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The Hong Kong Polytechnic University

Department of Building and Real Estate

**Incentive Structure and Market Performance:
Institutional Analysis of Governments' Roles Affecting Land
and Housing Prices in China**

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**A thesis submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy**

September 2010

CERTIFICATE OF ORIGINALITY

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ABSTRACT

This thesis explores governments' incentive structures affecting land and housing prices in China. There are three reasons for such institutional analysis: There has been a profound transformation from a welfare housing system to a commodity housing system, which affects the central government's incentive structure. Land reform and fiscal reform have significantly influenced local governments' incentive structure. Changes and conflicts of central and local governments' incentive structures result in governments' interference with the urban land market and the commodity housing market, which affects land and housing prices.

Although China's economic reforms and the subsequent changes of its housing system has been the subject of numerous studies, this thesis takes another perspective that could broaden the discussion. While land and housing markets are expected to respond to institutional changes and conflicts of central and local governments' incentive structures, there has been little theoretical explanation and empirical evidence in China's context. This thesis establishes a conceptual framework to discuss the impacts of such changes and conflicts, with the case of China.

Research process of this thesis is as follows: First, it provides an extensive literature review on the changes and conflicts of governments' incentive structures pertaining to financial system, fiscal distribution, and land use rights. These changes and conflicts have reshaped China's land and housing markets in a way that differs from what is explained

by classical economic theories originating from western economies. Second, a conceptual framework is established to integrate the impacts of institutional changes and conflicts on land and housing price movements, proposing the research hypothesis and testable propositions. Third, econometric models are applied to the derived propositions to study the impacts of governments' incentive structure changes and conflicts on the land and housing prices. Econometric techniques applied in this thesis include panel data model, cointegration test, and Granger causality test.

The research hypothesis of this thesis is: *Local governments' incentives include political promotion incentive, fiscal revenue incentive and economic growth incentive, whereas the central government's incentives include social stability incentive, fiscal revenue incentive and economic growth incentive. Changes and conflicts of central and local governments' incentive structures have significantly affected land and housing prices in China over the past two decades.*

Empirical results show that China's land and housing markets have experienced a prolonged boom with occasional adjustments. The property boom was mainly promoted by local governments. Specifically, local officials are motivated to increase GDP growth, which enhances their political promotion probability. To achieve this goal, a higher proportion of land for residential and commercial usage is sold by public auction, which has a positive impact on GDP growth. Public auction results in higher land price, which gives rise to real estate developers' land hoarding strategy. Land hoarding, together with increased public expenditure, contributes to housing price escalation. On the contrary, the

central government cautions inflationary pressure and social welfare. Affordable housing project, among other regulative policies, has been introduced to mediate land and housing market booms.

In conclusion, it is found that there are diverse goals between central and local governments that have significantly affected land and housing prices in China. When the central government takes control, the market turns to adjustment; when local governments gain advantage, the market experiences a period of boom. As commodity market being established, the central government's influence on market adjustment is gradually lessened; while local governments' impact on market boom is increasingly intensified. The nature of this incentive-performance nexus is that natural experiments such as financial, land, and fiscal reforms balancing central and local governments' interests have affected China's land and housing markets over the past two decades.

LIST OF RESEARCH PUBLICATIONS

Refereed Journal Papers

Li, J., Chiang, Y.H., Choy, L.H.T. (2011). Central-Local Conflicts and Property Cycle: A Chinese Style. Habitat International, vol. 35, No. 1, pp. 126-132

Refereed Journal Papers under Review

Chiang, Y.H., Choy, L.H.T., Li, J. (2010). What Causes Insufficient Affordable Housing Provision in China? A Principal-Agent Perspective. Journal of Urban Planning and Development (ASCE), under review

Chiang, Y.H., Choy, L.H.T., Li, J. (2010). Government Incentive and Housing Price Movement: China's Character. Construction Management and Economics, under review

Li, J., Chiang, Y.H., Choy, L.H.T. (2010). An Investment-Driven Property Boom? Evidence from Shanghai. Habitat International, under review

Refereed Conference Papers

Chiang, Y.H., Choy, Lennon, Li, J. (2010). Elite Privilege or Impersonal Exchange: Evidence from China's Urban Land Market. International Society for New

Institutional Economics (ISNIE) 14th Annual Conference, Stirling, UK, June 2010,

<http://papers.isnie.org/stirling.html>

Chiang, Y.H., Choy, Lennon, Li, J. (2009). Unaffordable Affordable Housing: Institutional Conflicts between Central and Local Governments on Affordable Housing Project in China. 2009 Asian Real Estate Society-American Real Estate and Urban Economics Society Joint International Conference, Los Angeles, USA, July 2009, <http://www.areuea.org/conferences/papers/details.phtml?id=2038>

Li, J., Chiang, Y.H., Choy, Lennon (2008). Government Impetus and Investment Distortion: A Case Study of China's Housing Market. Ronald Coase Institute 2008 Beijing Workshop on Institutional Analysis, Beijing, China, December 2008, <http://www.coase.org/2008beijingprogram.htm>

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This thesis is dedicated to my parents for their continued support and understanding over the years that this journey has taken. A few lines express my memory of this era:

Research is like a boat
Rarely known what's up next
Set sail or put anchor
No matter
Guest or host
Whatever
Never say never

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CHAPTER 1 INTRODUCTION

1.1 RESEARCH BACKGROUND

The research question of this thesis is to what extent do changes and conflicts of central and local governments' incentive structures affect land and housing prices in China.

Although China's economic reforms and the subsequent changes of its housing system has been the subject of numerous studies, this thesis takes another perspective that could help broaden the discussion. Over the past two decades, there has been a profound commodity housing reform that changes a welfare housing system into a commodity housing system, which affects the central government's incentive structure. Meanwhile, land reform and fiscal reform affect local governments' incentive structure. While land and housing markets are expected to respond to institutional changes and conflicts of governments' incentive structures, little theoretical explanations and empirical studies have been carried out so far. This thesis intends to establish a conceptual framework to reflect such interactions, with empirical evidence in China's context.

This chapter starts with illustrating the research gap relating to the interaction between governments' incentive structures and price fluctuations in the land and housing markets. It then states the research hypothesis to be discussed in this thesis with elaboration on

derived propositions, followed by detailed research objective to be fulfilled. Finally, the thesis structure is proposed.

1.2 RESEARCH GAP

China's land and housing markets are frequently influenced by political institutions (Han and Wang, 2003; Zhang, 2006). Li and Yi (2007) divide housing reform into the Pilot Experimental Stage (1985-1991), the Double Track Stage (1992-1997) and the Complete Commercialization Stage (since 1998). At each stage, there are natural experiments involving financial, land, and fiscal rearrangements which affect governments' incentive structures, inducing governments' interference with the land and housing markets. However, little empirical evidence has been provided to investigate the impacts of governments' interference on land and housing prices so far. What is more, neglecting the impacts of such institutional changes and conflicts has resulted in inconsistent explanations of the price mechanism in China. For example, Zhang and Sun (2006) claim that the driving forces of China's current property boom include real lending rate, real effective exchange rate, and real estate loans. However, Liang and Cao (2007) find that interest rate is not significantly affecting property price, while Deng et al. (2005) find that bank loan is valid to explain China's housing price fluctuation. With regard to economic fundamentals, Liu and Shen (2005) find that housing price fluctuation in China is not well explained by economic fundamental such as unemployment rate and disposable income, whereas Zhang (2007) argues that both variables explain the formation of the equilibrium housing price. What has caused such differences?

To explain why previous studies are inconsistent, one must first notice the role of transformational forces affecting market performance. When markets themselves are undergoing a transformation, the price fluctuation mechanism can be different (Roulac, 1996). Moreover, housing price fluctuation among different countries are fairly similar, but there are always country-specific disturbances, such as those arising from social, political or cultural institutions (Borio and McGuire, 2004; Chen et al. 2004). Due to such institutional differences, the price fluctuation mechanism in emerging markets (such as China's land and housing markets) may differ from conventional wisdom.

Over the past two decades, China's land and housing markets have been deeply affected by both transformational forces (such as housing, land and fiscal reforms) and country-specific disturbances (such as the political promotion and social welfare systems). Hence it is necessary to consider the sources of these forces and disturbances (changes and conflicts of central and local governments' incentive structures) as well as their impacts on land and housing prices. Without addressing the sources and impacts of governments' incentive changes and conflicts, explanations of land and housing price fluctuations in China could not be convincing.

1.3 RESEARCH HYPOTHESIS

The basic notion of the research hypothesis is that in light of the past and existing incentive structure, local governments thrive to achieve regional economic growth and maximize fiscal revenue as the primary performance indicators of political promotion. In

the urban development context, local governments tend to increase infrastructure investment and public land sales, which in turn will increase land and housing prices as well as economic growth. Whereas in addition to economic growth and revenue sharing, social stability also forms an integral part of the central government's mission, inducing the central government's regulative measures over the land and housing markets. In summary, it is the changes and conflicts of central and local governments' incentive structures that attributed to the boom and adjustment of land and housing price movement in China over the past two decades.

Generally, the research hypothesis and its propositions will be developed in Chapter 3 which discusses the conceptual framework and research methodology. In this section, a brief illustration of the research hypothesis and derived propositions is as follows.

***Research Hypothesis:** Local governments' incentives include political promotion incentive, fiscal revenue incentive and economic growth incentive, whereas the central government's incentives include social stability incentive, fiscal revenue incentive and economic growth incentive. Changes and conflicts of central and local governments' incentive structures have significantly affected land and housing prices in China over the past two decades.*

Below is a series of derived propositions to be tested in the subsequent chapters.

Proposition 1: *Local officials have promotion incentive. They tend to facilitate activities that foster political promotion, such as economic growth, instead of their personal interests, such as rent seeking. In the urban land market, local officials prefer public land auction that is conducive to economic growth, and hence their chances of political promotion. Thus the null hypothesis of Proposition 1 is that the proportion of land sales by public auction is negatively related to GDP growth.*

Proposition 2: *Apart from promotion incentive, local officials also have growth incentive (which is beneficial to their future promotion) and revenue incentive (which is beneficial to their present power). In the urban land market, local officials sell residential and commercial land that is most conducive to economic growth by public auction (Proposition 2.1), whereas selling industrial land that is most conducive to fiscal revenue by private treaty (Proposition 2.2). Descriptive statistics will be provided to test Propositions 2.1 and 2.2.*

Proposition 3: *Local officials do not have stability incentive. Welfare provision that is not conducive to their growth or revenue incentives will not be in local officials' favor. In the commodity housing market, more government spending would go to infrastructure which increases both economic growth (Proposition 3.1) and land sale revenue (Proposition 3.2). Thus the null hypotheses are that infrastructure spending is negatively related to residential housing investment as well as residential housing price.*

Proposition 4: *Other than stability incentive, the central government also has revenue incentive. Affordable housing at the expense of fiscal revenue loss will be provided, but to limited extent only. In the urban land market, provision of social welfare such as affordable housing (Proposition 4.1) that negates fiscal revenue can be compelled by the central government (Proposition 4.2). Thus the null hypothesis of Proposition 4.1 is that affordable housing development is positively related to land price. Descriptive statistics will be provided to test Proposition 4.2.*

Proposition 5: *Other than social stability incentive, the central government also has growth incentive. Housing price could be suppressed by new housing supply in the pipeline, hence attenuating local governments' effort to promote economic growth by increasing public land sales. In the urban land market, the central government tends to tolerate connections between local officials and real estate developers to increase land sales by volume (Proposition 5.1) while hoarding land pieces for housing development (Proposition 5.2). The null hypothesis of Proposition 5.1 is that developers' market concentration is positively related to land price. The null hypothesis of Proposition 5.2 is that land development ratio is significantly affecting land price.*

Proposition 6: *The central government has social stability incentive which local officials do not have. The central government tends to monitor the overall price level and financial stability. In the commodity housing market, capital injection (mainly from bank loans) increases property development. Being cautious that property boom would add to inflation pressure, the central government tends to control monetary supply and increase*

interest rate to mediate inflation, rather than allowing the overall price level such as raw material price to soar due to increased housing price. The null hypothesis of Proposition 6 is that inflation and housing price are negatively correlated.

1.4 RESEARCH OBJECTIVE

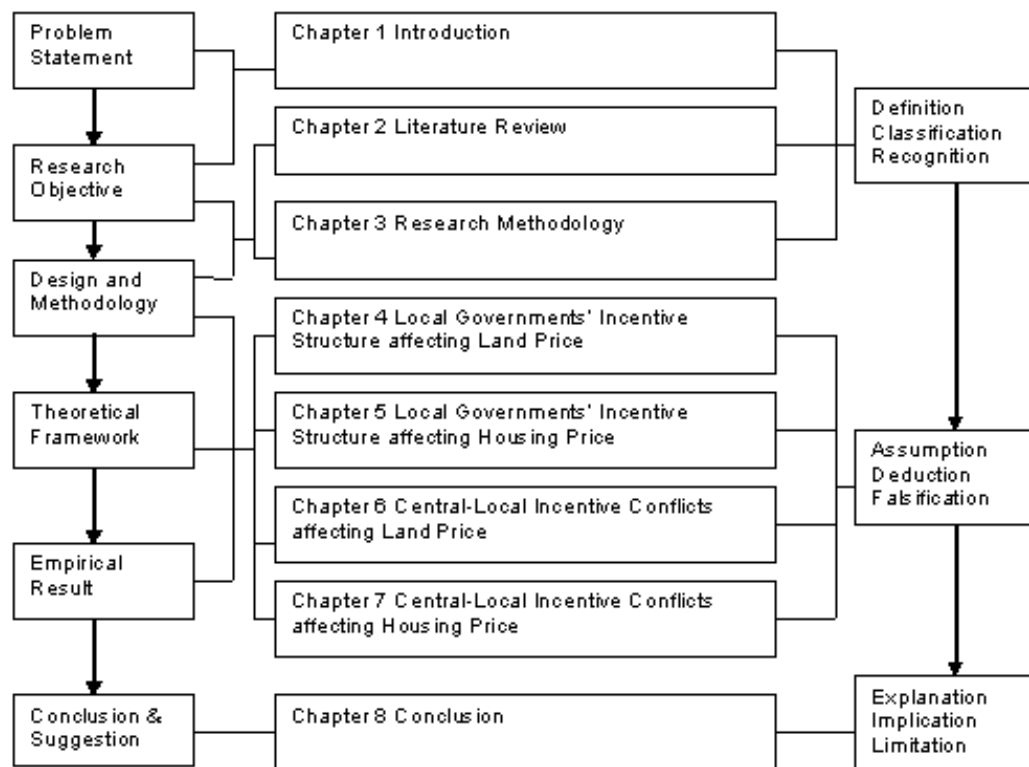
The following four specific objectives have been identified:

- To identify and analyze different historical stages of reforms in China's urban land market and commodity housing market, with illustration on matters relating to housing reform, land reform, fiscal and tax reform.
- To review research findings from literature and explain why these studies cannot well explain the price fluctuations in China's urban land market and commodity housing market.
- To theoretically verify and to empirically test the determinants of housing price and land price, considering central and local governments' incentive structure changes and conflicts.
- To evaluate the impact of government interference on the longitude and magnitude of price fluctuations, with policy implications for monitoring and regulating China's urban land market and commodity housing market.

