Regional Science and Urban Economics 67 (2017) 1–10

Contents lists available at ScienceDirect

Regional Science and Urban Economics

journal homepage: www.elsevier.com/locate/regsciurbeco

Home purchase restriction and housing price: A distribution dynamics analysis

Victor Jing Li[a], Andy Wui Wing Cheng[b], Tsun Se Cheong[b,*]

[a] Department of Geography and Resource Management, The Chinese University of Hong Kong, Shatin, New Territories, Hong Kong
[b] School of Business, Hang Seng Management College, Hang Shin Link, Siu Lek Yuen, Shatin, N.T., Hong Kong

ARTICLE INFO

JEL classifications:
R21
R31
R38

Keywords:
Housing purchase restriction
Housing price
Distribution dynamics
China

ABSTRACT

China's residential housing market has been largely influenced by the policy initiatives of the central government. This study examines how the implementation and removal of home purchase restrictions has affected housing price changes in major cities. Based on the dataset of 70 large- and medium- sized cities between 2014 and 2015, the price evolution trends were evaluated by the distribution dynamic analysis based on the method of Mobility Probability Plot (MPP). This newly developed method allows for better exploring housing price dynamics under home purchase restriction policy. There are four major findings: First, home purchase restriction has a salient effect on curbing speculative investment demand in terms of lowering large sized housing price growth; second, home purchase restriction has long-running effects on bringing down housing prices if the current price increase does not exceed 5% on a month-to-month basis; third, small- or large-sized housing may face more downward pressure of housing prices than medium-sized housing under the home purchase restriction; fourth, removal of the home purchase restriction may saliently increase the housing price levels that have been contained.

1. Introduction

China has transformed from a planned economy into a market economy. Nevertheless, the government has resorted to regulative policies from time to time. Housing market is without exception, after the transition from the welfare housing provision system to the commodity housing market (Li et al., 2011; Mak et al., 2007; Tian and Ma, 2009). Government basically influences the housing market through three channels: land administration, loan regulation, and purchase restriction. While land management mainly focuses on the supply side, lending and purchase policies aim at controlling housing demand. As China has experienced robust property booms over the last one and half decades, the government has taken a more active role in curbing housing prices from going up too fast through demand side interventions. A series of regulative and restrictive policy initiatives have been implemented in recent years, including restriction on home mortgage loans, restriction on selling price, and restriction on home purchases.

Among these restrictive policies, home purchase restriction policy seemed most effective to curbing housing price escalation (Li and Xu, 2015). On 30 April 2010, the State Council issued the home purchase restriction (HPR) policy[1] to be implemented in 46 major cities. The HPR policy maintained that: i) residents with local hukou or experts with special allowance can buy up to two flats in the city that they live; ii) non-local residents or foreign buyers can buy one flat only; and iii) for households who are allowed to purchase two flats, the interval for buying a second property must be at least two years. The HPR policy was first implemented in Beijing, and then adopted in many major cities. The goal was to curb the speculative housing demand for owning more than one property, thus providing more affordable housing opportunities for the first-time buyers and middle income households. Basically, the home purchase restriction was successful in reining the housing bubbles and lowering transaction volumes (Cao et al., 2015; Li, 2016; Sun et al., 2017).

While the home purchase restriction has a salient effect on containing housing prices, growing complaints about increasing local fiscal debts due to the declining land sale revenues that are on the rise. As the land sale was a major contributor to local fiscal income, containing

* Corresponding author.
E-mail address: jamescheong@hsmc.edu.hk (T.S. Cheong).

[1] Home purchase restriction refers to government initiated regulation on preventing buyers without a local residence permit from purchasing residential flat in major cities, which bears a planned economy feature. It was proposed in 2010 against the backdrop that housing prices in major Chinese cities had been increasing at double-digit growth rates over the previous decade, which had made housing more unaffordable. Policy makers tend to believe that the rich people who buy more than one property (who are likely to be speculators) are the main contributors to the property boom, thus initiating the HPR policy to stop the trend of homeownership financialization.

http://dx.doi.org/10.1016/j.regsciurbeco.2017.08.002
Received 13 July 2016; Received in revised form 5 July 2017; Accepted 3 August 2017
Available online 05 August 2017
0166-0462/

housing prices would affect fiscal sustainability of the local governments. Hence since late 2014, various cities have started relaxing home purchase restriction. By mid-2015, most cities have quitted the HPR policy except Beijing, Shanghai, Guangzhou, Shenzhen, and Sanya. Previous work has investigated the impact of implementing home purchase restriction on housing price (Du and Zhang, 2015), however little is known about the housing price dynamics after removing home purchase restriction. To the best of our knowledge, no study has been conducted to examine the responses to the HPR policy for different sizes of flats. This paper intends to fill in both gaps, using a distribution dynamic analysis to evaluate the price evolution trends of 70 large- and medium-sized cities' housing markets covering the period of January 2014 to June 2015, during which most cities had abandoned home purchase restrictions. The remainder of this paper is organized as follows: Section 2 reviews relevant literatures on China's housing market performance and housing price dynamics. Section 3 explains the mechanism of the distribution dynamics model and illustrates the data structure. Section 4 discusses the estimation results. Section 5 concludes the findings.

