MODELLING THE HOUSING MARKET AND HOUSING SATISFACTION IN URBAN CHINA

中国房地产市场和住房满意度建模研究

英文版

张方 著

上海交通大學出版社
SHANGHAI JIAO TONG UNIVERSITY PRESS

教育部人文社会科学研究青年基金项目（项目批准号：15YJC790140）

MODELLING THE HOUSING MARKET AND HOUSING SATISFACTION IN URBAN CHINA

中国房地产市场和住房满意度建模研究

英文版

张 方 著

上海交通大学出版社
SHANGHAI JIAO TONG UNIVERSITY PRESS

内容提要

本书主要对1998年后完全实现商业住房体系的中国房地产市场进行了探究。首先，开创性地利用system GMM模型发现影响中国房价上升的主要因素，并分析这些因素是如何影响房价的；其次，运用一系列统计检验和计量模型探究中国区域房价的收敛性和聚合效应；最后，利用有序概率模型对2006年中国综合社会调查数据进行建模分析，探究城镇居民生活幸福感和住房满意度与住房条件等房屋属性的关系，并研究住房条件对不同群体居民的不同影响。

本书适合相关领域的学生、研究人员阅读和参考。

图书在版编目(CIP)数据

中国房地产市场和住房满意度建模研究：英文/张方著.
—上海：上海交通大学出版社，2017
ISBN 978-7-313-15740-9

Ⅰ.①中… Ⅱ.①张… Ⅲ.①房地产市场—研究—中国—英文②住房—生活满意度—研究—中国—英文
Ⅳ.①F299.233.5

中国版本图书馆CIP数据核字(2016)第201008号

中国房地产市场和住房满意度建模研究(英文版)

著　　者：张　方
出版发行：上海交通大学出版社
邮政编码：200030
出 版 人：郑益慧
印　　制：凤凰数码印务有限公司
开　　本：710mm×1000mm　1/16
字　　数：362千字
版　　次：2017年1月第1版
书　　号：ISBN 978-7-313-15740-9/F
定　　价：68.00元

地　　址：上海市番禺路951号
电　　话：021-64071208
经　　销：全国新华书店
印　　张：20.5
印　　次：2017年1月第1次印刷

版权所有　侵权必究
告读者：如发现本书有印装质量问题请与印刷厂质量科联系
联系电话：025-83657309

Preface

The past three decades have witnessed the rapid development of the Chinese housing market[①], which is considered as a barometer of and an extremely crucial component of the whole Chinese economic system. Although some important findings have been obtained by previous research, many conclusions have been controversial and a comprehensive understanding of the mechanism and behaviour of the Chinese housing system is a worthwhile endeavour.

The existing studies about the Chinese housing market are mostly confined to qualitative analysis, lacking the support of a theoretical basis and empirical research. This book aims to employ more recent econometrical methodologies, from both theoretical and empirical perspectives, to systematically analyse several prevalent issues of the Chinese housing market. More specifically, this book is going to explore the main determinants of house prices, the convergence and ripple effects of regional house prices, and the interactive relationship between housing conditions and individual's subjective well-being.

Some empirical findings can be drawn from this book: 1) by using the system GMM dynamic panel data models, the results indicate that Chinese house prices are mainly affected by factors related to government policies and speculative demand rather than the urbanization process, which is

① "The Chinese housing market" in this book refers to the housing market in urban China, because the rural area of China has still implement the homestead system, which is completely different to the common concept of "housing market" system across the world. Generally, the homestead system in rural China aims to allocate homestead land to rural individuals by the village committees based on the average principal.

understandable in a non-fully market-oriented status quo; 2) there is evidence of very limited convergence of regional house prices by employing unit root tests, σ-convergence and β-convergence approaches; however, the alternative methods, such as panel regression models, Engle-Granger/Johansen cointegration tests and Granger Causality tests, imply that house prices can ripple out from some core cities to other cities; 3) the results of the Ordered Probit Models suggest that the housing conditions in urban areas play a significant role in peoples' subjective well-being in respect of housing satisfaction and overall happiness; additionally, the effects of housing factors impact on different groups of residents in different ways.