1.5 THESIS STRUCTURE

Figure 1.1 shows the thesis structure. The remainder of the thesis is organized into 7 chapters.

Figure 1.1 Organizations of Chapters



Chapter 2 provides a comprehensive literature review of the central-local conflict issues affecting property investment at three historical stages: the Pilot Experimental Stage (1985-1991), the Double Track Stage (1992-1997), and the Complete Commercialization Stage (since 1998). Central-local conflicts mainly lie in three aspects: inflationary pressure, land use rights, and fiscal revenue distribution. The review discusses factors

that are likely to influence the outcome of this study (market performance in terms of volume), and highlights what remain to be explored (market performance in terms of price) in this thesis. On the one hand, local governments have increasingly affected the price fluctuation mechanism as land and housing markets became more mature. Therefore, local governments' incentive structure will be the primary focus of this thesis (Chapter 4 and Chapter 5). On the other hand, the central government's influence over land and housing markets has gradually decreased due to increased local interference. The central government's incentive structure will be compared with that of the local governments (Chapter 6 and Chapter 7).

Chapter 3 summarizes the general research framework and discusses the econometric approaches to be used in this thesis. Empirical models are proposed in this chapter to test the propositions derived from the research hypothesis. Econometric approaches include cointegration test, Granger causality, and panel data model. Specifically, Chapter 4 studies local governments' incentive structure affecting land price; Chapter 5 studies local governments' incentive structure affecting housing price; Chapter 6 studies central and local governments' incentives affecting land price; Chapter 7 studies central and local governments' incentives affecting housing price. Due to data availability, the time dimension will be split into two spans: an overall time span covering all the three stages (Chapter 5) and the Complete Commercialization Stage alone (Chapter 4, 6 and 7).

Chapter 4 studies local governments' promotion incentive, revenue incentive and growth incentive affecting land price (*Proposition 1&2*). It argues that more land sales through

public auction for residential and commercial usage increase local GDP growth, and hence local officials' chances of political promotion. However, only residential and commercial land that is most conducive to economic growth is sold by public auction, whereas industrial land that is most conducive to fiscal revenue is sold by private treaty.

Chapter 5 examines local governments' revenue incentive and growth incentive affecting housing price (*Proposition 3*). The long lasting property boom over the past two decades in Shanghai is found to be largely boosted by local government's increasing public expenditure, which suggests that local governments are not welfare servers who care about social stability.

Chapter 6 discusses the central government's revenue incentive and growth incentive affecting land price (*Proposition 4&5*). Empirical result shows that although affordable housing development is negatively related to land price and hence housing price, affordable housing keeps declining. Meanwhile, public land sales and developers' market concentration increases land price, while land hoarding has no effect on land price. The implication is that the central government also cares about revenue and growth, hence mediating the regulative policies on the land market.

Chapter 7 explores the central government's stability incentive affecting housing price. Controlling other factors, empirical result shows that housing price and inflation are positively related. The interpretation is that the central government also cares about social stability. Capital injection (mainly from bank loans) increases property investment and

hence affecting property price, which arouses central government's tension to mediate inflation.

Chapter 8 draws conclusions of the thesis, illustrates the research gaps that have been bridged, describes research limitations, and suggests directions for future work.

1.6 CHAPTER SUMMARY

This introductory chapter describes the framework for conducting the research study, including (1) research background, (2) research gap, (3) research hypothesis, (4) research objective, and (5) thesis structure.

CHAPTER 2 LITERATURE REVIEW

2.1 INTRODUCTION

Market performance is evaluated by two major factors: volume and price. While there is still a big gap on the interaction between governments' incentives and price fluctuations, a growing literature explores the impacts of governments' interference on property investment fluctuation in China. Most of these studies are under the property cycle category. Therefore, before discussing governments' incentive structures affecting price fluctuations, which is the main focus of this thesis, this chapter reviews China's property investment cycles affected by the governments. The literature review focuses on the incompatible incentive structures between the central and local governments that have affected property investment fluctuations in China over the past two decades. This chapter starts with a brief illustration of the commodity housing reform, the urban land reform, as well as the tax and fiscal reform, from which government conflicts emerged.

2.2 HOUSING, LAND, FISCAL AND TAX REFORMS

2.2.1 Commodity Housing Reform

The traditional housing system was featured by state ownership, rent compensation and welfare provision. This inflexible system increased state-owned enterprises' fiscal burden

and resulted in inefficient housing development. For example, compared to 1949, in 1978 the average residential area declined from 4.5 m² to 3.6 m² per person. 8.69 million households did not have their own residence, consisting 47.5% of the urban population¹. The housing reform aims at changing the welfare housing system into the commodity housing market.

Housing reform starts with experimental housing sales in several middle-sized cities in the middle 1980s. Housing cost was covered by three sources: one third from the state, one third from local enterprises, and one third from individual tenants. Due to serious inflation between 1987 and 1988, these experiments were soon called off for price stability consideration. In the early 1990s, a series of official documents were issued in this period to speed up the housing reform. According to *Document No.30 [1991]* issued on 7 June 1991, instead of living in company or state owned houses, eligible workers got grants to buy their own houses. On 17 Oct 1991, General Office of the State Council issued *Document No.73 [1991]* to officially initiate the nationwide housing reform to transform welfare housing to commodity housing. This reform quickly led to a property bubble between 1992 and 1993 in certain cities, such as *Haikou* and *Beihai*. Again being alert to inflationary pressure, the central government took little measures to further support the reform at this stage after 1993.

As the land and housing markets gradually cooled down, the State Council issued *Document No.43 [1994]* on 18 July 1994 to quicken commodity housing reform.

¹ Data Source: China's Annual Statistics of 50 Years (1949-1999)

Affordable housing project and housing provident fund were established to support housing purchase. Local governments are held responsibility for the outcome of commodity housing reform. As local governments were required to take on more duties while sharing higher property tax, the reform went on smoothly. By 1998, the welfare housing provision system was cancelled while the commodity urban housing market was established. On 3 July 1998, the State Council issued *Document No.23 [1998]* to regulate the commodity housing market. Local governments are encouraged to support affordable housing development while monitoring the commodity housing price level. Local governments should set revenue ceiling for property developers if housing price goes up too quickly. The central government supports housing development by allowing commercial banks to grant personal loans for housing purchase.

While local governments strongly support commodity housing investment, they were not enthusiastic towards affordable housing projects and setting revenue ceilings. Housing price kept increasing, forcing the State Council to issue a series of regulations, including the famous regulative measures of the “*National Eight Regulations*” (2005) and the “*National Six Regulations*” (2006). These regulations intend to stabilize housing price by increasing supply and decreasing demand, while speeding up the construction of affordable housing and low rent housing to meet the residential demand of low income people. As will be discussed in Chapter 6, the goals of providing shelters are far from being achieved.

On the whole, the central government is the primary advocator of the housing reform. Except for times when inflationary pressure was menacing social stability, the central government was always willing to encourage commodity housing development to enhance people's living conditions. As a consequence of the housing reform, the average urban residential area increased from 3.6 m² per person in 1978 to 27.1 m² per person in 2006². As for local governments, property tax and economic growth accelerator are major benefits from the housing reform. As the commodity housing market grows bigger, its positive influence on local governments' revenue and growth incentives increases. Therefore, local governments gradually became supporters of the housing reform.

2.2.2 Urban Land Reform

Urban land reform was initiated in later 1980s. On 1 December 1987, *Shenzhen* sold the first piece of state-owned land by auction as an experiment of separating land ownership from land use right. On 9 July 1988, *Shanghai* sold the first piece of state-owned land by public auction. Although these trials opened the door for the urban land market, in practice the legal obstacle from the constitution remained unsolved. As the constitution revised in 1982 put it: "Any organization or individual is not allowed to sell or rent land illegally". To overcome this obstacle, the constitution was revised in 1988, stating that "Land use rights can be transferred as commodity". After this revision, urban land transfer finally became officially admitted and legally permitted. On 19 May 1990, the State Council issued *Document No.55 [1990]* to construct the legal foundation of the

² Data Source: China Statistical Yearbook 2007

urban land market. This document consisted of three key items: First, the state re-ensures that the land use right transfer is legal. Second, the state identifies the buyers of land and protects their rights in the transfer. Third, the state classifies land use right transfer into three channels: private treaty, bidding and auction, which refers to private, partially public, and public land sales, respectively. Legally, China's land market came into being when this document was issued. Further revisions were made in 1994 and 1998, with minor changes of the details of transferring land use rights in the open market.

However, in the mid 1990s one of the important criteria to evaluate local officials' performance was their ability to attract foreign investment, thus land price was often intentionally depressed by local governments to attract foreign developers (Tian and Ma, 2002). Under such circumstance, most land was still granted by private treaty instead of public bidding or auction. Rent seeking was also predominant in these transfers (Zhang, 1997). To encourage land transfer through bidding and auction, on 30 April 2001 the State Council issued *Document No.15 [2001]* to push land transfer through bidding and auction. It was stated that "unless for state safety or confidential purposes, land for construction purpose is strongly recommended to be transferred through bidding and auction". "Strictly control private treaty, reporting all privately reached prices to the public is a necessity".

The 2001 document did not significantly change the land sale pattern. Between 2000 and 2003, the average proportion of land sale through private treaty remained 82.29% of total

land sales³. As a consequence, on 31 March 2004 the State Bureau of Land Resource issued a deadline on 31 August 2004 to stop selling land through private treaty. This compulsory command was called the “31 August Deadline”. Seeking to prevent corruption in nontransparent land transfer, this deadline reduced the proportion of land sale through private treaty to 65.73% between 2004 and 2007⁴. While the primary land market experienced changes of land transfer pattern, the secondary land market also emerged and expanded. From 1998 to 2005, the proportion of real estate mortgage loan to total fixed investment increased from 4.31% to 26.98%⁵, indicating the secondary land market’s rapid growth.

While great transformation took place in the urban land market, there remained an underlying institutional problem. Legally belonged to the people, in practice land sale revenue entirely goes to the governments. Because of this separation, the rise of the urban land market benefits the governments, while the people pay the cost of increasing land price and consequently, higher housing price. Further land reform is required to change the land revenue redistribution system between the government and the people. Whatever the central-local distribution may be, growth of land sales as well as land price escalation is consistent with both the central and local governments’ revenue incentives.

³ Data Source: China Land Resource Yearbook (2001-2004), calculated by the author. Detailed discussion on land sale pattern changes can be found in Chapter 4.

⁴ Data Source: China Land Resource Yearbook (2005-2008), calculated by the author.

⁵ Data Source: China Real Estate Yearbook 2006, calculated by the author.

2.2.3 Fiscal and Tax Reform

A sizable literature has emphasized the importance of fiscal decentralization for China's rapid economic growth in the 1980s and early 1990s (see for example, Tao and Yang, 2008). However, in 1994 China introduced a tax assignment system to replace the discretionary fiscal contract system. This fiscal reform reshaped the local governments' roles and goals in economic development, exerting impacts on the land and housing markets as well. The fiscal reform is divided by the milestone of the tax and fiscal reform in 1994.

Stage 1 (1978-1993) Fiscal Decentralization

According to Tao and Yang (2008), China's fiscal decentralization can be characterized by an evolutionary process at multiple levels: from central government to local governments, from local government to enterprises, from villages to households, and so forth. From 1983 to 1984, fiscal contracting reform took place to limit tax delivery to the central government while allowing local governments to share a larger proportion of fiscal revenue. Under this system, the central government signed contracts with local governments at provincial level, provincial governments signed contract with local governments at the city level, and so forth. This fiscal decentralization created strong incentives for local officials to seek long term revenue for their expenditure responsibilities.

Because of fiscal decentralization, local governments at this stage were shareholders rather than tax collectors. Therefore, state owned enterprises and township and village enterprises received favorable policies from local governments. For example, local governments pushed local banks to lend to local enterprises (Brandt et al, 2005), as local banks were subordinated to both the banking hierarchy and the local governments before late 1990s. In general, local governments' support of local enterprises enlarged their revenue base. However, this golden period was interrupted by the 1994 Fiscal and Tax Reform.

Stage 2 (1994-1998) Fiscal Centralization

During the fiscal decentralization reform from 1980s to early 1990s, China's economic transition was characterized by lessening state control while favoring local interest (Han, 2000; Zhang, 2003). Local governments had economic incentives to support business and pursue long term objectives (Montinola et al. 1995; Lin and Liu, 2000). However, given the continuous revenue decline, the central government embarked on a profound tax and fiscal reform in 1994. As part of the reforms, variable product tax from manufacturing industries was shared between central and local governments at the ratio of 75 percent versus 25 percent. This change significantly diluted the linkage between enterprises and local revenues (Wong and Bird, 2005).

The growing fiscal pressure after 1994 tax and fiscal reform led local governments to focus more on extra-budget revenue, among which land revenue constituted a large

proportion. Most land revenue was kept for local usage in the 1994 reform (Tian and Ma, 2008). However, the central government repeatedly tried to include some extra-budgets into the budgetary system. Land market was no exception. With commodity housing reform, the property market also became increasingly related to local governments' revenue source, as most property-related taxes are retained at the local level. This growing piece of the pie also aroused central government's appetite, inducing more central-local conflicts in fiscal revenue distribution (Li and Song, 2007).