2. Literature review

Substantial literatures have examined the determinants of housing prices in China. Various factors were investigated, including land price and land sale (Li and Chiang, 2012; Pan et al., 2015; Wen and Goodman, 2013; Wu et al., 2012; Zhang et al., 2013), monetary supply and mortgage rate (Liang and Cao, 2007; Xu and Chen, 2012; Yu, 2010; Zhang and Sun, 2006; Zhang et al., 2012), income growth and unemployment rate (Chow and Niu, 2015; Hongyu and Yue, 2005; Li et al., 2014; Li and Chand, 2013; Wang and Zhang, 2014; Zhang et al., 2007), and hedonic price factors (Hanink et al., 2012; Jim and Chen, 2006; Kong et al., 2007; Zheng and Kahn, 2008). Du et al. (2011) maintained that urban housing market was more efficient than urban land market in terms of price response to external supply and demand shock. Guo and Huang (2010) found that the inflow and outflow of hot money an influential contributor to real estate price fluctuation. Bian and Gete (2015) maintained that productivity, saving glut, and policy stimulus were dominant factors of housing price booms. Lin and Tsai (2016) found an asymmetric reversion pattern of housing price rise and fall: there was resistance to the falling of housing prices, but an overreacting behavior to the rising of housing prices. Ahuja et al. (2010) argued that housing price boom will be maintained due to low interest environment, lack of alternative investment vehicles and underdeveloped housing mortgage market. Zheng et al. (2010) found that housing prices are lower in cities with higher ambient pollution levels. Wang et al. (2011) found that 1% increase in urban economic openness would lead to 0.282% increase in urban real estate prices. Choy and Li (2016) discovered that housing prices are jetted up indirectly in provinces with higher proportions of degree holders.

There has been no consensus on whether government intervention with the housing market was successful in China. On the one hand, Chen et al. (2011) found government's initiative of quickening urbanization significantly contributed to residential housing price increase. Mak et al. (2007) explored the homeownership constraints of Chinese households and found that the government restricted less affluent and rural buyers from accessing urban housing market. Tian and Ma (2009) argued that state intervention through land supply largely accounted for the real estate bubbles. On the other hand, Hui and Wang (2014) maintained that government's macro-control measures are inefficient to affect housing price and transaction volume. Wei et al. (2014) unraveled the evasive practices and illicit tactics of real estate developers to invalidate the policy effects of government's credit controls. Due to the Global Financial Tsunami, since 2009 the Chinese government has implemented a large fiscal stimulus package to maintain economic development. However, an intended outcome was that much of the fiscal stimulus package transfers paid to state owned enterprises were used to purchase real estate assets (Deng et al., 2011).

Regarding the effectiveness of home purchase restriction, Sun et al. (2017) found that home purchase restriction was helpful to squeeze out speculative demand and to dampen the soaring home prices in Beijing: specifically 17–24% decrease in resale price, 25% drop in the price-to-rent ratio compared to its historical mean, and a 50–75% reduction in sales transaction volume. Cao et al. (2015) argued that although home purchase restriction was effective to reduce property prices and transaction volumes, it was ineffective to contain the nationwide construction booms. Li (2016) found that the minimum effective period of home purchase restriction on containing housing price bubbles was 2 years for the 30 cities studied, which coincided with the banning period of eligible households for buying a second flat. He further revealed that among the 30 cities 26 did not show signs of housing bubbles for a period of 3 years after implementing the HPR policy. While these studies took different perspectives and adopted various techniques, none of them explored the housing price dynamics after quitting the HPR policy. This paper aims at filling this gap, based on the distribution dynamics analysis.

3. Research method and data

Distribution dynamics analysis was first proposed by Quah (1993). It can be broadly divided into two approaches, namely, the discrete Markov transition matrix approach and the stochastic kernel approach. The latter can be viewed as an improvement of the former as the latter can circumvent the issue of demarcation of state.

The bivariate kernel estimator used in the analysis can be represented as:

$$\hat{f}(x, y) = \frac{1}{nh_1h_2}\sum_{i=1}^{n} K\left(\frac{x - X_{i,t}}{h_1}, \frac{y - X_{i,t+1}}{h_2}\right) \quad (1)$$

where h_1 and h_2 are optimal bandwidths which are calculated based on the approach suggested by Silverman (1986), K is the normal density function, n is the number of observations, x is a variable representing the monthly growth rate of the housing price of a city at time t, y is a variable representing the monthly growth rate of the housing price of that city at time t+1, $X_{i,t}$ is an observed value of the monthly growth rate of the housing price of a city at time t, and $X_{i,t+1}$ is the observed value of the monthly growth rate of the housing price of a city at time t +1. It should be noted that the technique of adaptive kernel with flexible bandwidth is employed in this analysis in order to take the sparseness of data into consideration (Silverman, 1986).

Suppose that the evolution is first order and time invariant, so that the distribution at time $t + \tau$ depends on t only and not on any previous income distribution, then the distributions at time $t + \tau$ can be computed by:

$$f_{t+\tau}(z) = \int_0^\infty g_\tau(zx) f_t(x) dx \quad (2)$$

where $f_{t+\tau}(z)$ is the τ-period-ahead density function of z conditional on x, $g_\tau(zx)$ is the transition probability kernel which maps the distribution from time t to $t + \tau$, and $f_t(x)$ is the kernel density function of the distribution of growth rate of the housing price at time t.

The long-term steady state is termed the ergodic distribution. It can be computed by:

$$f_\infty(z) = \int_0^\infty g_\tau(zx) f_\infty(x) dx \quad (3)$$

where $f_\infty(z)$ is the ergodic density function when τ is infinite.

The three-dimensional plot and the contour map provides a lot of important information on the distribution dynamics, however, they are difficult to interpret. Therefore, the Mobility Probability Plot (MPP) is employed to analyze the mobility of growth of housing price for each city. This tool was developed by Cheong and Wu (2017), and it has been employed in various research areas in analyzing distribution dynamics, such as industrial output (Cheong and Wu, 2017), rural