynamic characteristics in the burgeoning housing market. Most empirical studies examine the idea of a single market

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in the country, province, or city, while ignoring possible correlations between markets. Previous studies well indicate that there are differences in economic development between regions in China. The East coastal region is rich and developed and, by contrast, the Middle and the West are relatively backward. Likewise, house prices in the East are higher than those in the Middle and the West (Liang & Gao, 2007). Among the few studies on the ripple effect in China, they involve only several cities (Huang, Li & Li, 2010) or mainly discuss the cyclical features of house price series (Huang, Zhou & Li, 2010). This paper will examine the ripple effect in house prices between regions in China. Due to the instability of the result in unit root test especially in short time series available in China, it can only be used as an auxiliary judgment. As income disparity and spatial lags are important in explaining house price changes, structural differences in regional housing markets need to be considered. According to the idea of Meen (1999) about coefficient heterogeneity, this paper observes the correlation of house prices between regions with multivariate regression equation. We use the average prices of newly-built-houses in 35 metropolitan areas from 1995 to 2013 to investigate structural differences between regional markets. The 35 metropolitans, including 26 provincial capital cities and 9 Municipalities, are scattered in six regions. And we will divide them into five different regions on the bases of economic structures. Then, this paper determines the main characteristics of regional housing markets and further the possible factors that drive the ripple effect. Built on previous studies, we extend to examine the yet-to-explore determinants that affect house prices in the Chinese housing market. Coupled with housing reforms and housing marketization, China's central government launched mortgage rules and a loose monetary policy in the late 1990s. With the support of these financial policies, the housing market was booming and house prices were rising rapidly. On the other hand, China's urbanization was rapidly advancing. The urbanization levels in distinct cities affected the housing demand there (Du, Yang, Li, & Zuo, 2017). Wang, Hui, and Sun (2017) figures out that an increase in the level of urbanization by 1% will drive up housing prices by 0.343%.So interest rates, money supply and urbanization rates are important factors in determining house prices in the sample period. Furthermore, there may be different responses to these determinants in each region. To further investigate the price interaction between regions, we apply Johansen co-integration test, Granger test and impulse response function based on VAR model. Using house price series of representative metropolitans in each region, we examine the lead-lag relations between regions and observe the strength and duration of response to shocks from other regions.

The rest of this paper is organized as follows. First we review literature about house price differentiation and ripple effect. The subsequent section describes Chinese regional economic pattern and housing market, and then introduces the coefficient heterogeneity model in detail. In the empirical part, we establish the regression equations for house price deviation to countrywide average in each region. Then we construct a VAR model with monthly data to get more direct evidence of the ripple effect, followed by discussions on empirical results. The final section provides concluding remarks.

2. Literature review

Interrelationships between house prices at different places have attracted extensive concerns in sociology and economics. Munro and Tu (1996) proposed a model in the form of spatial interaction. House prices in London or in the Southeast are included in the price equations of other regions. Then Muellbauer and Murphy (1997) introduced a series of interactive factors to extend the

thought of spatial lag. In recent years, Pesaran (2006), Bai (2009), among others, carried on the idea of "spatial lag" to study the spatial correlation of house prices. These studies were primarily concerned with the spatial spillover effects of house prices.

Some scholars examine whether a co-integration and Granger causality exist between different housing markets based on time series methods. MacDonald and Taylor (1993) and Alexander and Barrow (1994) find that long-run co-integration relationships exist between regions in Great Britain and house price in Southeast leads the house price cycle. Using the VAR model and the Granger causality test, Pollakowski and Ray (1997)suggest that, house price diffusion exists only between the five largest primary metropolitan statistical areas in the Greater New York area, and not between the nine census divisions at the sub-national level. Similarly, a number of studies (Luo, Liu, & Picken, 2007; Shi et al., 2009; Stevenson, 2004) use co-integration and the Granger causality test to study whether the long-run equilibrium relationships exist among regional housing markets in Ireland, Australia, New Zealand, and South Africa. Lee, Lee, and Lin (2014) reveal a strong lead-lag interdependence of house price changes among Taiwan's largest urban areas.

While some scholars argue that the ripple effect relates to the structural differences in regional markets and they model house prices based on structured variables. Meen (1996, 1999)propose the coefficient heterogeneity model, which means that the structural or behavioral differences in the regional markets can cause a ripple effect. The key point is that coefficients should exhibit distinct spatial characteristics rather than purely random changes. Holmes and Grimes (2008) and Tsai (2014) indicate that if the ripple effect exists, there will be a long-run stable relationship between regional house prices. Their empirical research is consistent with Meen's (1999) results. Referring to the coefficient heterogeneity model, Zhang, Gerlowskib, and Ford (2014) construct a regional house price model with determinants including national house price, interest rate and some other economic variables in each region. The result indicates that house prices are influenced by economic variables in other regions.

Researchers have not found a unified behavioral explanation to account for the observed ripple effect. Oikarinen (2005) finds that information may play important role in house price diffusion between distant areas. But within a metropolitan area, employment growth and migration may be the main factors. Gupta and Miller (2012) examine the time-series of house prices in Los Angeles, Las Vegas, and Phoenix. The Granger causality corresponds to the transfer of housing equity. This kind of spatial spillover and house price lead-lag related to home migration primarily exists in house markets between the local level, but not the regional level (Jones & Leishman, 2006). Gray (2012) further points out that information flow and expectation may strengthen the housing price transmission across the sub-nation regions. Meen (1999) deems that the ripple effect is due to the adjustments in internal regions. The structural differences in regional housing markets come from the differences in family composition and behaviors, as well as house supply.

Overall, previous studies indicate that house price diffusion exists in most countries and regions. There are two approaches to study the ripple effect. One approach uses house price series only and examines the interaction between them. The other examines if the regional house price has a departure trend from the national average and if regional prices have different but ripple reactions to fundamental determinants. Our work inspects the interaction between regions from both ways. The empirical study about the ripple effect or differentiation between regional markets in China is still very lacking. But in such a centralized regulated housing market, this research is necessary.