Due to the limitations of data sources in the early days, this book is the first to combine such a wide panel data series, on both the time dimension and geographic dimension, to study the Chinese Housing Market. Also, when analysing the convergence and ripple effects models, this book transfers the original link indexes used by previous scholars into modified constant growth indexes, which improves the efficiency of empirical models to a greater extent. In addition, approaches using the system GMM method, σ- and β-convergence analysis, Engle-Granger/Johansen cointegration tests and Granger Causality tests are first introduced into the study of the Chinese housing market, generally achieving good results especially in the determinants of house prices and the ripple effects of regional house prices. Moreover, except for the commonly used method of the Ordered Probit Model for the questionnaire survey research, this book produces the predicted value of housing satisfaction by using two-stage estimations, to investigate the effects of housing conditions and housing satisfaction on people's overall happiness. Meanwhile, the approach of "money equivalent effects" is also a new perspective in detecting the effects of housing conditions on overall happiness.

试读结束：需要全本请在线购买： www.ertongbook.com

CONTENTS

Chapter 1 Introduction ····· **001**

1.1 Research Motivations and Contributions ····· 001

1.2 Research Framework and Structure ····· 005

Chapter 2 Background to the Chinese Housing Market ····· **008**

2.1 Introduction ····· 008

2.2 Overview of the Chinese Housing Market Development ····· 009

2.3 Chinese Housing Reform ····· 015

2.3.1 The Development of Housing Policy ····· 016

2.3.2 The Development of Other Relevant Policies ····· 022

2.4 Achievements of Chinese Housing Reform ····· 033

2.4.1 The Diversification of Chinese Housing Types and Home Ownership Ratio ····· 034

2.4.2 Demand and Supply Sides of Housing Market ····· 035

2.4.3 Residential Investments ····· 036

2.4.4 Per Capita Housing Space ····· 037

2.5 The Major Problems of the Chinese Housing Market ····· 037

2.5.1 Housing Inequities for Householders with Different Income ····· 037

2.5.2 Lack of Sufficient Affordable House or Low-Rent Housing Supply ····· 040

2.5.3 Principal-Agent Problem ····· 044

2.6 Summary of the Chinese Housing Market ····· 047

Chapter 3 Empirical Analysis of Determinants of China's Housing Market …… 051
3.1 Introduction …… 051
3.2 Literature Review …… 052
3.2.1 The Impact Factors of Chinese House Prices …… 053
3.2.2 Methodologies and Models of Chinese House Prices …… 070
3.2.3 Summary of Literature Review …… 076
3.3 Methodology …… 078
3.3.1 Basic Model …… 078
3.3.2 Fixed Effects and Random Effects …… 082
3.3.3 2SLS or Instrumental Variables Estimator …… 084
3.3.4 Difference GMM and System GMM Method …… 085
3.3.5 Tests for Overidentification and Autocorrelation …… 089
3.3.6 The Long-run Equilibrium of DPD Model …… 090
3.4 Data Source and Description …… 092
3.5 Empirical Results …… 101
3.5.1 System GMM Estimations …… 101
3.5.2 Robustness Checks …… 107
3.6 Conclusion …… 110

Chapter 4 Testing the Convergence and Ripple Effects of Regional House Prices in China …… 113
4.1 Introduction …… 113
4.2 Literature Review …… 115
4.2.1 Literature on the Convergence and Ripple Effects of Regional House Prices Worldwide …… 115
4.2.2 Literature on the Convergence and Ripple Effects of Regional House Prices in China …… 126
4.3 Methodology …… 128
4.3.1 Unit Root Tests …… 128
4.3.2 σ-convergence and β-convergence …… 131
4.3.3 Cointegration Tests …… 134

