Urbanization, inequality and property prices: Equilibrium pricing and transaction in the Chinese housing market

Teng GE [a,*], Tao WU [b]

[a] Hull University Business School, University of Hull, Cottingham Road, Hull, HU6 7RZ, United Kingdom
[b] School of Economics, Jiangxi University of Finance and Economics, 169 Shuanggang East Road, Nanchang, 330013, China

A R T I C L E   I N F O

A B S T R A C T

The particularly overheated Chinese housing market, with its soaring property prices, has attracted a large amount of research. We point out three of its striking empirical features, which current literature leaves unexplored: co-existence of steady growth of real transaction price and excess supply, accelerations in price-to-income ratio, and significantly strong positive correlation between real transaction prices and income inequality. A search-equilibrium model is built to explain these facts. Heterogeneous buyers and homogeneous sellers randomly search for partners to trade in a frictional property market. The search equilibrium of the property market is either a high-price-and-low-transaction elitist matching equilibrium, or a low-price-and-high-transaction pooled matching equilibrium. The terms of trade determine which equilibrium arises. Empirical observations argue for the development of China's property market through evolution from a pooled matching equilibrium to an elitist matching equilibrium. We set out to show that the market equilibrium is always inefficient, due to crowding out externalities and market incompleteness. Policy experiments support redistributive tax, as a means to improve social welfare.

1. Introduction

In the last two decades there has been a large amount of research on the fast-rising property prices in China. The property market in China is now arguably regarded as being overheated (Dreger & Zhang, 2013; Wu, Gyourko, & Deng, 2012); it is widely accepted that speculative investments and accelerating residential demands are the main contributors to property market bubbles (Hanink, Cromley, & Ebenstein, 2012; Linchetberg & Ding, 2009; Zheng & Kahn, 2008). In this paper, we claim that the soaring property prices are an equilibrium phenomenon which is a consequence of China's economic development. Specifically, we argue that increases in property prices are the consequences of the evolution of the market from a pooled matching equilibrium to an elitist matching equilibrium. Whereas in the first equilibrium, transaction prices are lower and volume of trade is higher, in the second equilibrium transaction prices are higher but volume of trade is lower. Our model's predictions are consistent with the empirical evidence as documented in Sato (2006) and Zhang (2015).[1] Furthermore, we claim that policies such as direct distributive tax could reduce the transaction price and potentially correct market failures caused by crowding out externalities and market incompleteness.

---

* Corresponding author.
  E-mail addresses: t.ge@hull.ac.uk (T. Ge), roaroa.wu@gmail.com (T. Wu).
  [1] Zhang (2015) had documented the relationships between income inequality and access to housing with Chinese urban household survey (UHS) from 2002 to 2009. His findings provided some sound empirical evidences for our theory.

Our theoretical model is motivated by three stylized facts about the Chinese property market: first, a steadily increasing property price coexists with excess supplies of residential buildings; second, according to the house affordability index (price-to-income ratio), property transaction prices are growing at a higher rate than the average income; finally, both income and income inequality are strongly positively correlated with transaction price. Literature based on a conventional model of residential investment and asset pricing, including Bertaut (2002); Case, Quigley, and Shiller (2005); Muellbauer and Murphy (1997); Hongyu, Park, and Zheng (2002); Wang (2011), and Ren, Xiong, and Yuan (2012) cannot explain the first two facts; on the other hand, search-and-bargaining literature like Wheaton (1990); Carrillo (2006), and Albrecht, Anderson, Smith, and Vroman (2007); Albrecht, Gautier, and Vroman (2016); Genesove and Han (2012) are silent on the third factor above. Therefore, building an equilibrium model to investigate the Chinese housing market is a contribution to research on housing market in developing countries overall, and not just China.

We built a general equilibrium model within the framework of a random search. Ex-ante heterogeneous buyers are differentiated by their disposable wealth, while the homogeneous sellers endogenously choose certain types of houses to build, before contacting any buyers in the market. Sellers commit to the price they set for trade after the investment has been made. Then buyers and sellers randomly search for potential partners to trade. Hence, given the distribution of the buyers' wealth, sellers choose the optimal amount of investment in housing, and determine the asking prices in order to maximize their expected payoffs through a direct mechanism.

Due to market friction, the seller's optimal strategy trades off a higher profit margin, through charging a high price, against a higher probability of trade. We show that there exist two market equilibria: in the elitist matching equilibrium, sellers build high-quality houses (high investment) and sell these houses only to wealthy buyers at a high price, hence excluding less wealthy buyers from the trade; in the pooled matching equilibrium, sellers build medium-quality houses (low investment) and sell them to both types of buyers at a price also affordable to the less wealthy ones; hence, in the market, every contact is consummated into a trade. The first equilibrium arises when either the proportion of the wealthy buyers is sufficiently high, or the wealth inequality is sufficiently large. The second equilibrium arises when national wealth is relatively equally distributed among buyers or there is a relatively low proportion of wealthy buyers. We argue that the current development of the Chinese property market could be characterized by the elitist matching equilibrium. Furthermore, the model predicts that the increase in the income of wealthy households, supported by incessant economic growth, will result in even higher property prices in the future.

Neither of the above market equilibria are efficient. The volume of trade is inefficiently low in the elitist matching equilibrium, due to the crowding out externality exerted by wealthy buyers on the less wealthy ones. On the other hand, the market is incomplete for borrowing and lending. Such market incompleteness causes under-investment in properties in the pooled matching equilibrium, but over-investment in the elitist matching equilibrium. Through comparative statistical studies, our findings shed light on implications of the policy regulating the housing market in China. Since the distribution of wealth across the buyers plays a significant role in determining property prices, government policies aimed at curbing property prices need to take into consideration the reducing of the wealth inequality between the rich and the poor.

Previous research, including Wheaton (1990); Carrillo (2006); Genesove and Han (2012); Clayton, Miller, and Peng (2010), and Albrecht et al. (2007, 2016), has regarded the housing market as a typical market with trade frictions, where searching buyers and sellers coexist. These papers mainly concern stock–stock matching, i.e. trading with existing properties. Hence, there is a trade-off between time to trade and transaction price. However, inflows of newly completed constructions account for a large proportion of existing housing stock (according to Zheng & Kahn, 2008, this ratio was as high as 13.1% in 2005) and the price determination in an equilibrium stock-flow matching model remains to be solved. In our work, the equilibrium transaction price is determined by the distribution of types of buyers, and the evolvement of price is associated with the development of the reallocation of wealth among buyers. Furthermore, we allow the quality of the housing to be endogenously determined, thus differing from the above search models, which assume ex-ante homogenous, but ex-post heterogeneous matching specific house qualities. Consequently, our model implies the positive sorting in elitist matching equilibrium, which is analogous to search-and-matching models of labour market like Acemoglu (1999) and Albrecht et al. (2007, 2016).

The remainder of this paper is organized into six sections; Section 2 briefly discusses the recent findings in the Chinese housing market, which motivate our study; Section 3 presents the model and derives market equilibria; Section 4 shows a social welfare study; Section 5 describes the policy experiment study and the policy implications; Section 6 concludes and discusses potential future research.

2. Stylized facts about the Chinese property market

This section illustrates three striking features of the Chinese property market. We use annual market data ranging between 1991 and 2011, from the China Economic Information Network Statistical Database. This data includes information on the supply side of the market, for example annually completed new residential buildings (measured in square metres), and the demand side of the market, such as the annual average transaction price, annual transaction quantity (measured in square metres), and household income. We also use the rates of inflation and interest during the same period, published by the National Bureau of Statistics of China. All prices and incomes have been deflated, by taking 1999 as the reference base year.