2.3 LIMITATION OF CYCLE LITERATURE

Property cycle is appealing to researchers interested in market predictions. However, experience from explaining and forecasting these cycles has taught us to always: "give them a number or give them a date, but never give them both" (Hendershott and Weicher, 2002). As simple as this doctrine might sound and as true as it may be, the mechanism that underpins it requires discussion. What happened in the past two decades has invalidated, if not overthrown, the rational expectation hypothesis. A typical explanation for predicting failure involves imperfect foresight (Clayton, 1998; Case and Shiller, 2004; Akerlof and Shiller, 2009). Irrational expectation, such as myopic anticipation or herd instinct, leads to erratic price fluctuation and helps to explain the boom and bust of property markets (Gatzlaff, 1994; Clayton, 1997; Wang et al., 2000; Brooks et al., 2001; Hui and Lui, 2002); but it cannot distinguish various magnitudes and longitudes of property cycles in different markets.

Arising economic theories (Lucas, 1987; Mueller, 2002; Leung, 2004) and econometric approaches (McGough and Tsoolacos, 1999; Coleman and Gentile, 2001; Leung et al., 2002; Witkiewicz, 2002; Wang, 2003) have been applied to explore the nature of property cycles. In some studies, property cycle is related to changes of market fundamentals, such as inflation (Titman, 1982; Gordon et al., 1996; Anari and Kolari, 2002), income (Dokko et al., 1999; Tse and Raftery, 1999; Bjorklund and Soderberg, 1999; Jud and Winkler, 2002; Andrew and Meen, 2003; Gallin, 2006), interest and bank loan (Englund and Ioannides, 1997; Collyns and Senhadji, 2001; Okina et al., 2001; Davis and Zhu, 2004; Gerlach and Peng, 2005; Zhu, 2006; Chan et al., 2006). In others, explanations for endogenous oscillation stem from construction lags (Grenadier, 1995; Kummerow, 1999; Spiegel, 2001; Barras, 2005), land price fluctuation (Guntermann, 1997; Leung and Chen, 2006; Bostic et al., 2007), and financial market impacts (Sagalyn, 1990; Wilson and Okunev, 1999; Mejia, 1999; Brown and Liow, 2001).

To help grasp this extensive body of knowledge on cycle literatures, in their encyclopedic collection of writings on the property cycle, Pyhrr et al. (2003) call for “a common terminology, theoretical framework and methodology for cycle research by academic and industry researchers”. Their intention is to provide a more systematic framework to evaluate cycle literature, which would result in better investment strategies. The goal, however, is far from being achieved, and it may never be. The problem again lies in the unsuccessful prediction of cycles at different markets (Wheaton, 1999). When markets themselves are undergoing a transition, transformational forces that affect property

performance should be differentiated (Roulac, 1996). The implication is that due to transformation forces such as reforms in emerging markets, a cycle may be different.

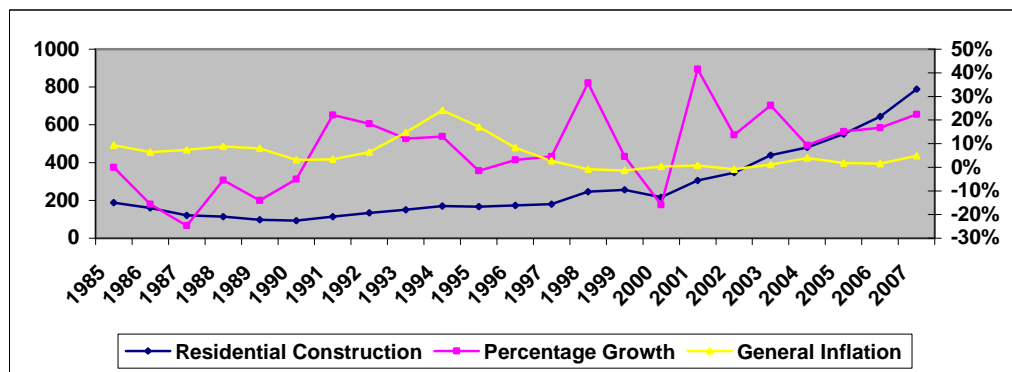
China's property market experienced dramatic changes over the past two decades. Li and Yi (2007) divide housing reform into the Pilot Experimental Stage (1985-1991), the Double Track Stage (1992-1997) and the Complete Commercialization Stage (since 1998). During this process, many natural experiments involving financial, land, and fiscal rearrangements were carried out to balance the conflicts between central and local governments' interest in the property sector. However, the existing literature has not explored conflict issues affecting property investment cycles. What is more, although there are some studies about transformation forces that lead to speculative bubble and housing inequality in China (Rosen and Ross, 2000; Wang and Murie, 2000; Huang and Clark, 2002; Sato, 2006; Lau and Li, 2006; Mak et al., 2007), none of them explore the impacts of institutional changes on land and housing prices.

To fill in these gaps, this chapter reviews the roles of central and local governments affecting property investment cycles in China. Instrumental underlying forces behind land and housing price fluctuations include changes and conflicts of central and local governments' incentive structures pertaining to financial system, fiscal distribution, and land usage. Taken place in a less regulated and continuously evolving system, these issues have reshaped land and housing price fluctuations into a pattern that differs from what is explained by classical economic theories originating from western economies.

2.4 CENTRAL-LOCAL CONFLICTS AFFECTING PROPERTY CYCLE

2.4.1 Pilot Experimental Stage (1985-1991)

Figure 2.1 Property Investment Cycle and General Inflation (million sq.m.)



Data Source: *China Statistical Yearbook on Investment in Fixed Asset 1950-2000, 2008*

The Pilot Experimental Stage was underpinned by reform measures such as sale of public housing at cost and gradual increase of public housing rent to cover maintenance cost at least (Li and Yi, 2007). This experiment was not successful, because compensation for public housing was still too much a burden to the local governments. Yet those from coastal cities were more passionate towards this trial than those from inland cities (Han, 1998). It was not that coastal city leaders had anticipated the prosperity of a commercialized housing market in the near future, but they were lured by capital inflow especially from Hong Kong, Macau and Taiwan enterprises to boost local economy (Wang and Murie, 1996). Before the early 1990s local authority enjoyed the fruit of fiscal decentralization and the primary criteria to evaluate an official's performance was the increase of foreign investment in his region (Zhang, 1997). Hence land price was

intentionally depressed by local governments (Walker and Mckinnell, 1995; Li, 1997), resulting in their excessive and *ultra-vires* usage of arable land, in order to satisfy their own need (Xie et al. 2002). Therefore, when the Land Administrative Law allowed land use right to be traded and transferred in 1988, the effect on residential construction was not as instant as expected.

While local government's goal of attracting foreign investors at discounted land price accounted for land conflict at the Pilot Experimental Stage, the property market also faced negative impacts from financial conflict. The late 1980s saw a fall in residential construction accompanied by aggregated inflationary pressure. To stabilize the economy, the central government stopped housing reform experiments before they were conducted to a larger scale. The policy uncertainties of the central government fended off especially foreign investors (Wang and Murie, 1999). It can be concluded that the central government did not actively participate in housing reform when approaching 1990s, due to inflationary pressure and political tension. Nevertheless, the entire economy was transforming from a planned economy system to a market economy system. Besides, fiscal decentralization took place from 1980s to early 1990s, enabling local governments to seize overwhelming power in local affairs. To maximize their revenue, they have economic incentive to support business (Montinola et al., 1995). Contrary to local governments' need of financial deregulation, the central government feared that overflow of capital would induce further inflation pressure. The victim of this financial conflict was housing development, which encountered serious problems before early 1990s, amid which the lack of financial support was a severe obstacle (Chen et al., 2006). Financial

regulation also eliminated individual housing investment, as banks primarily served the state rather than the market before a commodity housing market was established (Zhang, 2006).

At the Pilot Experimental Stage, property sector had not been a major source of fiscal revenue. Residential investment at this stage was mainly influenced by government conflicts from the state-owned banking system and land use right. The interaction between financial resource and land leasing also produced conflict. For example, property developers assigned by local officials often enhanced their credibility by pledging the land to be developed as collateral. Local government thus managed to transfer land default risk to state-owned banks. This was another type of central-local conflict induced from financial institutions and land use rights.

On the whole, residential construction was rather subdued throughout the late 1980s, due to the central government's dominant role in land use rights and financial institutions. With regard to land conflict, Chan (1999) demonstrates several early dysfunction patterns in the land market, including information release difficulty, land registration complexity, existence of black market, and corruption among local officials. Zhang (2001) illustrates the dilemma created by the radical shift to real estate commercialization: the central government intends to introduce a complete market mechanism while economic, social and political reality at local level does not allow the Chinese housing market to perform as intended. With regard to financial conflict, the central government needed to control price level to maintain social stability, thus inducing strict financial regulations. At this

stage, the central government dominated financial resources whilst local governments were not able to compete for land revenue. Consequently, residential construction was not on top of the central or local government's agenda, rendering abatement in investment from late 1980s to early 1990s.

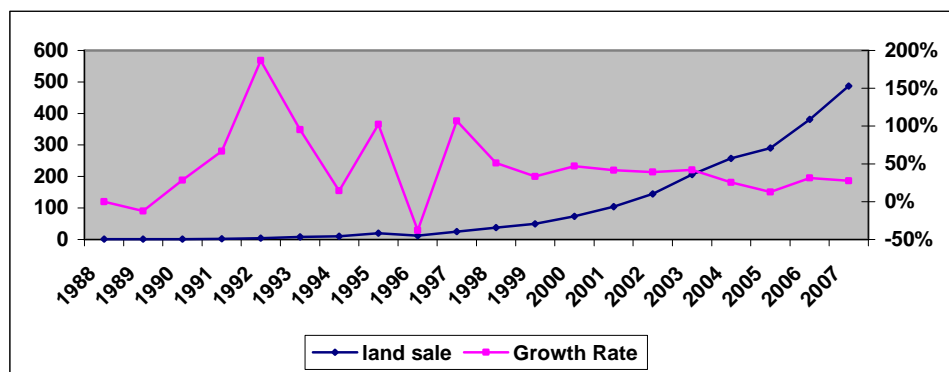
2.4.2 Double Track Stage (1992-1997)

The Double Track Stage was featured by two distinct housing provision systems: welfare housing and commodity housing. During this period, the central government still played a dominant role in market transformation. For example, Wu et al. (2006) emphasize the uniqueness of initializing and terminating the 1990s property cycle in Hainan: It is the central government who retained the capacity to directly interfere with the property market via finance and planning controls. In this sense, the 1990s Hainan cycle is largely a state-driven and experimental case in market transition. Evidence is also found in Guangzhou where the central government took control over the immature market before late 1990s (Wu et al., 2007). Meanwhile, central-local conflicts became more complicated, affecting the volatile fluctuation of residential construction (Figure 2.1).

On the financial front, the Housing Provident Fund was introduced in 1992 to accelerate market supply by accumulating funds for housing construction (Burell, 2006). As the central government became determined to carry out comprehensive reform of the urban housing system, financial institutions were inclined to support housing construction projects, and more personal funds were injected into housing construction (Zhang, 2000).

Because a fully developed commodity housing market had not yet been established, most capital entered into the land market which turned soar between 1992 and 1993 (Figure 2.2). Land was bargained at higher and higher price for speculation. Many developers acquired land for quick profits instead of housing construction, a process called “stir-frying” (*chaodipi*). This overheated industry induced hyperinflation and rising income inequality, causing the rapid growth of property sector to become a burden to the central government (Huang and Yang, 1996). Measures were taken to deal with inflation, including a tight control of bank loans to local governments and real estate developers. While financial deregulation partly gave rise to an upswing of residential construction in the early 1990s, financial regulation played a role in putting an end to the property boom. Again, at this stage financial conflict arose from the central government’s concern of inflation.

Figure 2.2 Local Governments’ Land Sale Revenue (billion RMB)

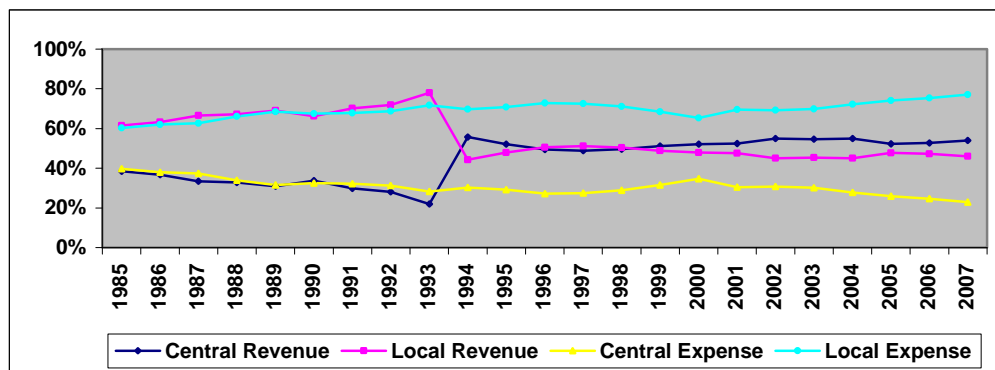


Data Source: *China Statistical Yearbook 1996, 2008*

The property market at the Double Track Stage was also influenced by fiscal conflict. Demarked by the 1994 tax and fiscal reform, the incentive of local government in

economic development was largely reshaped (Tao and Yang, 2008). Changes were made to centralize revenues yet keeping local authorities responsible for expenditure tasks (Figure 2.3).

Figure 2.3 Fiscal Revenues and Expenses (Central versus Local)



Data Source: *China Statistical Yearbook 1990, 2008*

In terms of housing provision responsibility, at the Pilot Experimental Stage the central government compensated local governments for welfare housing construction. At the Double Track Stage however, devolution was made to shift welfare housing provision to local level (Lim and Lee, 1993; Chen, 1996). There was no alternative of this transfer, as the central government was busy getting rid of the hyperinflation problem that menaced China's economy in the mid 1990s. The devastating double-digit inflation rate from 1993 to 1995 (Figure 2.1) left the central government with no choice but to transfer the burden to local governments. The measure of releasing central pressure had a profound impact on local government's behavior. Left with little formal budget autonomy, local authorities sought to benefit more from informal revenues, of which a large proportion came from land leasing. Fiscal conflict awoke local government's awareness of

benefiting from the emerging property market, which had a long-lasting impact on property cycle at the Double Track Stage and afterwards.