4.3.4 Panel Regression Model for Ripple Effects ····· 137
4.3.5 Granger Causality Tests ····· 138
4.3.6 Conclusion of Methodology ····· 140
4.4 Data Description and Transformation ····· 141
4.4.1 Data Description ····· 141
4.4.2 Data Transformation ····· 148
4.5 Empirical Results ····· 158
4.5.1 Results of Unit Root Tests ····· 158
4.5.2 Results of σ-/β-convergence ····· 170
4.5.3 Results of Cointegration Tests ····· 172
4.5.4 Results of Panel Regression Models ····· 180
4.5.5 Results of Granger Causality Tests ····· 184
4.6 Conclusion ····· 190

Chapter 5 Housing and Life Satisfaction in Urban China ····· 216
5.1 Introduction ····· 216
5.2 Literature Review ····· 218
5.3 Data Sources and Data Description ····· 232
5.4 Methodology ····· 246
5.5 Empirical Results ····· 253
5.5.1 The Effects on Housing Satisfaction ····· 253
5.5.2 The Effects on Overall Happiness ····· 263
5.5.3 The Effects on Overall Happiness of Including Housing Satisfaction as an Explanatory Variable ····· 270
5.5.4 The Effects on Overall Happiness Using the Predicted Value of Housing Satisfaction ····· 278
5.5.5 The Money Equivalent Effects of Housing Conditions on Overall Happiness ····· 281
5.6 Conclusion ····· 283

Chapter 6 Conclusion ····· 288
6.1 Main Empirical Findings ····· 288

6.2 Implications ····· 292
6.3 Further Research ····· 294

References ····· **296**

Index ····· **311**

List of Figures

Figure 1.1 GDP Growth Rate of China: 1991 - 2010 ····· 001
Figure 1.2 Chinese Housing Price Index: 1997 - 2010 ····· 003
Figure 1.3 The Research Framework ····· 006
Figure 2.1 The Development Time Lines of Different Policies ····· 016
Figure 2.2 The Diagram of Chinese Housing Reform Process ····· 019
Figure 2.3 Three-Tier Housing Policy of China ····· 021
Figure 2.4 The development of Chinese real estate tax categories ··· 026
Figure 2.5 The classifications of Chinese commercial houses ····· 034
Figure 2.6 The Disposable Income Gap between the Top 3 and the Last 3 Provinces over Few Years ····· 038
Figure 2.7 The Mutual Relationships of Each Party in the Chinese Housing Market ····· 045
Figure 2.8 The Growth Rate and Percentage of Land Transfer Fees 2001 - 2010 ····· 046
Figure 3.1 The Nationwide Unemployment Rate in China, 1990 - 2009 ····· 065
Figure 3.2 Shanghai Composite Index and Average Housing Price, 1997 - 2008 ····· 068
Figure 3.3 The Correlation Framework of Chinese House Prices and Other Factors ····· 068
Figure 4.1 Theoretical interaction model of house prices ····· 127
Figure 4.2 China Diagram with 35 Cities' Geographic Locations ····· 144
Figure 4.3 The Link Index of HPI of 35 Cities from 1998Q1 to 2010Q4 ····· 145
Figure 4.4 The Link Index of HPI of 35 Cities by Groups over

1998Q1 - 2010Q4 …… 148
Figure 4.5 Link Index (HPI) Gap during Stable Period …… 151
Figure 4.6 The Difference Between Link Index (HPI) and Adjusted Index (P) …… 153
Figure 4.7 The Log of Transferred House Price (HP) Indices …… 157
Figure 4.8 The Graph of the 1st Difference of House Prices (DLHP) …… 162
Figure 4.9 The Coefficient of Variation of LHP over 1997Q1 - 2010Q4 …… 170
Figure 4.10 The Diagram of Highlighted Cities with Cointegration Relationship …… 173
Figure 4.11 The Diagram of Highlighted Cities by Granger Causality Test …… 184
Figure 4.12 Income Inequality in China, 1988 - 2007 (Gini Coefficient; CHIP data) …… 192
Figure 4.13 The Granger Causality Effects of Quarterly House Price Changes of Core Cites (Beijing, Hangzhou and Shenzhen) in the Short Run …… 196
Figure 4.14 The Granger Causality Effects of Yearly House Price Changes of Core Cites (Beijing, Hangzhou, Shenzhen and Guangzhou) in the Long Run …… 198
Figure 5.1 Predicting Family Life Satisfaction in Reforming Urban China: An Integrated Model …… 221

