



# Measuring the degree of speculation in the residential housing market: A spatial econometric model and its application in China



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## ABSTRACT

Since the housing marketization reform, China's real estate industry has rapidly developed and commercial housing prices have risen sharply. The main reason for this is the speculative demand for housing, which breaks the equilibrium of supply and demand, leading to housing prices deviating from their basic value. The housing market in China is not isolated by province, since speculative behavior in one part of the country can affect other regions. This paper analyzes the spatial relevance in housing prices among different provinces in China by calculating Moran's I index and by measuring the speculation degree through spatial autoregressive model (SAR), a spatial economic model combined with a spatial weight matrix. For commercial housing speculation degree measurement and comparison, 31 provinces in China were chosen along with the following variables: housing prices, personal disposable income, one-year personal housing mortgage rates, housing prices growing rates, the rent, amount of residential investment, and the construction areas of houses. The results show that China's housing prices have a clear interaction among the selected cities, and that housing speculation behavior also influences each other in space. Although there are speculation activities in China, from a global perspective the degree of speculation, which varies from region to region, is still just within internationally acceptable limits. Although there are some regions with high degrees of housing speculation, the speculation is not yet China-wide.

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## 1. Introduction

Housing prices in China have long commanded widespread attention. Providing affordable housing to every household is a tremendous task in China, not only because of its large population, but also because of its short history of housing marketization (Chiu, 2001; Rosen & Ross, 2000; Zhang, 2000; Zhao & Bourassa, 2003). The booming housing market is producing property wealth gaps, although it is not the only reason for the inequalities of the urban property regime (Chen & Han, 2014). Maintaining the affordability of housing is essential for political consolidation and social stability.

Since 2000, the rate of housing price growth in China's major cities has been much higher than the rise in wages. In some cities, such as Beijing, Shanghai and Guangzhou, house prices have

increased up to five-fold, while average wage growth over the same period was only 60%–80% (Kuang, 2010), which clearly demonstrates the shrinking disposable income of Chinese families and the irrationality of house price growth. The price earnings ratio is generally recognized by academics as an important index for measuring the rationality of housing prices. At present, China's housing price-income ratio has far exceeded the internationally accepted limit compared to other industrialized and developing countries. The E-House Real Estate Institute noted that Chinese national commercial housing price earnings ratio for 2014 was 7:1 as reported in the "2014 national price earnings ratio report" released in 2015. Rapidly rising house prices have gradually pushed the cost of houses beyond the range of the average household's purchasing power, which has become a social issue.

Since 2005, the Central Bank and the State Department of China have introduced a number of macro-purchase policies, aimed at controlling the growth rate of house prices, but the policies have not restrained price increases. Problems such as active speculative investments and non-standardized trading market still exist.

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Speculation can increase housing transaction costs. Some customers buy houses as speculators, which increases circulation in the housing market and ultimately increases buyers' transaction costs.

The explosion in housing demand has been widely attributed to China's rapid house price growth (Chen & Han, 2014). With the accelerated process of urbanization in China, a large number of rural migrants need housing in cities, so many of them join the ranks of home buyers thereby increasing the demand for housing.

In China, land and housing is supplied moderately, which maintains the dominance of housing sellers, and housing supply costs are kept high by local governments' practice of increasing land prices without warning. In addition, real estate developers often hold a lot of land or delay opening time to maximize economic benefits, which causes a false appearance of insufficient supply.

The result of speculation is to make the housing market appear as though supply is less than the demand, so that house prices continue to increase in order to make the balance of supply and demand. Speculative demand tends to lead to an overall demand surge.

Some degree of speculation is beneficial to stimulate economic growth and promote the prosperity of the real estate market, but too much speculation will lead to a real estate bubble hindering the healthy development of the housing market.

This paper provides valuable insights into speculative behavior in China's housing market, and proposes a speculation measurement system to help identify large imbalances between the economies of different provinces and show where the residential market is uneven. In China, the spatial linkage of the housing market is strong, and the spatial association is considered when the model is selected. The result reveals the correlation and mutual influence between different provinces in China, which shows that the housing market of each province is not independent, and their speculative behavior is diffuse. And the spatial distribution is not balanced. In this paper, the authors point out that by measuring the degree of investment in China's housing market, we find that there is spatial correlation between real estate prices in China and real estate speculation in the space also have mutual influence, but the previous studies pay more attention to speculative degree analysis.