When the land market was soaring, local government enjoyed the excess profits from market speculation. However, the central government only received 2.63 billion of a 52.5 billion RMB that came from land leasing in 1995 (Huang and Yang, 1996). Historically, distribution of land leasing revenue between central and local governments experienced several changes. It was initially designed that the central government took possession of 32 percent of land leasing premium in 1988. However, local governments were reluctant to remit land revenue to the central government. After a series of bargains, nearly all the land leasing revenue fell into local government's pocket in the 1994 Tax and Fiscal Reform. Because local government solely enjoyed land revenue at the Double Track Stage, the central government had nothing to lose by regulating the land market, as it had nothing to do with the central coffer. As indicated in Figure 2.2, land sale for residential development dropped by 50% in 1996, due to the central government's strict control of land supply for residential housing development. In a word, land conflict was intensified at Double Track Stage.

To sum up, though the central government's regulation over property boom was successful, the reason is worth exploring. On the one hand, the immature commodity housing mechanism, restricted financial support, and imbalanced revenue distribution prompted central regulation over the property sector. On the other hand, capacity of commodity housing market was still small. When condition deteriorated, overheated

market quickly calmed down. Compared to Pilot Experimental Stage, fiscal revenue distribution became a major conflict issue affecting residential investment fluctuation. Inflationary pressure remained to be the central government's most serious concern. Central-local conflicts at this stage include monetary supply-inflationary pressure conflict, fiscal revenue and expense conflict, and land revenue distribution conflict. Property market had a striking boom from 1991 to 1993, which was largely attributed to fiscal decentralization, mild inflation and land revenue sharing. Subsequently from 1994 to 1997, the market adjusted itself because of fiscal centralization, hyperinflation and land revenue redistribution. Compared to Pilot Experimental Stage, local governments became increasingly influential in causing the property boom.

2.4.3 Complete Commercialization Stage (1998-)

When a commodity property market was finally established in 1998, housing investment and economic growth became more closely related. Chen and Zhu (2008) find a bi-directional Granger causality between housing investment and GDP using quarterly provincial panel data from 1999 to 2007. Peng et al. (2007) find similar linkage between residential investment and GDP growth from 1998 to 2004. These findings suggest that property sector has become a driver of economic growth, and local governments have that in mind when implementing relevant policies. For example, since 70% of public expenditure is assumed by local governments, the responsibility induced local governments to make decisions outside of the budget process (Wong, 2000). As Deng (2003) points out, public land leasing helps to include private firms into local

government's alternative revenue sources. More and more infrastructure projects are carried out, which enhance land value (Voith, 1991; Benjamin and Sirmans, 1996) and hence land transaction revenues (Yang and Gakenheimer, 2007). In turn, increasing land revenue also contributes to massive infrastructure projects as public goods provision by local governments (Ding, 2003). This revenue incentive drove local governments to favor a long run property boom by providing more infrastructure development.

While fiscal conflict pushed local governments to make the best use of the property boom to boost the economy, land conflict at the Complete Commercialization Stage was not as fierce as before. The main conflict at this stage was that the central government set a limit on the amount of farmland to be developed for housing usage, because of pressure from the growing population. However, local governments did not want to "waste" the developable land, so they always stalled on centrally directed welfare projects for which the piece of land was intended. However, the central government did not take a rigid attitude towards these trials. The reason is that in 1998, the Land Management Law was amended so that the central government could share 30% of revenues from leasing newly acquired land (Tian and Ma, 2008). From then on, the market has witnessed tremendous increase in residential investment. Moreover, the central government issued a deadline for tendering and negotiating land by August 31, 2004, which rendered higher land price and hence land revenue. In 2006, the central government again issued an order to stop giving land to developers for free or at very low prices. These measures were consistent with changes of the central government's position in land revenue distribution after 1998. As local governments remitted part of land revenue to the central government, land

conflict was lessened, land use regulation was less frequent and intense, and property boom was sustained.

Other than fiscal and land conflict, financial conflict at this stage also changed. Over the past decade, inflation pressure has subsided. Therefore, the central government shifted the goal of maintaining overall price stability to regulating more specific areas, property sector included. Before a commodity property market was finally established, the central government had already cautioned that a totally privatized property market might be out of the reach of low-income people. Hence, the affordable housing project was introduced as a complementary plan for market reform in 1995. Literature shows that attempts to utilize planning policies and regulations have little effect on producing enough supply of affordable housing (Lai, 1998; Ong and Sing, 2002; Paris, 2007). This problem of housing affordability triggered a new type of financial conflict in China. When the central government directs the state-owned banks to set lending limits on commodity housing projects, local governments resort to selling more land under the name of affordable housing projects to fill in the financing gap. Developers who bid for more affordable housing projects would then get more bank loans. As a chain of action and reaction, land revenue increases, property boom is sustained, and more bank loan is injected into property sector.

At this stage, the vast store of capital caused a so far unrelenting property boom, which intrigued the central government's attention. But unlike previous stages, as commodity housing market was fully developed, local governments got more fiscal revenue from

property sector. Thus they had increasing resistance against the central government's regulative directives on the property sector. What is more, land conflict was lessened because of land revenue redistribution between central and local governments. Financial conflict was no longer caused by inflationary pressure, but concern of low-income's living affordability. Because of local governments' strategic response, affordable housing project was not as successful as intended to cool down the property boom. In the end, property boom at Complete Commercialization Stage was extended and expanded compared to those at previous stages.

2.5 CHAPTER SUMMARY

This chapter extensively reviews the impacts of government conflicts on property booms and adjustments at three historical stages. Due to data constraint, empirical results of land and housing movements are scarce for the Pilot Experimental Stage and the Double Track Stage. Yet the review of literature can deepen the understanding of China's property market movements before the commodity housing reform in 1998. For example, the abovementioned property boom between 1992 and 1993 at the Double Track Stage can shed light on interpreting the mechanism of the property boom at the Complete Commercialization Stage: Compared to double-digit inflation between 1992 and 1993, the central government faces relatively milder inflationary pressure (below 5%) in recent years. Hence the central government is less motivated to exert rigid regulative methods, which may curb the property boom as well.

Specifically, the literature shows that property investment cycles are significantly influenced by the incompatible incentive structures pertaining to financial systems, fiscal distribution, and land use rights at different historical stages. Specifically, the stability incentive drives the central government to regulate the property market at both the Pilot Experimental and the Double Track Stages, especially when inflation rate is high. The conflicted revenue incentives of central and local governments induce competition in terms of fiscal and tax reform as well as land reform, consequently resulting in dramatic investment fluctuations in the land and housing markets at the Double Track Stage. At the Complete Commercialization Stage when the economy needs reviving, central and local governments increasingly focus on their consistent growth incentives. Central-local cooperate to boost the economy, rendering a prolonged period of property boom.

To sum up, governments' incentive changes and conflicts have played significant roles in affecting property investment fluctuation at different stages (Li, et al, 2010). While the interaction between governments' incentive structure and property investment has been studied, the transmission mechanism through which governments' incentives affect land and housing prices remains unexplored. Because market performance is estimated by changes in its volume and level, the next chapter will discuss the interaction between governments' incentive structure and market price movement in detail.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research classification of the thesis, followed by the establishment of the conceptual framework and elaboration of the hypothesis test. Finally, the econometric approaches for empirical models are specified.

3.2 RESEARECH CLASSIFICATION

According to Gay and Diehl (1992), research can be classified into basic research and applied research based on the degree to which findings have direct application and the degree to which they are generally applicable to other situations. Basic research involves the development and refinement of theory and is not concerned with practical applicability. It most closely resembles the laboratory conditions and controls usually associated with scientific research. Applied research concerns the application of theory to the solution of problems. These studies emphasize “what” works best more than “why” it works.

This research applies theories to explain the impacts of governments’ incentive structure changes and conflicts on land and housing price fluctuations, hence it is an applied research. Considering the research objectives, this study is an applied research with two methods:

- A comprehensive review of literature provides the basis upon which a conceptual framework is established.
- Econometric approaches are applied to estimate the influence of central and local governments on land and housing prices.

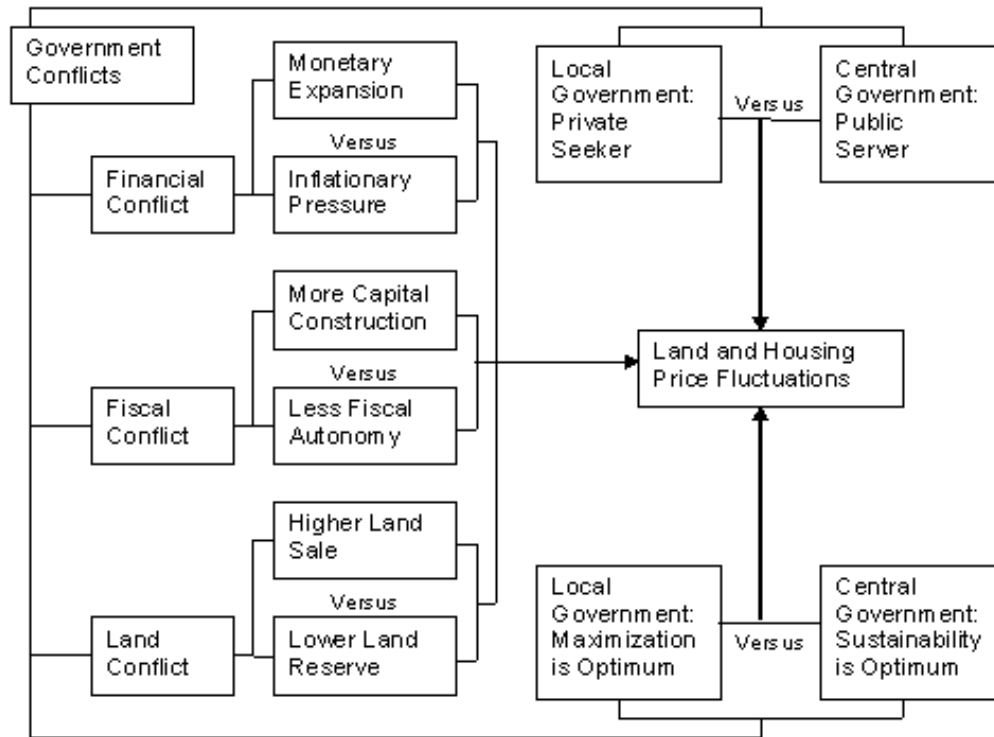
3.3 CONCEPTUAL FRAMEWORK

A series of housing, land, fiscal and tax reforms have reshaped central and local governments' incentive structures over the past two decades. Theoretically, thriving markets require not only an appropriately designed economic system, but also a secure political foundation which credibly commit the state to honor economic and political rights (Weingast, 1995). Governmental over-regulation of efficient business can be overwhelming, if the political system provides local governments with no incentive to increase tax base or provide public goods, such as Russia (Zhuravskaya, 2000; Berkowitz and Li, 2000). On the contrary, China's economic success heavily rests on a foundation of political reform which provides a considerable degree of credible commitment to markets (Montinola et al, 1995; Cao et al, 1999). Institutional reform in terms of fiscal decentralization encourages local elites to carry out more experiments that boost economic growth (Chhibber and Eldersveld, 2000).

While the fiscal system is decentralized, China's governance structure remains a top-down mandate (Zhang, 2006). Hence local governments' incentives to bail out inefficient projects largely depend on the trade-off between political benefits and economic costs

(Qian and Roland, 1998). Under the authorization political system, the central leaders can use personnel control to induce desired economic outcomes, by relating provincial leader's turnover probability to their economic performance (Li and Zhou, 2005). By retaining the prerogative to appoint local officials as well as the power to reconfigure central-provincial fiscal relations, the central government remains influential in interfering with local affairs (Yang, 2006).

In general, China's economic development in transition is characterized by lessening state control while favoring local interest in the economic field (Han, 2000; Zhang, 2003). Although decentralization gives rise to faster economic growth, conflicts between central and local governments are persistent, owing to their divergent economic and political roles. On the one hand, local officials are political agencies employed to govern the society with their own interest. They favor fiscal decentralization, which increases inflationary pressure since provincial and municipal leaders always compete with one another to boost their own economic growth for motives that may be shortsighted and at the expense of other's, with little consideration for the political consequence. On the other hand, the central government serves for public good, and favors centralizing financial resources to ensure sustainable economic development. Consequently, changes and conflicts of central and local governments' incentive structures affect the price fluctuations in land and housing markets (Figure 3.1).

Figure 3.1 Incentive Structures affecting Price Movements

Research Hypothesis: *Local governments' incentives include promotion incentive, revenue incentive and growth incentive, while the central government's incentives include stability incentive, revenue incentive and growth incentive. Changes and conflicts of central and local governments' incentive structures have significantly affected land and housing prices over the past two decades.*

Three implications emerge from this research hypothesis:

First, local governments' political promotion incentive and the central government's social stability incentive are incompatible. China's political promotion system remains a

top-down mandate. Local officials' effort to climb further up the career ladder can be regardless of or even harmful to social welfare, as Chinese voters have been so far powerless in affecting the outcome of political elections. This is the underlying conflict between central and local governments' incentive structure.

Second, central and local governments' revenue seeking incentives are incompatible. Both of them want to share a larger proportion of the taxes, charges and incomes. Intense competition exists in terms of the fiscal and tax reform as well as the land reform, redistributing revenues between central and local governments.

Third, central and local governments' economic growth incentives are consistent. Both of them want higher economic growth, yet they differ in the balance between speed and sustainability. Local officials want speedy economic growth as the direct proof of their ability in the political promotion competition, whereas the central government wants sustainable growth to control inflation for social stability consideration.

Given the complexity of central and local governments' incentive changes and conflicts, a series of testable propositions in relation to governments' incentive structures affecting land and housing prices are derived as follows.