试读结束：需要全本请在线购买： www.ertongbook.com

List of Tables

Table 2.1 Key Milestones of Chinese Land Reforms Effecting Housing Market ····· 022
Table 2.2 The "Diwang" of different cities in 2009 ····· 024
Table 2.3 Three "Diwang" in Beijing on 15th March 2010 ····· 025
Table 2.4 The Adjustment of Housing Loans' Policies ····· 031
Table 2.5 Cost and Profit Comparison across Different Housing Projects of Vanke ····· 042
Table 3.1 Nationwide GDP Index, Average Disposable Income Index, Average House Price and Rental Indices, China 2000 - 2009 (2000=100) ····· 054
Table 3.2 The Adjustment of Statutory Reserve Ratio for Large Financial Institution and Nominal Six-month to One-year Benchmark Lending Rate ····· 094
Table 3.3 The Glossary of Variables ····· 097
Table 3.4 Statistics Summary ····· 098
Table 3.5 Correlation between house price and other explanatory variables ····· 100
Table 3.6 The Values of VIF ····· 101
Table 3.7 Estimation Results of System GMM Regressions ····· 102
Table 3.8 Estimation Results of FE and RE Models ····· 108
Table 3.9 Estimation Results of System GMM Regressions with Alternative Explanatory Variables ····· 109
Table 4.1 The Summary of Literature on the Convergence and Ripple Effect of Regional House Prices in the Worldwide ····· 124
Table 4.2 Classes and City Codes of 35 cities ····· 142

Table 4.3 Highway Mileage between Cities (km) ····· 143
Table 4.4 The Stable Period and the Index Difference after Adjustment ····· 152
Table 4.5 Tests of the Significance of the Trend for House Price Indexes of Each City ····· 157
Table 4.6 Panel Unit Root Tests for LHP and DLHP ····· 163
Table 4.7 Univariate Unit Root Tests of HPR ····· 165
Table 4.8 Panel Unit Root Tests of HPR ····· 167
Table 4.9 Panel Unit Root Tests for House Price Ratios Based on Different Benchmark City ····· 168
Table 4.10 Results of Both β-convergence Models with Full Sample and Sub-sample ····· 171
Table 4.11 The Pairwise Cointegration Relationship between Specific Cities ····· 174
Table 4.12 Johansen System Cointegration Test with Trend and Without Trend ····· 177
Table 4.13 Results of Ripple Effect Regressions for Beijing, Shanghai and Guangzhou (the first difference for quarterly change) ····· 181
Table 4.14 Results of Ripple Effect Regressions for Beijing, Shanghai and Guangzhou (the fourth difference for yearly change) ····· 182
Table 4.15 Number of Cities of Each City Causes Other Cities ····· 185
Table 4.16 Results of Ripple Effect Regressions for Beijing, Hangzhou and Shenzhen (the first difference for quarterly change) ····· 188
Table 4.17 Results of Ripple Effect Regressions for Beijing, Hangzhou, Shenzhen and Guangzhou (the fourth difference for yearly change) ····· 189
Table 4.18 Urban-Rural Income Gap & Inequality (CHIP data) ····· 193
Table 4.19 Asset Income & Inequality (CHIP data) ····· 193
Table 5.1 Literature on Different Categories of Determinants of Life Satisfaction ····· 218
Table 5.2 Independent Variables of the Predicating Family Life Satisfaction Model ····· 221
Table 5.3 The Methodologies and Findings of Knight and Gunatilaka