## 2. Literature review

Speculation is economic activity involving temporary buying and selling aimed at gaining profits through price changes, instead of buying for own use (Case & Shiller, 2003). Speculation in residential housing markets can be described as an arbitrage activity in residential housing trades, such that speculators obtain benefit in the form of buying low and selling high based on a change of housing prices in a relatively short period of time. There is a difference between residential housing speculation and investment. The former emphasizes making use of short-term market fluctuations to gain short-term benefit, while the latter refers to long-term possession to enjoy the utility. Speculation is usually considered to be a kind of irrational investment behavior that is distinguished from asset trading in terms of holding time and risk of revenue. However, in some cases there can be a mutual transaction such as when originally intending to buy a house for leasing out but then deciding to sell when housing prices show a rising trend and there is an opportunity to sell at a high market price. Conversely, if originally intending to again arbitrage but housing prices begin to fall, it might be more advantageous to rent out; speculators then become investors.

The degree of speculation can be quantitatively measured as speculation activity. This describes the impact of past house price

growth on the expected price growth, which can be defined as the ratio of housing price change rate between the next period and last period. Many factors from the supply side and the demand side, as well as the external environment, influence the degree of speculation in the housing market.

On the demand side, disposable income, housing area, rent levels and so on are generally considered to affect the decision of speculators (Harrison & Kreps, 1978; Xiao & Park, 2009). The price earnings ratio, and size of the household are all important determinants of housing demand (Han, 2010). Disposable income relates to both the individual housing decision and the socially desirable level of consumption (Jie, Hao, & Stephens, 2010). Fawley and Wen (2013) argued that because of speculation, the demand for housing might burst, even when income growth rates and savings rates start to decline. Chen, Guo, and Wu (2011) found that the migration of population from rural to urban areas has generated more pressure on housing prices in the coastal provinces than in the inland provinces. On the supply side, real estate investment, land costs, and construction costs of housing will affect the psychological expectations of speculators (Riddell, 2011; Mak, Choy, & Ho, 2012).

At the same time the influence of external factors on housing speculation cannot be ignored, such as cultural psychology, monetary policy (Elbourne, 2008; Xu & Chen, 2011), interest rates (Ye & Wu, 2008), and land supply (Kauko, 2003; Wu, 2012); The unique land auction and presale systems in China produces significant supply rigidity and helps to fuel sustained price inflation, which is key to understanding the dynamics of the country's housing supply (Chen & Han, 2014). A high degree of speculation and the economic factors of rapid development are inseparable (Collins & Senhadji, 2002; Kawaguchi, Chen, & Patel, 2004).

Different factors may have mutual relations. The Granger causality test reveals a significant impact relationship among output growth, the rate of price changes, income, and expected future prices (Miller & Peng, 2006). Zhang, Cheng, and Ng (2013) identified the effect of the constraint of fundamentals on housing price, by a three-sector model (agriculture, manufacture, and housing), while Barros, Chen, and Gil-Alana (2013) found a relationship among the price, quality, location and delays of projects.

There are diverse standards and methods of measuring the degree of speculation. In general terms, the methods currently used include direct measurement, indirect measurement, and evaluation indicators. The direct measurement method is based on speculative housing prices, which is considered to be the sum of a deviation caused by speculative factors and the value of the base price (Levin & Wright, 1997). Because housing is speculation based on the expected behavior of house price changes, the degree of speculation can be indirectly measured by changes in housing prices. The upper limit of the variance test (Pesaran, 2004) for housing prices, the earnings reduction model tailed test (Himmelberg & Sinai, 2005), the recursive unit root test (Chen & Funke, 2013), and tails assay are relatively common methods (Lux & Sornette, 2002). Ren (2012) did not find the existence of a bubble when he applied the hazard rate-modeling framework to China's real estate market. Dreger and Zhang (2013) applied a panel co-integration model to draw an inference on the degree of speculation. House prices between different regions are not independent, but are rather interactive with each other. Through building a time and space model of house prices, the spatial effect of housing prices has been found to be a significant presence (Stevenson, 2004; Holly, Pesaran, & Yamagata, 2010; Saiz, 2010).

The aforementioned studies from multiple perspectives present the influencing factors of housing speculation in general. However, in view of the special nature of the Chinese residential market and the complexity of the environment, the theory is out of touch with

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