Proposition 1: *Local officials have promotion incentive. They tend to facilitate activities that foster political promotion, such as economic growth, instead of their personal interests, such as rent seeking. In the urban land market, local officials prefer public land*

auction that is conducive to economic growth, and hence their chances of political promotion. Thus the null hypothesis of Proposition 1 is that the proportion of land sales by public auction is negatively related to GDP growth.

Proposition 2: *Apart from promotion incentive, local officials also have growth incentive (which is beneficial to their future promotion) and revenue incentive (which is beneficial to their present power). In the urban land market, local officials sell residential and commercial land that is most conducive to economic growth by public auction (Proposition 2.1), whereas selling industrial land that is most conducive to fiscal revenue by private treaty (Proposition 2.2). Descriptive statistics will be provided to test Propositions 2.1 and 2.2.*

Proposition 3: *Local officials do not have stability incentive. Welfare provision that is not conducive to their growth or revenue incentives will not be in local officials' favor. In the commodity housing market, more government spending would go to infrastructure which increases both economic growth (Proposition 3.1) and land sale revenue (Proposition 3.2). Thus the null hypothesis of Proposition 3.1 is that infrastructure spending is negatively related to residential housing investment which is conducive to economic growth. The null hypothesis of Proposition 3.2 is that infrastructure spending is negatively related to residential housing price which is conducive to land sale revenue.*

Proposition 4: *Other than stability incentive, the central government also has revenue incentive. For example, affordable housing at the expense of fiscal revenue loss will be*

provided, but to limited extent only. In the urban land market, provision of social welfare such as affordable housing (Proposition 4.1) that negates fiscal revenue can be compelled by the central government (Proposition 4.2). Thus the null hypothesis of Proposition 4.1 is that affordable housing development is positively related to land price. Descriptive statistics will be provided to test Proposition 4.2.

Proposition 5: *Other than social stability incentive, the central government also has growth incentive. For example, housing price could be suppressed by new housing supply in the pipeline, hence attenuating local governments' effort to promote economic growth by increasing public land sales. In the urban land market, the central government tends to tolerate connections between local officials and real estate developers to increase land sales by volume (Proposition 5.1) while hoarding land pieces for housing development (Proposition 5.2). The null hypothesis of Proposition 5.1 is that developers' market concentration is positively related to land price. The null hypothesis of Proposition 5.2 is that land development ratio is significantly affecting land price.*

Proposition 6: *The central government has social stability incentive which local officials do not have. The central government tends to monitor the overall price level and financial stability. In the commodity housing market, capital injection (mainly from bank loans) increases property development. Being cautious that property boom would add to inflation pressure, the central government tends to control monetary supply and increase interest rate to mediate inflation, rather than allowing the overall price level such as raw*

material price to soar due to increased housing price. The null hypothesis of Proposition 6 is that inflation and housing price are negatively correlated.

3.4 MODEL SPECIFICATION

Chapter 4 tests *Proposition 1&2* by studying local governments' incentive structure affecting land price. The null hypothesis for *Proposition 1* is formulated on the assumption that public auctions of residential and commercial land are more conducive to economic growth, which enhances the political promotion probabilities of the local officials. The empirical model is hence specified as follows:

$$GDP_{it} = \alpha_0 + \alpha_1 land_{it} + \alpha_2 POP_{it} + \alpha_3 EDU_{it} + \alpha_4 FI_{it} + \alpha_5 POL_{it} + \varepsilon_{it} \quad (3.1)$$

Where α_{it} is fixed effect dummy, β_t is year effect dummy. It is expected that the coefficient of land sale by public auction would enhance GDP growth, which means α_1 is expected to be positive in Equation (3.1). The fixed effect panel data uses data sets of 30 provinces and municipalities, covering the period from 2000 to 2007.

Proposition 2 cannot be directly tested by formulating null hypothesis. However, statistical description of land sale for different usage will be used to test *Proposition 2.1&2.2*. The statistics covers the period from 2003 to 2007 on a national basis.

Chapter 5 tests *Proposition 3* by studying local governments' incentive structure affecting housing price. Empirical analysis explores the cointegration relationship between public expenditure and residential investment, public expenditure and residential

housing price in the city of Shanghai from 1987 to 2008 on an annual basis. Correlation is expected to be positive between public expenditure and housing price, based on the assumption that higher spending on public facilities results in increased GDP growth (*Proposition 3.1*) and higher land revenue (*Proposition 3.2*).

Chapter 6 tests *Proposition 4&5* by studying central-local incentive conflicts affecting land price, using annual data from 33 major Chinese cities. Fixed effect panel data model for land price is:

$$lp_{it} = \alpha_0 + \alpha_1ahr_{it} + \alpha_2par_{it} + \alpha_3mcr_{it} + \alpha_4hp_{it} + \alpha_5ldr_{it} + \lambda_i + \varepsilon_{it} \quad (3.2)$$

$$(1 \leq i \leq N, 1 \leq t \leq T)$$

Determinants of land price include affordable housing ratio, public auction ratio, developer's market concentration, housing price, and land development ratio.

Proposition 4 has two propositions. To test *Proposition 4.1*, in Equation (3.2) land price is assumed to be negatively related to affordable housing ratio. To test *Proposition 4.2*, statistical description of affordable housing development will be given.

Proposition 5 has two propositions. To test *Proposition 5.1*, in Equation (3.2) land price is assumed to be negatively related to market concentration ratio. To test *Proposition 5.2*, in Equation (3.2) the coefficient of land development ratio should not be significant.

Chapter 7 tests *Proposition 6* by studying central-local incentive conflicts affecting housing price. Cointegration analysis and Granger causality test are employed to the monthly data (2000-2009) on the national basis. Controlling local governments' influence

(public expenditure and land sale), it is expected that housing price and inflation are negatively related.

3.5 RESEARCH METHOD

This section gives more details with respect to their implementations. Given the comprehensive literature review in Chapter 2, this chapter mainly discusses econometric approaches for empirical models.

3.5.1 Literature Review

In line with the six purposes of literature review (Ridley, 2008), Chapter 2 has extensively reviewed central-local conflicts in financial system, fiscal distribution, and land use rights. The literature review gives an overview of the current context in which the research is situated by referring to contemporary debates, issues and questions in the field (the on-going unrelenting property boom), including a discussion of relevant theories and concepts which underpin the research (supply-demand nexus). Next it introduces relevant terminology and definition (government interference) to clarify how terms are used in the context of the research work. It then describes how the current work extends and addresses a gap in the related research in that field (incentive changes and conflicts affecting price fluctuations). Finally, it provides supporting evidence for a practical problem (the interaction between incentive structure and price fluctuation) which the research is addressing, thereby underlining its significance.

3.5.2 Econometric Methods

Unit Root Test

Since land and housing price indices involve with time series data, their stationary properties are important. To test whether the time series data is stationary, the first econometric method to be applied in the following four chapters is the unit root test.

A stationary time series process is one whose probability distributions are stable over time in the following sense: The stochastic process $\{x_t : t = 1, 2, \dots\}$ is stationary if for every collection of time indices $1 \leq t_1 < t_2 < \dots < t_m$, the joint distribution of $(x_{t_1}, x_{t_2}, \dots, x_{t_m})$ is the same as the joint distribution of $(x_{t_1+h}, x_{t_2+h}, \dots, x_{t_m+h})$ for all integers $h \geq 1$ (Wooldridge, 2009). Since a wrong choice of data transformation produces biased results and has consequences of wrong interpretation, it is crucial to check the stationarity of time series data to set up an appropriate methodology in the formation of econometric models (Engle and Granger, 1987). To determine the order of integration, Augmented Dickey-Fuller test (Dickey and Fuller, 1979) for detecting unit root is run. To test stationarity, the following auxiliary equation is used:

$$\Delta y_t = \alpha + \beta y_{t-1} + \gamma t + \sum \lambda^t \Delta y_{t-1} + \varepsilon_t \quad (3.3)$$

where Δ is the first differencing operator, and ε_t is the error term with zero mean and constant variance. The null hypothesis is that unit root existence in y_t is rejected, when β is not zero. Ordinary least square method is used in the estimation of equation. In case

the null hypothesis cannot be rejected, the same procedure will be applied on the first order differenced y_t , second order differenced series, and so on until a stationary differenced series with no unit root is identified. If the null hypothesis of a unit root is rejected at n differences, the series is said to be integrated of N or $I(n)$.

For panel data stationarity, Im et al. (2003) construct a unit root test for panel data. Suppose panel sets include n series each containing T observations. For each series, first perform an ADF test of the form:

$$\Delta y_{it} = a_{i0} + \gamma_i y_{it-1} + a_{i2} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-j} + \varepsilon_{it}, i = 1, \dots, n \quad (3.4)$$

Once various γ_i estimated, t-statistics are obtained to test the null hypothesis $\gamma_i = 0$. For the panel unit root test, form the sample mean of individual t-statistics t_i as:

$$Z_{tbar} = \frac{\sqrt{n}}{\sqrt{\text{var}(t_i)}} [\bar{t} - E(t_i)] \quad (3.5)$$

Z_{tbar} has an asymptotic standardized normal distribution under large samples. $E(t_i)$ and $\text{var}(t_i)$ are respectively the mean and variance of t_i . \bar{t} is the weighted average of t_i .

Panel Data Model

While the stationary property of data can be easily identified by unit root test, a more complex problem with empirical analysis is the data availability. For example, as the mainstream statistical publications in China, the Real Estate Yearbook provides land price from 35 major cities, while the Land Resource Yearbook provides land price from

30 provinces and municipalities. However, both yearbooks are only available after 2000. Given the limited time span T , it is necessary to expand the range span N to provide consistent estimation of coefficients. Thus the *Panel Data Model* will be used in Chapter 4 and 6, which discuss the land price determinants from 30 provinces and municipalities (Chapter 4) and 33 major cities (Chapter 6) on an annual basis.

A panel approach allows for the control of individual heterogeneity, reducing the problem of collinearity and providing more degrees of freedom (Hsiao, 2003). A fixed effect model assists in controlling for unobserved heterogeneity, when this heterogeneity is constant over time: typically the ethnicity, the year and the location. Its major drawback is that the model uses a large number of dummy variables that reduce the degree of freedom. Alternatively, a random effect panel model controls omitted variables that are fixed among cases but vary over time. It controls region-specific factors through the error term rather than the constant. In other words, the omitted factors in the random effect model are constant over cases, but vary over time.

Both Chapter 4 and 6 choose fixed effects model because (i) Both chapters explain land price fluctuations, hence variables that vary over time cannot simply be omitted; (ii) Fixed effects model is always much more convincing than random effects for policy analysis using aggregate data (Wooldridge, 2009); (iii) The number of geographical regions is sufficiently large relative to the time span, thus the random sampling assumption in panel data is conceptually flawed.

Formally a fixed effect model is defined as:

$$y_{it} = x_{it}\beta + \alpha_i + u_{it} \quad (3.6)$$

where y_{it} is the dependent variable observed for individual i at time t , β is the vector of coefficients, x_{it} is a vector of regressors, α_i is the individual effect and u_{it} is the error term.

This constant can be removed from the data, for example by subtracting each individual's means from each of the observations before estimating the model. The coefficient can be estimated via:

$$\hat{\beta} = \left(\sum_{i,t} \hat{x}'_{it} \hat{x}_{it} \right)^{-1} \left(\sum_{i,t} \hat{x}'_{it} \hat{y}_{it} \right) \quad (3.7)$$

where $\hat{x}_{it} = x_{it} - \bar{x}_{it}$ is the zero-mean regressor, and $\hat{y}_{it} = y_{it} - \bar{y}_{it}$ is the zero-mean dependent variable.

Cointegration

Another problem that affects the outcome of empirical analysis is model validity. When discussing time series with longer span, simple linear equation may not provide consistent estimation of coefficients. Chapter 5 discusses housing price determinants using annual data from Shanghai, covering a period of 22 years. Chapter 7 discusses housing price fluctuations from 2000 to 2009 on a monthly basis, covering a time span of more than 100 data units. To explore the long-term interaction among variables, *cointegration* analysis and *Granger causality* test will be utilized.

If a set of variables are non-stationary, but a linear combination of them is stationary, then these variables are said to be cointegrated (Engle and Granger, 1987). Specifically, if we have X and Y as CI (1) series, there must exist a representation describing the long-run equilibrium dynamics. Consider an ADL (1,1) model for brevity:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 X_t + \alpha_3 X_{t-1} + \mu_t \quad (3.8)$$

where $\mu_t \sim \text{i.i.d.}(0, \sigma^2)$. Take Expectation of the above equation, we have:

$$E(Y_t) = \alpha_0 + \alpha_1 E(Y_t) + (\alpha_2 + \alpha_3) E(X_t)$$

$$\Rightarrow E(Y_t) = \frac{\alpha_0}{1 - \alpha_1} + \frac{(\alpha_2 + \alpha_3)}{1 - \alpha_1} E(X_t) \quad (3.9)$$

Take $k_0 = \frac{\alpha_0}{1 - \alpha_1}$, $k_1 = \frac{(\alpha_2 + \alpha_3)}{1 - \alpha_1}$, we have:

$$E(Y_t) = k_0 + k_1 E(X_t) \quad (3.10)$$

where k_1 is the long-run multiplier of X_t on Y_t .

To identify the cointegration relationship, two statistics are utilized to estimate the cointegration vectors: a trace test and a maximum Eigen-value test. Both statistics have an asymptotic distribution and their critical values are provided by Johansen and Juselius (1990). It is noteworthy that if sample size is small, maximum Eigen-value test may not be valid (Cheung and Lai, 1993). To capture the short run dynamics, a number of lags are usually included for variables involved in the model.

Granger Causality

A time series X is said to Granger-cause Y if it can be shown that lagged values of X provide statistically significant information about future values of Y (including the past values of X). It is required that each variable in the equation is stationary (Granger and Newbold, 1974). More than 1 lag level of a variable can be included in the final regression model, as shown below:

$$X_t = \sum_1^n \alpha_{1i} Y_{t-i} + \sum_1^n \alpha_{2i} X_{t-i} + \varepsilon_t \quad (3.11)$$

$$Y_t = \sum_1^n \alpha_{2i} X_{t-i} + \sum_1^n \alpha_{1i} Y_{t-i} + \varepsilon_t \quad (3.12)$$

If some α_{1i} are not zero, Y Granger causes X. If some α_{2i} are not zero, X Granger causes Y. If both relations exist, there is a feedback effect.