(2010, 2011) and Knight *et al*. (2009)'s Works ····· 224
Table 5.4 The Summary of Recent Happiness Studies in China ····· 229
Table 5.5 The 2006 CGSS Questionnaire List ····· 234
Table 5.6 Correlation between Subjective Wellbeing Variables and Other Explanatory Variables ····· 236
Table 5.7 The Summary of Statistical Features of Relevant Variables ····· 237
Table 5.8 The Descriptive Results between Individual Subjective Well-being and Housing Conditions ····· 244
Table 5.9 The Effects on Housing Satisfaction with Total Sample ··· 254
Table 5.10 Group Division Tests for Housing Satisfaction ····· 258
Table 5.11 The Separate and Interactive Effects of Age and Income on Housing Satisfaction ····· 259
Table 5.12 The Effects on Housing Satisfaction by Groups ····· 261
Table 5.13 The Effects on Overall Happiness with Total Sample ····· 264
Table 5.14 Group Division Tests for Overall Happiness ····· 266
Table 5.15 The Separate and Interactive Effects of Age and Income on Overall Happiness ····· 266
Table 5.16 The Effects on Overall Happiness by Groups ····· 268
Table 5.17 The Effects on Overall Happiness including Housing Satisfaction as an Explanatory Variable with Total Sample ····· 271
Table 5.18 Group Division Tests for Overall Happiness with Housing Satisfaction ····· 273
Table 5.19 The Separate and Interactive Effects of Age and Income on Overall Happiness with Housing Satisfaction ····· 274
Table 5.20 The Effects on Overall Happiness including Housing Satisfaction as an Explanatory Variable by Groups ····· 276
Table 5.21 Ramsey RESET Test for Misspecification ····· 279
Table 5.22 Comparisons of the Overall Happiness Regressions between the Regression using the Predicted Value of Housing Satisfaction and the Original Regression ····· 279
Table 5.23 The Money Equivalent Effects of House Size on Overall Happiness ····· 281

Glossary

[1] **The reform and opening up**: this policy was carried out by Chairman Deng in 1978, which marked the date that the Chinese economy started to transform from the centrally planned economy to the market economy.

[2] **Shi Ye Dan Wei**: quasi-government organizations.

[3] **Zhu Fang Gong Ji Jin**: the Housing Provident Fund program.

[4] **Quanqian**: refers to the property developers using many different ways to get financing from the market, especially the stock market and bond financing.

[5] **Quandi**: buying and holding land in hand as much as possible.

[6] **Wudi**: enterprises hold the land without selling or constructing any buildings

[7] **Wupan**: property hoarding, means enterprises delaying selling their dwellings in order to get more profits from house price increases.

[8] **NBSC**: National Bureau of Statistics of China.

[9] **Tube-shaped apartments**: a typical housing style in China, which is a product of the Chinese state-owned enterprises welfare housing system in the 1970s and 1980s. These buildings are dormitories with a long corridor, shared toilets & kitchens, and the same size individual rooms, usually less than 20 m^2 for each room.

[10] **An Ju Gong Cheng**: the largest affordable/low-renting housing project supported by the governments.

[11] **"90 - 70" Policy**: in 2006, the central government issued a declaration that real estate developers are obligated to allocate 70% of the total area in each of their new housing projects to "affordable housing", i.e., smaller than 90 m^2 per unit.

[12] **Diwang**: the highest records of land transfer fees.

[13] **Wenzhou Real Estate Corporation**: speculators from Wenzhou, a rich and developed area in Zhejiang province, that build up groups to acquire buildings for speculation in big cities, such as Beijing and Shanghai.

[14] **Hukou**: a unique Household Registration System in China with two types: official migration with Hukou transfer (or permanent migration), and unofficial migration without Hukou transfer (or temporary migration).

