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Water resources availability and the growth of housing prices in China

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ABSTRACT

A striking empirical feature of the currently overheated Chinese housing market is the coexistence of the steady growth in real prices and excess supply. In this study, we provide a new perspective to explain this feature, demonstrating that water resources availability plays a significant role in the formation of the housing market equilibrium. By using water resources, local governments can improve the waterfront amenities to entice consumers to participate in the housing market, which will increase the equilibrium price and may ultimately result in an increase in fiscal revenue and social welfare. We propose a theoretical model to describe the formation mechanism of the housing market equilibrium and use panel data on 31 provinces from 2004 to 2014 to test our theory. The results of our empirical study show that water resources availability positively affects the growth in housing prices, but that the marginal effect decreases. Our policy suggestion is that the central government of China should adopt customized policies to the housing markets of different provinces, considering their water resources availability and waterfront amenities.

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1. Introduction

In the past two decades, a large amount of research has addressed the rapid rise in housing prices in China and the subsequent overheating of the housing market (Wu et al., 2012; Dreger and Zhang, 2013). It is widely accepted that speculative investments and accelerating residential demand are the main demand-side contributors to housing market bubbles (Linchetberg and Ding, 2009; Zheng and Kahn, 2008; Hanink et al., 2012). On the supply side, some researchers argue that the “land finance” of local governments and land selling systems are crucial in the process of raising housing prices (Linchetberg and Ding, 2009; Lin and Yi, 2011; Su et al., 2012; Lin et al., 2014). In this paper, however, we claim that soaring housing prices may also be caused by the urbanization process and water resources sustainability.

Our study is motivated by a stylized fact of the Chinese housing market: steadily increasing housing prices coexist with an excess supply of housing. Fig. 1 demonstrates the relationship between the average real transaction price and excess supply from 2005 to 2014 in 35 large cities in China. Excess supply is measured by using the inventory ratio, which is the ratio of the area of housing inventory over the area of transacted housing.¹ This figure

shows a steady increase in real transaction prices when the Chinese housing market was experiencing excess supply during the past decade. Studies based on a conventional model of residential investment (Muellbauer and Murphy, 1997; Bertaut, 2002; Hongyu et al., 2002; Case et al., 2005; Wang, 2011) cannot explain this special phenomenon. Some search-and-bargaining studies (e.g., Wheaton, 1990; Carrillo, 2006; Albrecht et al., 2007; Albrecht et al., 2016; Genesove and Han, 2012; Ge and Wu, 2016) discuss that the heterogeneity in terms of trading partners may be one possible reason for this phenomenon.

We believe that some important factors have been ignored in previous research on China's housing market, namely water resources sustainability and waterfront amenities, because these factors influence both the demand and the supply sides of the housing market. Mays (2007, p. 13) defined water resources sustainability as follows:

“Water resources sustainability is the ability to use water in sufficient quantities and quality from the local to global scale to meet the needs of humans and ecosystem for the present and the future to sustain life, and to protect humans from damages brought about by natural and human-caused disasters that affect sustaining life.”

This definition incorporates all the important information related to water resources sustainability. However, matching the concept with the empirical data is challenging because data on water quality and natural and human-caused disasters are

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¹ The data are collected from the China Real Estate Statistics Yearbook 2004–2015.

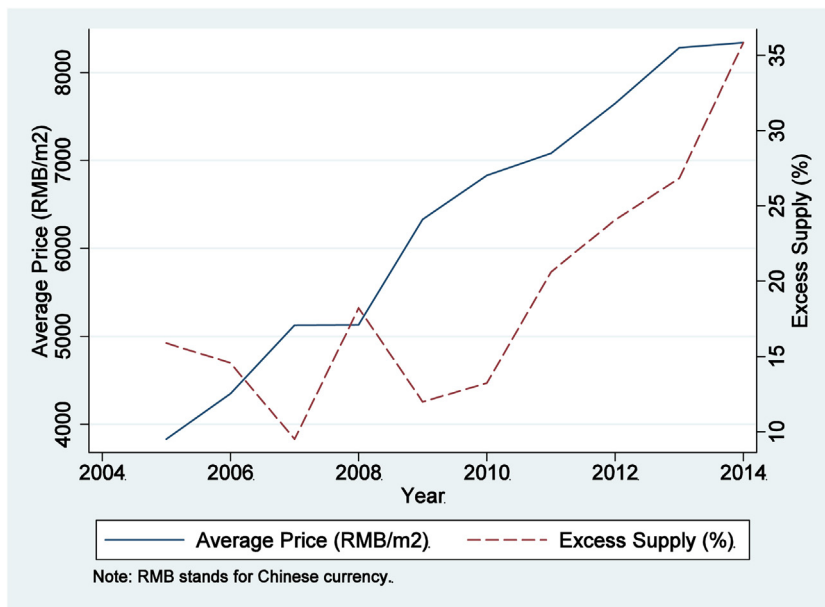


Fig. 1. Equilibrium Price and Excess Supply in the Chinese Housing Market.