3.6 CHAPTER SUMMARY

This chapter describes the research methodology for conducting the research. The conceptual framework and the econometric models are established to fill in the gaps reviewed in Chapter 2.

CHAPTER 4 LOCAL GOVERNMENTS' INCENTIVE STRUCTURE AFFECTING LAND PRICE

4.1 INTRODUCTION

To have a comprehensive understanding of local governments' incentive structure affecting land price, this chapter tests the correlation between land sale pattern and local GDP growth. In the field of political economy, the interaction between GDP growth and political promotion in China has been investigated by various literatures. As for this chapter, these findings are applied to explain local officials' incentive structure that affects their choice of the land sales, and hence land price.

4.2 RESEARCH BACKGROUND

According to North-Wallis-Weingast's Model (2009), social orders in limited access societies (or natural states) are maintained by the creation of economic rents to the elites, whereas social orders in open access societies are maintained by the open competition of economic rents by any entity. Economic performances of the latter societies, according to their survey, far outperform the former ones. Transition from natural states to open access societies requires institutional arrangements and doorstep conditions that allow impersonal exchanges instead of personal elite privileges. Developed countries have both competitive democracies and market economies to strengthen one another, which foster

impersonal exchange and enable the price mechanism to function. Unless the dominant coalition finds it beneficial to elites by expanding impersonal exchange, this transition will not initiate in limited access societies.

China is no doubt a country with limited access politically, but whether the economy is dominated by the elites is dubious. With regard to China' urban land market, this chapter intends to test the economic system at work why local elites tend to sell land by public auction at the expense of less economic rents. In the past, most land for industrial usage was granted to the sitting state owned enterprise tenants through nontransparent negotiation (private treaty), and the land price was intentionally depressed by Chinese local officials such that economic rents were created for the elites. In recent years however, land sales by public auctions significantly. To explain this increase, the major proposition of this chapter is that land sale by public auction is conducive to local economic growth, which enhances local officials' political promotion probability (*Proposition 1*). Another proposition is that industrial land is most conducive to local officials' revenue seeking incentive, hence most industrial land is still sold by nontransparent negotiation (*Proposition 2*).

The relationship between economic performance and Chinese local officials' promotion has received theoretical explanation and empirical evidence. For example, Blanchard and Shleifer (2001) find that Chinese local officials' performances are judged by local economic growth. Li (1998) discusses the reward-punishment mechanism within the multidivisional-form (M-form) structure of the Chinese economic system, which induces

intense regional competition among local officials. Li and Zhou (2005) find that when the annual GDP growth rate increases by one standard deviation, the probability of political promotion at provincial level will increase by 15% of the deviation. The positive correlation between chances of political promotion and local economic performance is similarly confirmed by Chen (2004). Intuitively, other usual performance criteria such as political, social and economic stability, unemployment, crime rate etc may as well affect local official's political promotion, yet there is still scarce empirical evidence supporting these interactions in China's context. Thus the hypothesis of this study will be based on the positive correlation between GDP growth and political promotion in China.

4.3 PROPOSITION AND METHODOLOGY

While promoting economic growth is beneficial to achieve Chinese local officials' political promotion objective, the correlation between land sale pattern and economic growth in China remains unexplored. From the views of development economics, sources of economic growth include factor input (capital, labor, and land) increase or total factor productivity (technology) growth. If more pieces of land are sold through nontransparent negotiations, more economic rents will be created between enterprises that get these pieces of land and local officials. Although these enterprises will perform better than other enterprises and hence gain higher economic revenue of their own, the entire economy can be undermined due to inefficient allocation of land resources.

This chapter intends to test whether local officials are willing to give up some of their rent seeking privileges in the land market to exchange for higher economic growth by utilizing fixed effect panel data analysis of 30 Chinese provinces from 2003 to 2007 on an annual basis. It is noteworthy that this study concentrates on the impact of land sale by public auction, but does not consider the impact of land sale by tendering. The reason is that in China tendering is generally regarded as another type of private negotiation, with only a few bidders who have close relationship with local officials (Zhang, 1997; Xie et al., 2002).

Under these conditions, why would some local officials choose to give up some of, if not all, their personal privileges in the land market? **Proposition 1** suggests that public land auction is conducive to economic growth, which enhances local officials' political promotion probability. However, **Proposition 2** indicates that local officials still care about revenue seeking incentive by selling residential and commercial land only through public auction.

***Proposition 1:** Local officials have promotion incentive. They tend to facilitate activities that foster political promotion, such as economic growth, instead of their personal interests, such as rent seeking. In the urban land market, local officials prefer public land auction that is conducive to economic growth, and hence their chances of political promotion. Thus the null hypothesis of Proposition 1 is that the proportion of land sales by public auction is negatively related to GDP growth.*

Proposition 2: *Apart from promotion incentive, local officials also have growth incentive (which is beneficial to their future promotion) and revenue incentive (which is beneficial to their present power). In the urban land market, local officials sell residential and commercial land that is most conducive to economic growth by public auction (Proposition 2.1), whereas selling industrial land that is most conducive to fiscal revenue by private treaty (Proposition 2.2). Descriptive statistics will be provided to test Propositions 2.1 and 2.2.*

Table 4.1 Variable Definition

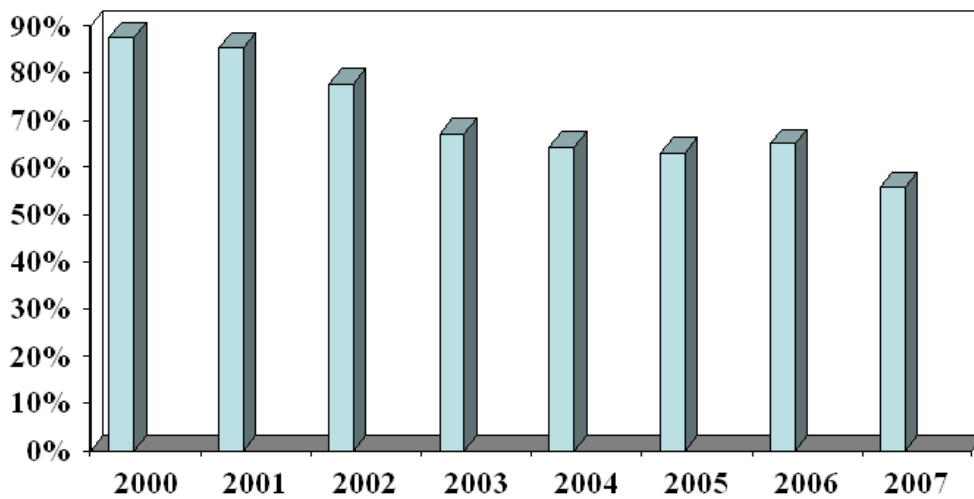
Variable	Definition	Abbreviation
<i>Dependent Variable</i>		
GDP growth rate	Percent GDP growth rate	<i>GDP</i>
<i>Independent Variable</i>		
Public Land Auction	The proportion of land sale by public auction	<i>Land</i>
Labor Input	Measured by working population growth rate	<i>POP</i>
Technology Input	Measured by average years of education	<i>EDU</i>
Capital Input	Measured by fixed investment growth rate	<i>FI</i>
<i>Instrumental Variable</i>		
Policy Dummy	Whether there is restriction on land negotiation	<i>POL</i>

To deal with the potential endogeneity problem between GDP growth and choice of land sales⁶, two-stage least square (TSLS) method is employed. Under the two-stage least squares method, the first step is to find an instrument variable that affects land sale pattern, but does not affect GDP growth unless through land sales. Table 4.1 defines dependent, independent, and instrumental variables to test **Proposition 1**. The instrumental variable is a policy dummy (*POL*), which indicates whether or not there is restriction on nontransparent land negotiations. Specifically, the State Council issued a

⁶ For example, it is likely that local governments' fiscal revenue would affect both GDP growth and choice of land sales. If local governments' fiscal revenue increases, it may affect official's expenditure plan which affects GDP as well as official's land sale strategy. The TSLS method aims at addressing the potential endogeneity problem.

deadline restricting land sale through nontransparent negotiation after 31 August, 2004. Because this document was issued in early 2004, the policy dummy is defined as equal to 1 since 2004, while equals 0 before 2004. This restriction applies to all residential, commercial and recreational land. Figure 4.1 shows that there is a significant decline in land sales by private negotiation after this restriction was imposed.

Figure 4.1 Proportion of Land Sale by Private Treaty



Data Source: *National Statistical Bureau, calculated by the author*

Using *POL* as the instrument, which is correlated with land sale by public auction, but not correlated with the error term, a simple regression between the proportion of land sale by public auction and the policy dummy on land negotiation restriction is established:

$$\hat{land}_{it} = .186 + .159POL_t + u_{it} \quad (4.1)$$

The t-statistics on *POL* is 15.51, which indicates that *land* and *POL* have a statistically significant positive correlation.

Next, the empirical equation for GDP is specified, using POL as an instrument for $land$:

$$GDP_{it} = \alpha_0 + \alpha_1 \hat{land}_{it} + \alpha_2 POP_{it} + \alpha_3 EDU_{it} + \alpha_4 FI_{it} + \alpha_i \beta_t + \alpha_i + \varepsilon_{it} \quad (4.2)$$

Where α_i is fixed effect dummy, β_t is year effect dummy. It is expected that the coefficient of land sale by public auction would enhance GDP growth, which means α_1 is expected to be positive.

There are three reasons why public land auction increases GDP growth: First, public land auction integrates more competitive enterprises into local economy, creating more efficient production and sale processes; Second, as a factor input, usually land pieces with higher quality will be sold through public auction in China. Therefore, the higher the proportion of public land auction, the more productive use the average land pieces will be sold to; Third, higher proportion of public land auction reduces rent seeking opportunities between officials and entrepreneurs, hence reducing efficiency losses in the economy. With regard to controlling variables, working population growth rate (POP) to control labor input, average years of education (EDU) to control technology input, and fixed investment growth rate (FI) to control capital input.

GDP, population and fixed investment growth rates are available from *China Statistical Yearbook* (various issues). Average years of education are calculated from *China Statistical Yearbook for Regional Economy* (various issues). Land areas sold by negotiation and auction can be found in *Statistical Yearbook of China's Land Resource* (various issues). Descriptive data will be shown to test **Proposition 2.1 and 2.2**.

4.4 DISCUSSION OF EMPIRICAL RESULTS

Test results in Table 4.2 show that land sale pattern significantly influence GDP growth rate. By controlling labor input, technology input, capital input and policy differences, test results in column 4 show that when the proportion of land sale by public auction increases and GDP growth are positively correlated, rejecting the null hypothesis of *Proposition 1*. The implication is that local officials favor activities that are conducive to local economic growth to enhance their chances of political promotion.

Table 4.2 Land Sale and GDP Growth

Dependant Variable: <i>GDP</i>				
Coefficient	(1)	(2)	(3)	(4)
<i>Land</i>	0.167(10.87)***	0.038(2.40)**	0.044(2.74)***	0.049(2.70)***
<i>POP</i>		0.014(3.19)***	0.013(3.02)***	-0.023(-0.99)
<i>EDU</i>		0.053(13.17)***	0.061(12.36)***	0.055(10.36)***
<i>FI</i>		0.035(4.03)***	0.037(4.37)***	0.044(4.11)***
<i>GDP(-1)</i>			-0.126(-2.82)***	-0.120(-2.59)**
<i>Land(-1)</i>				0.033(1.57)
<i>Constant</i>	0.103(25.13)***	0.103(22.85)***	0.114(19.27)***	0.105(14.62)***
<i>F-Statistics</i>	5.00***	11.00***	11.15***	11.14***
<i>Adjusted R-squared</i>	0.33	0.57	0.58	0.61

Due to lack of data for different land usage, to test *Proposition 2* descriptive data only covers the period covering from 2003 to 2007 on a national basis. Table 4.3 shows that almost 95% of land areas are sold for commercial, industrial and residential usage in China, while the rest of them are for public utility and building, transport and water conservancy, and other special purposes.

Table 4.3 Proportion of Land Sale Areas by Different Usage

Proportion/Year	2003	2004	2005	2006	2007
<i>commercial and service</i>	14.99%	13.11%	8.15%	4.99%	5.60%
<i>industry, mining & warehousing</i>	63.97%	62.12%	73.93%	81.26%	77.33%
<i>residential use</i>	14.86%	18.96%	11.71%	9.66%	13.57%
<i>other uses</i>	6.18%	5.81%	6.22%	4.09%	3.51%

Data Source: *Statistical Yearbook of China's Land Resource 2004-2008*, calculated by the author

Table 4.4 Proportion of Land Sale Revenue by Different Usage

Proportion/Year	2003	2004	2005	2006	2007
<i>commercial and service</i>	22.57%	28.13%	16.10%	14.15%	11.88%
<i>industry, mining & warehousing</i>	34.86%	27.43%	43.46%	46.59%	32.59%
<i>residential use</i>	39.12%	41.35%	36.37%	35.88%	52.41%

Data Source: *Statistical Yearbook of China's Land Resource 2004-2008*, calculated by the author

Table 4.5 Proportion of Different Land Sale Areas by Public Auction

Proportion/Year	2003	2004	2005	2006	2007
<i>commercial and service</i>	4.09%	4.73%	9.68%	15.20%	21.01%
<i>industry, mining & warehousing</i>	0.41%	0.32%	0.30%	0.13%	0.44%
<i>residential use</i>	6.51%	5.61%	13.39%	12.34%	21.57%

Data Source: *Statistical Yearbook of China's Land Resource 2004-2008*, calculated by the author

Among different usage, industrial land contributes an average 71.72% to total land areas sold. However, Table 4.4 shows that industrial land sale only constitutes an average 36.99% of total land sale revenue. In contrast, residential land sale constitutes an average 41.03% of total land sale revenue, which triples its average proportion of 13.75% to total land areas sold. Commercial and service land sales create an average 18.56% of total land

sale revenue, which doubles their average proportion of 9.37% to total land areas sold. Every year, more than 99% industrial land is sold by private negotiation, such as tendering and agreement (Table 4.5). Through private negotiation, land price for industrial usage is intentionally depressed by local governments (Walker and Mckinnell, 1995; Li, 1997; Xie et al. 2002). On the contrary, a growing proportion of land packets for commercial and residential usage are sold by public auction (Table 4.5).