Chapter 1

Introduction

1.1 Research Motivations and Contributions

As we know, China has become one of the fastest developing countries in the world. Even during the Asian and the Global Financial Crises, the Chinese economy has still maintained a very high-speed of growth. As we can see from Figure 1.1, China's GDP growth rates have only dropped slightly after the 1997 Asian Financial Crisis and 2007 Global Financial Crisis. Even

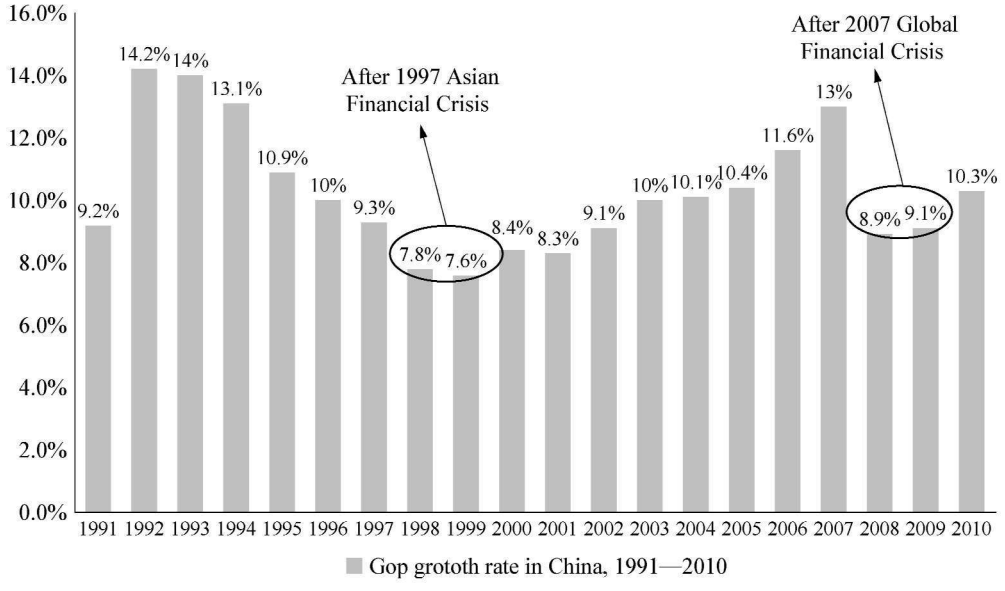

Figure 1.1 GDP Growth Rate of China: 1991 - 2010

Data Source: National Bureau of Statistics of China http://www.stats.gov.cn/.

during the crisis, the growth rates have stayed around 8%, which is still very impressive. Afterwards, China's economy has recovered very quickly from the financial crisis.

The housing market relates to a significant industry for the whole economic system and has always been a barometer of the economy. Since the welfare housing system① has been gradually phased out in the 1990s, the Chinese housing market has been through a rapid development over last two decades. In recent years, the fast urbanization has provided another favourable opportunity for the real estate market. Meanwhile, benefitting from land policy, financial support and local government policies, the high rate of return of the housing industry has attracted huge amounts of investments, to the extent that the Chinese housing market has sustained an increasing growth trend over recent times.

Real estate wealth has become one of the major factors promoting economic growth in China. It reflects not only the tendency for economic development but also the speed of economic development. Since the reform and opening-up②, marked changes have occurred within the Chinese housing market and the behaviour of the housing market in China has had a significant impact on the aggregate economy. Housing accounts for a significant proportion of the wealth of the personal sector③. Over the last 30 years in China, both the super-fast economic growth and the rapid increase of personal disposable income have stimulated the demand for owner-occupied dwellings, and thereby there has been a dramatic increase in house prices and house purchases. During the global financial crisis periods, most countries' housing markets have been through an unprecedented rough time; while the Chinese housing market has sustained growth rather than a depression, and Chinese house prices have kept an upward trend since the reform and opening-up in 1978 (see Figure 1.2).

---

① Under the welfare housing system, all land and housing resources were entirely owned, built and delivered by the state or state agents, such as local public entities and work units.

② The reform and opening-up policy was carried out by Chairman Deng in 1978, which marked that Chinese economy started to transform from central planning economy to market economy.

③ A similar situation exists in the UK (Holly and Jones, 1997) and US (Poterba, 1991).

试读结束：需要全本请在线购买： www.ertongbook.com