lacking. In the analysis presented in this paper, we thus use the term “water resources availability” as an indicator of water resources sustainability. As water resources availability per capita increases, humans and the ecosystem find it easier to sustain life both in the present and in the future, while humans are also better able to sustain life during natural and human-caused disasters. We thus believe that water resources availability per capita, despite not serving as a perfect measurement, can shed light on how water resources sustainability might affect the Chinese housing market.

During the urbanization and economic development over the past decade, Chinese consumers’ housing preferences have changed considerably. As household income has increased, consumers have begun to pay more and more attention to the quality of the living environment (e.g., waterfront amenities), and their willingness-to-pay for properties with a high-quality living environment has risen (North and Griffin, 1993). On the other side, Chinese people still believe that living close to water is good for their health and fortune for cultural reasons, which reinforces the effects on housing demand. Hence, by using water resources, local governments can improve waterfront amenities to entice consumers to purchase properties. This policy both increases housing demand by consumers and decreases housing supply, as the government uses more land to build waterfront amenities (e.g., lakes, lakeside parks, green lands) instead of selling it to property developers. Combining these demand- and supply-side effects, transaction prices would grow and the fiscal revenue of local governments might also rise as they can collect more taxes from housing transactions. Hence, waterfront amenities and water resources availability may be key determinants of the market equilibrium, and thus their effects on the growth in housing prices need to be investigated.

Let us take the city of Nanchang as an example. Nanchang is the capital of Jiangxi Province, a less developed province in China, but one that has rich water resources. In recent years, the local government has chosen to create nearly around 10 lakes (i.e., Xianghu Lake, Aixihu Lake, Yaohu Lake, Qianhu Lake, Jiulonghu Lake, Chengbiyu Lake, and etc.) on empty lands rather than sell such lands to property developers. The total area of the region’s lakes increased to

2204 km² in 2013, representing 30% of the city area.² Many lakeside parks and green spaces were also constructed around these lakes. Unsurprisingly, the living environment around the lakes improved considerably, increasing land and housing prices in the local area. Hence, these policies also proved to be popular with the public.

This case illustrates the trade-off for local governments that want to maximize both fiscal revenue and social welfare: to sell more land or to provide more urban services. By sacrificing some land and improving waterfront amenities, local governments receive payoffs in terms of fiscal revenue and popularity. However, this strategy is optimal only for those provinces that have relatively high water resources availability because the marginal benefit of constructing lakes (or providing other urban water services) should be at least the same as the marginal cost for local governments. Otherwise, they have no incentive to improve waterfront amenities. The marginal cost of the strategy includes both the opportunity cost of sacrificing the land to provide waterfront amenities and the opportunity cost of water resources used. The only rational choice for those provinces with lower water resources availability is to sell land to property developers, which will increase the quantity of housing supplied and result in excess supply. Even for some developed provinces like Beijing or Shanghai, their marginal benefit of providing waterfront amenities are high given the housing prices are high. However, the opportunity costs of building waterfront amenities on empty lands are also high. They may still lack the incentive to provide more waterfront amenities, given their low water resources availability. Hence, the key variable in the decision-making process of local governments is the abundance and sustainability of water resources.

Many scholars have analyzed water resources sustainability and urban water infrastructure (Birol et al., 2006; Fagan et al., 2010; Listowski et al., 2013; Marteleira et al., 2014; Young and Loomis, 2014; Chang et al., 2014). Some research has focused on energy sustainability (Huang et al., 2013; Dong et al., 2015; Makki et al., 2015; Ren et al., 2015a, 2015b, 2015c; Li et al., 2016b), while others analyze the relationship between economic growth (Li et al., 2016a)

² These data were collected from the Chinese report “The investigation analysis of lakes in Nanchang city” published in 2013. Website: <http://www.docin.com/p-738447448.html>, accessed on March 29, 2016.

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