This comparison gives rise to a fundamental question on China's regional competition. While the booming real estate market explains why residential land price on average surpasses industrial land price, it does not explain why local government do not sell more industrial land by public auction to increase their revenue. To understand local governments' contradictory sale strategies towards industrial and residential land, it is essential to analyze local governments' fiscal gain and losses in different land sale patterns. From fiscal revenue incentive, land sale provides local governments two sources of revenue. For one thing, land sale revenue provides a lump sum of income for local governments. For another, taxes and charges are collected from enterprises performing on the land sold. For local governments whose target is maximizing fiscal revenue, the balance between a lump sum of income and a prolonged source of revenue is worth considering.

In fact, local governments' attitudes towards manufacturing sector and servicing sector are diverse. Manufacturing activities remain a main driving force of economic growth in Chinese's cities. Higher industrial land revenue does not outweigh the benefits of

economic growth as far as local official's incentive structure is concerned (Cheung, 2008). Major manufacturing producers do not have technological edges to sustain their market possession, yet most of them are state-owned. Because of highly homogenous products, manufacturers are very sensitive to production cost. Attractive factors to manufacturers include compensational infrastructure, cheap land, lower standards of environment and labor protection. Local governments thus have to provide such convenience, or else they will face political pressure from their leaders. This explains why local governments tend to sell industrial land by private negotiation at compensated price.

Unlike manufacturing sector, servicing sector provides highly heterogeneous products because most servicing enterprises are privately owned, hence having their comparative edges to survive and prosper. With less consideration for the survival of servicing enterprises, local governments get higher land revenue for residential and commercial usages by public auction, the burden of which in the end is transferred to local consumers. Besides, the central government's dramatic policy changes in land supply in recent years also affect local governments' choice of land sale pattern. The initial goal of central government's land supply control is to ensure the "180 billion square meters (or 1.8 billion *mu*) of cultivated land", due to increasing food pressure from the largest and still growing population over the world. In practice, since 2002 real estate investment has taken 600 to 1050 thousand *mu* of land each year, constituting 0.0333% to 0.0583% of the 1.8 billion *mu* reserved land for cultivation⁷. According to the Ministry of Land

⁷ Data Source: *China Land Resource Yearbook (2008)*, calculated by the author.

Resource, China's cultivated land remained at 1.83 billion *mu* by the end of 2008. To regulate land sales, the central government imposed a series of measures on the urban land market in recent years. Table 4.6 summarizes these regulative policies and measures.

Table 4.6 Important Restrictive Policies on Land Market

Issue Time	Issue Authorities	Main Contents
Feb 2003	Ministry of Land Resource	Restricting land supply for building and construction
Mar 2004	Ministry of Land Resource, Ministry of Supervision	Supervise land bidding, tendering and auction, investigate the problem of intentionally providing land at compensated price
Apr 2004	The State Council	Stop issuing rural land for urban construction for half a year
Dec 2004	Ministry of Land Resource	Revitalize stocks of undeveloped construction land
Aug 2006	Ministry of Construction	Restrict party and government organization and heavy censorship on other organizations to raise fund for building construction
Sep 2006	Ministry of Construction	Define six types of land that must be transacted through bidding, tendering and auction, consolidate real estate deal order
Sep 2006	The State Council	Set minimum price level of industrial land, protect cultivated land, and adjust land sale fees and taxes
Nov 2006	Ministry of Land Resource, People's Bank of China, Ministry of Finance	Adjust land leasing fees for new construction projects, redistribute land revenue between central and local governments, regulate land sale to more strictly protect cultivated land
Nov 2006	local taxation bureaus	Transfer of non-residential houses within 5 years will be charged for 1% land value added tax
Jan 2007	State Administration of Taxation	Raise urban land use tax to a maximum of 30 RMB/m ²
Jan 2007	State Administration of Taxation	Double charge land leasing fee for new construction projects
Feb 2007	State Administration of Taxation	Make it clear that real estate enterprises will pay land value added tax by liquidate payment
Mar 2007	Ministry of Land Resource, The State Council	Purse the most rigid control over land supply, maintain the "red line of 1.8 billion <i>mu</i> cultivated land" at any cost
Jun 2007	Ministry of Construction	No purchase allowed for housing on collective-owned land
Aug 2008	People's Bank of China	Developers who hoard land for more than 2 years can no longer get bank loans

Table 4.6 shows that restrictive land policies are most frequent and intense between 2004 and 2007. The intentional control of land supply caused land price to go up swiftly, thus inducing real estate enterprises to hoard more land for future development. For example, only 43% of land acquired by 40 major real estate developers in 12 Chinese cities was sold between 2003 and 2008⁸. In the city of *Shanghai*, top developers have intentionally

⁸ Data Source: *Law and Regulation Daily*, 14 September, 2009.

increased their land reserve in recent years⁹. Among them, *Hejihuangpu*, Hong Kong giant under Chinese richest Mr Li-Ka shing, has land reserve available that is enough for a striking 19.5 years of development, as estimated on the basis of its sale volume in 2008. *China Wanke*, the largest real estate enterprise in terms of market capitalization in mainland China, has 2990 thousand square meters land reserve, highest among other developers. While real estate developers suffered from increasing land price, the central government worried about unaffordable housing price. As a remedy, *Document [214] (2008)* was issued by the People's Bank of China stating that developers who hoard land for more than 2 years can no longer get bank loans. To conclude, central government's directives as well as the diverse needs of local governments for industrial and residential land affect the land sale strategies.

4.5 CHAPTER SUMMARY

Why would some Chinese local officials choose to sell more land publicly in recent years? To answer this question, it is necessary to understand the essence of the cultural difference in China, because the culture we inherit in the past provides constraint to what we can do today (North, 1990). There are unique characteristics of the politics-economy interaction in China, regarding the cultural impact on the rule of law for Chinese elites.

According to Hong (2009), China has developed into a power-capital economy, which is neither a planned economy nor a market economy. This power-capital economy is

⁹ Data Source: *Morning Oriental*, 7 May, 2009.

featured by connection between politicians and entrepreneurs. Second, more and more Chinese elites have developed into a group of wealthy private entrepreneurs. However, they are strongly opposed to democratic reform, but are willing to join the dominant party. These two characteristics explain why public land auction did not increase in China for a long period of time, because nontransparent negotiation provides politicians more economic rents, while entrepreneurs are willing to sustain this relationship.

However, public land auction did increase significantly in some cities in recent years. This chapter studies the positive correlation between GDP growth and local officials' chances of promotion for a cause. A promotion might lead to merely a few hundred dollars more per month for a local official, so why do they bother? One plausible explanation is that the benefits of political promotion also include the intangible benefits, such as easier access to information, more positional convenience, and expanded social networking. In China where particular connection or "guanxi" is crucial and where information is "king", the intangible benefits may outweigh the tangible economic rents for local officials.

Based on this notion, local officials are expected to perform their best according to the criteria the central government evaluates their performance: From 1980s to early 1990s, local officials' performance was judged by their ability to attract foreign investment. Hence land price was intentionally depressed to attract foreign investors. After the central government launched the tax and fiscal reform to centralize fiscal revenue in 1994, local governments chose to sell more land privately. Again in 2000 when the 10th Five Year

Plan initiated, speedy GDP growth became the most important criteria to judge local officials' performance. As a consequence, local governments sold more land publicly to boost the economy in the political competition. Yet local officials still care about their revenue incentive, thus most industrial land is sold by private negotiation. Nevertheless, the benefits of political promotion in China are overwhelming.

To conclude, the incentive structure that values the political promotion incentive most affects local governments' choice of land sales. Given the GDP-based criteria in recent years, local officials choose to sell more land by public auction to boost local economy and hence to maintain their position in the political competition. Most public auctions take place in land sales for commercial and residential uses. These auctions have boosted the residential land price of the commodity housing market. The next chapter will focus on local governments' incentive structure affecting the housing price.

CHAPTER 5 LOCAL GOVERNMENTS' INCENTIVE STRUCTURE AFFECTING HOUSING PRICE

5.1 INTRODUCTION

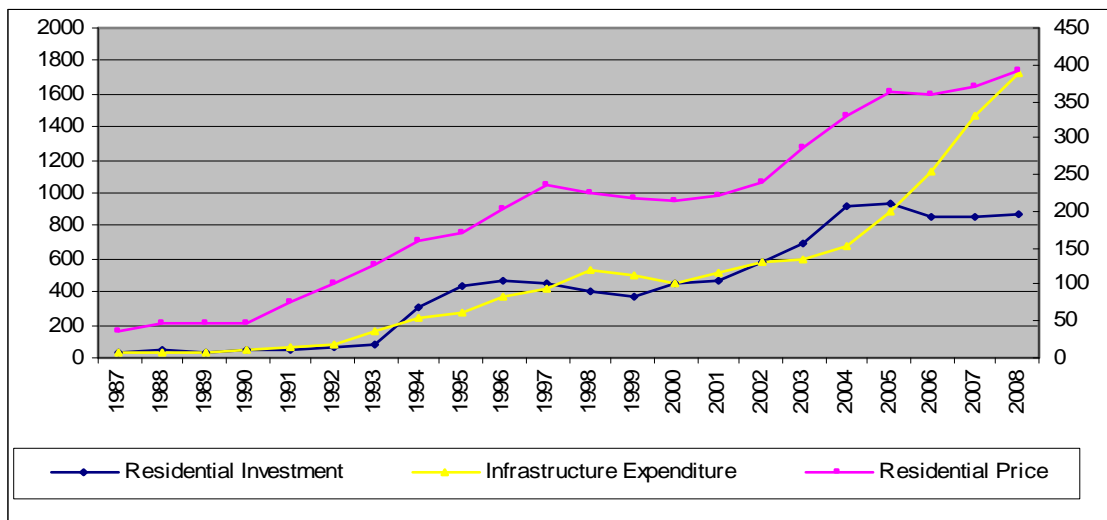
This chapter examines the city of Shanghai to analyze local governments' incentive structure affecting housing price. The choice of Shanghai as the target city has four advantages: First, Shanghai is a city that enjoys higher economic autonomy than other cities, due to its uniqueness and importance in China. Second, it was not until late 1980s that a nascent commodity property market was established among certain coastal cities and Special Economic Zones, Shanghai included. Third, Shanghai's property market experienced dramatic boom in the early 1990s, and was cooled down by tightening bank loans in the mid-1990s (Haila, 1999). Since the late 1990s, the property sector prospered again. Fourth, the Shanghai Statistical Bureau provides complete time series available since 1987, while other cities like Beijing, Guangzhou and Shenzhen do not have such a long span of data for cointegration analysis.

5.2 PROPOSITION AND METHODOLOGY

There are a handful of macroeconomic variables regarded as drivers of property booms, such as income growth (Dokko et al., 1999; Tse and Raftery, 1999; Bjorklund and Soderberg, 1999; Jud and Winkler, 2002; Andrew and Meen, 2003; Gallin, 2006),

continuous inflation (Titman, 1982; Gatzlaff, 1994; Anari and Kolari, 2002), excess bank loan (Davis and Zhu, 2004; Gerlach and Peng, 2005), and stock market prosperity (Sagalyn, 1990; Wilson and Okunev, 1999; Brown and Liow, 2001). With regard to China's property market, there are still other perspectives, such as imbalanced financial accessibility (Yeung and Howes, 2006), uneven income distribution (Sato, 2006), and unregulated land leasing (Haila, 2007). These studies provide some insights into explaining China's property boom, but have not reached a convincing consensus.

Figure 5.1 Price, Investment, and Expenditure in Shanghai

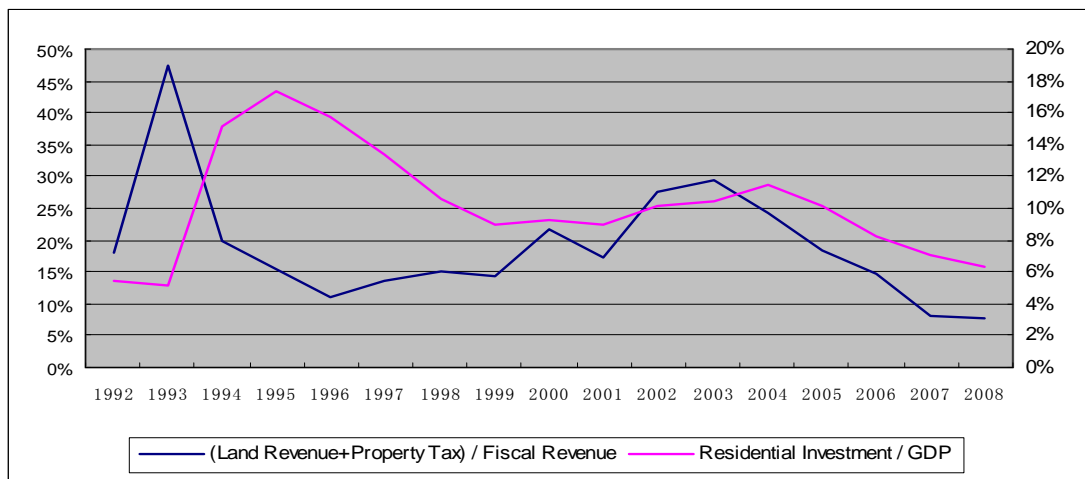


Data Source: Shanghai Statistical Yearbook (1988-2009). *Note:* Left axis represents infrastructure expenditure and residential investment (0.1 billion). Right axis represents residential price index (Year 1992 = 100).

One crucial reason why previous studies have not reached a consistent conclusion is that none of them consider the roles of local governments affecting the housing market. For example, local government's infrastructure projects may boost economic growth, which

in turn enhances property price. In this regard, public expenditure is an exogenous fiscal policy that stimulates property price, whereas the interaction between macroeconomic variables and property price becomes endogenous. Figure 5.1 shows the co-movement of housing price, housing investment and public expenditure. Does this co-movement reflect local government's incentive structure related to the commodity housing market?

Figure 5.2 Shanghai Government's Gain from Housing Market



Data Source: Shanghai Statistical Yearbook (1993-2009). *Note:* Left axis represents the proportion of land revenue and property tax to fiscal revenue. Right axis represents residential investment to GDP.

The answer is positive, for the housing market has several advantages for local governments to achieve their revenue and growth incentives: First, most property-related taxes are retained at local level (Li and Song, 2007). Second, most land revenue is kept for local usage (Tian and Ma, 2008). Third, property investment is a driver of economic growth. These benefits lead local authorities to embark on more infrastructure projects, which enhance land revenue. In return, increasing land revenue allows local government

to spend more on public facilities, which encourage residential development. To further elaborate local governments' gains from the housing market, Figure 5.2 shows the proportion of land revenue and property-related taxes to municipal government's fiscal revenue, plus the proportion of residential investment to GDP in Shanghai.

Given the gains shown in Figure 5.2, who benefits most from a property boom? Apart from developer's revenue, property price is mainly composed of construction cost, land price, taxes and fees. According to Li and Song (2007), over the past decade construction cost on average constitutes 30 percent of property price in China, which directly contributes to local economic growth, let alone their magnified impacts on upstream and downstream industries. 30 percent of property price goes to the land price, with another 20 percent going to taxes and fees, and the remaining to developer's revenue. To add up, about 50 percent of property price goes to government's pocket. Among them, local governments share more than 70% of land revenue (Tian and Ma, 2008), and almost all taxes and fees related to property sector (Li and Song, 2007). No doubt it is local government who benefits from the property boom since late 1990s. Hence it is not easy for central government to curb speculative property development, without compromising local government's revenues. In fact, without local government's aggressive infrastructure expenditure plan, the property boom may not be sustained for such a long period.

There remains no consensus on the influence of infrastructure expenditure on housing price: Although literature supports the positive effect of infrastructure spending on land

value (Voith, 1991; Benjamin and Sirmans, 1996; Yang and Gakenheimer, 2007), it is not clear whether infrastructure expenditure increases residential price. For example, it is likely that public projects have negative effects on housing environment, such as noise or pollution, which undermines house value. To study the impact of local government's infrastructure spending on housing investment and housing price, **Proposition 3** is as follows.

Proposition 3: *Local officials do not have stability incentive. Welfare provision that is not conducive to their growth or revenue incentives will not be in local officials' favor. In the commodity housing market, more government spending would go to infrastructure which increases both economic growth (Proposition 3.1) and land sale revenue (Proposition 3.2). Thus the null hypothesis of Proposition 3.1 is that infrastructure spending is negatively related to residential housing investment which is conducive to economic growth. The null hypothesis of Proposition 3.2 is that infrastructure spending is negatively related to residential housing price which is conducive to land sale revenue.*

This empirical test focuses on Shanghai housing price from 1987 to 2008 on an annual basis. The annual data is collected from *Shanghai Statistical Bureau*. The annual data for public expenditure and residential investment in Shanghai are collected from *Shanghai Statistical Yearbook (2008)*. Infrastructure expenditure consists of investment on power generation, transportation, post, communication, tap water, gas, parks, green areas, environmental sanitation, and administration of civil utilities. Both data sets cover the period 1987 to 2008. Land revenue data is from various sources on multiple volumes,

including *Shanghai Statistical Yearbook*, *Shanghai Real Estate Market* and *China Statistical Yearbook of Real Estate*, covering the period 1992 to 2008. The research hypothesis is that increased infrastructure expenditure has sustained Shanghai's property boom.

Table 5.1 Stationary Test for Variables

Method	INV	PE	HP	LR
Null Hypothesis: Contain a unit root (Level)				
ADF Test	2.00 (0.99)	1.90(0.98)	0.29(0.76)	0.46(0.80)
PP Test	1.64 (0.97)	3.50(1.00)	0.29(0.76)	0.77(0.87)
Null Hypothesis: Contain a unit root (1 st Difference)				
ADF Test	-3.07 (0.00)	-1.82(0.07)	-3.40(0.00)	-7.40(0.00)
PP Test	-3.04 (0.00)	-1.73(0.08)	-3.41(0.00)	-6.36(0.00)
<i>Note:</i> p-value is contained in brackets, following t-statistics for each variable. When p-value is higher than 0.10, the null hypothesis cannot be rejected, indicating the variable is not stationary. Test Equations do not include trend or intercept.				

Before processing empirical tests, the time series properties of variables will be confirmed. Empirical models include 4 variables: Residential Investment (INV), Infrastructure Expenditure (PE), Residential Price (HP), and Land Revenue (LR). All the variables are taken log forms before carrying out Unit Root Test. Both Augmented Dickey-Fuller Test (1979) and Phillips-Perron Test (1988) are run for stationarity test.

5.3 DISCUSSION OF EMPIRICAL RESULTS

5.3.1 Infrastructure Expenditure and Housing Investment

Table 5.2 gives out the cointegration result between infrastructure expenditure and residential investment (1987-2008). The lag period is set at 1, because we assume infrastructure expenditure affects residential investment plan of developers the following

year. Unrestricted cointegration model is used, given that first differencing is taken to achieve stationary time series among defined variables.

Table 5.2 Cointegration Test for PE and INV (1987-2008)

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.66	28.77	20.26	0.0026
At most 1	0.21	5.12	9.16	0.2709
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.66	23.65	15.89	0.0025
At most 1	0.21	5.12	9.16	0.2709

Trace test indicates 1 cointegration at the 0.05 level. Max-eigenvalue test indicates 1 cointegration at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.

Test results show that residential investment and residential price are cointegrated in the following equation:

$$INV = -0.78 + 0.81PE \quad (5.1)$$

The above equation suggests there is a long-term equilibrium between infrastructure expenditure and residential investment. Infrastructure expenditure positively affects residential investment the following year in Shanghai, and vice versa. This result has three implications.

Above all, increased infrastructure expenditure has initiated and sustained Shanghai's residential investment. During the study period between 1987 and 2008, residential investment in Shanghai reached its first peak in 1996 (Figure 5.1). It declined for the next

three years, and then entered into another boom since 2000. Meanwhile, infrastructure expenditure kept increasing till 1998 (Figure 5.1), fell a bit between 1999 and 2000, and went into the upstream afterwards. It's noteworthy that before the first booming phase (1993-1996), both residential investment and infrastructure expenditure grew moderately. Between 1987 and 1992, infrastructure expenditure increased from 3.26 billion to 8.44 billion, whereas residential investment increased from 3.58 billion to 6.12 billion. When infrastructure expenditure suddenly doubled to 16.80 billion in 1993, residential investment also dramatically touched 30.65 billion in 1994. The 1-year lagged effect of infrastructure expenditure has not only triggered but also magnified the property boom (1993-1996) in Shanghai.

Furthermore, the interaction between infrastructure expenditure and residential investment is bridged through land market. When property market is booming, local government usually has a strong tendency to sell more land to increase revenue. When property market turns to recession, land transaction is also likely to decline. At the beginning of Shanghai's dramatic property boom in 1993, land area transacted for property development increased by an astonishing 153.2% compared to 1992. This overheated growth rate quickly aroused central government's caution (Huang and Yang, 1996; Haila, 1999). Policy measures to curb land transaction were effective. Land area transacted in Shanghai dropped by 62.5% in 1994, 45.4% in 1995, and kept declining until 2000. It is not surprising that land transaction fell ahead of fading property investment. After all, decline in land transaction for property development indicates a decrease in market demand forecasted by developers. Whilst developers can choose to

buy less land to safeguard economic and political uncertainty, on-going projects cannot be easily deferred or cancelled, resulting in an inevitably delayed decline in property development. There is still a possibility that developers bought less land not to be cautious, but merely because land acquired in previous years had not been developed. From market supply perspective, frequent resettlements took place between 1995 and 1998, and again after 2000. Resettlements not only brought about more developable land, but also created new market demand for residential and business usage. The resettlement trend is perfectly consistent with that of infrastructure expenditure, indicating that Shanghai government intentionally increased land supply in booming times.

Finally, the central government's regulative and restrictive policy on property sector has been counteracted by Shanghai government's infrastructure expenditure plan. If real estate market becomes overheated and especially once hyperinflation or aggregated income inequality sets in, central government cannot but have to take remedial measures. For example, draconian administrative regulations and stricter monetary policies had been executed since 2004 to cool down nationwide property fever. Measures included raising interest rate and bank reserve ratio, charging more tax, restricting construction period, fighting against land hoarding, limiting foreign investment and constructing more affordable houses. Yet the rampant property market still saw no braking. A report for Shanghai housing affordability shows that 54.1% of respondents pay a range of 20%-50% of their monthly income for housing, 31.8% over 50%, much higher than the expected portion of 1/3 by central bank in 2004 (*China Youth Daily*, 14 August, 2006). This unrelenting property fever forced central government to take more actions, such as

restriction on second-hand housing transactions and minimum down payment requirement for self-use housing loans. The combination of fiscal, financial, and regulatory impositions is startling, for policy changes over real estate sector have never been that frequent and determined. With retrospect to central government's combination of policy decisions, it is undeniable that most methods pertaining to financial support, income distribution, regulatory and lawful loopholes have been used. The consequence however, is barely satisfactory. Residential investment in Shanghai kept increasing until it met with a minor setback in 2006. Nevertheless, residential price proceeded upwards. These facts suggest that local government's role in infrastructure expenditure is one that central government fails to dominate, and the impact of central government on property sector has been limited in recent years.

5.3.2 Housing Investment and Housing Price

To test whether increasing residential investment gives rise to higher residential price, cointegration test is run for residential investment and residential price. Lag interval is set at 1 because it normally takes 1 year to carry out a property project.

The correlation between residential investment and residential price is not clear-cut. Conventional demand and supply theory tells us if price rises, supply will increase but demand will decline. It is likely that if increased residential investment leads to over-supply, residential price declines. Hence residential investment and residential price will be negatively correlated. There is another possibility that developers may choose to hoard

undeveloped land, so that they can sell property at higher prices due to limited supply on the market. In that case residential investment and residential price can be positively correlated.

Table 5.3 Cointegration Test for INV and HP (1987-2008)

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.62	27.68	20.26	0.0039
At most 1	0.30	7.57	9.16	0.0994
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.62	20.11	15.89	0.0102
At most 1	0.30	7.57	9.16	0.0994
Trace test indicates 1 cointegration at the 0.05 level. Max-eigenvalue test indicates 1 cointegration at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.				

Test results in Table 5.3 show that residential investment and residential price are cointegrated in the following equation:

$$HP = 0.80 + 1.07INV \quad (5.2)$$

The former situation is supported by classical theories in a perfectly efficient market, while the latter situation is supported by empirical evidence in Equation (5.2). In fact, to abide by central government's directives on eliminating land hoarding, Shanghai land bureau issued a warning on restricting further transferring of land to developers who had a bad record of hoarding (*Shanghai business*, 25 January, 2008). However, the impact of this regulation is not expected to be satisfactory. According to *Real Estate Regulation Law of People's Republic of China (1995)*, land undeveloped for more than 1 year will be

charged 20% of land transaction cost. Yet this regulation has never been executed in Shanghai up till now.

Empirical evidence shows that there is a positive cointegration between housing investment and housing price the following year. But this result alone cannot lead to the conclusion that it is land hoarding that boosts residential price in Shanghai's market. To test if there is any role of land hoarding on Shanghai's property sector, cointegration test is run for land revenue and residential investment in Shanghai. Lag interval is set at 1. Test results are shown in Table 5.4.

Table 5.4 Cointegration Test for LR and INV (1992-2008)

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.83	32.18	20.26	0.0007
At most 1	0.23	4.18	9.16	0.3865
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.83	28.00	15.89	0.0004
At most 1	0.23	4.18	9.16	0.3865
Trace test indicates 1 cointegration at the 0.05 level. Max-eigenvalue test indicates 1 cointegration at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.				

Tests results show that land revenue and residential investment are positively cointegrated in the following equation:

$$INV = -2.11 + 0.40LR \quad (5.3)$$

The implication is that developers have a tendency to hoard land for profit-seeking incentive. It strengthens the conclusion that land hoarding induces positive correlation between housing investment and housing price in Shanghai.

5.3.3 Infrastructure Expenditure and Housing Price

According to previous results, infrastructure expenditure and residential investment are cointegrated at 1 year's lag, residential investment and residential price are cointegrated at 1 year's lag. Given these results, we test the relationship between infrastructure expenditure and residential price at 2 lags (see Table 5.5).

Table 5.5 Cointegration Test for PE and HP (1987-2008)

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.74	36.86	20.26	0.0001
At most 1	0.34	8.81	9.16	0.0582
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.74	28.05	15.89	0.0004
At most 1	0.34	8.81	9.16	0.0582
Trace test indicates 1 cointegration at the 0.05 level. Max-eigenvalue test indicates 1 cointegration at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. **MacKinnon-Haug-Michelis (1999) p-values.				

Test results suggest infrastructure expenditure and residential price are cointegrated at 2 lags in the following Equation:

$$HP = -0.46 + 0.67PE \quad (5.4)$$

The long lasting impact of infrastructure expenditure on residential price can be traced through historical changes that have taken place in Shanghai's Eastern District (*Pudong*). *Pudong* had been nothing more than one of the suburban areas of Shanghai before 1990s, when by then Shanghai was well-known for its Western District (*Puxi*). Yet *Pudong* has experienced dramatic economic growth for the past two decades due to policy deregulation and increased fixed capital formation investment. In accordance with China's "Five-Year Plan", analysis of *Pudong*'s case can be classified into three stages from early 1990s onwards.

During the 8th "Five-Year Plan" between 1991 and 1995, infrastructure spending in *Pudong* reached its twin peaks in 1993 and 1994. The most influential infrastructure spending projects were the so-called "Seven Roads plus Three Bridges Plan" (*qilusanqiao*) in 1993 and "Five Roads plus One Bridge Plan" (*wuluyiqiao*) in 1994. These transportation projects provided better linkage between *Pudong* and *Puxi*. As a result, a large number of enterprises flocked into *Pudong* between 1993 and 1994, including a good proportion of foreign investors (*Pudong New Area Statistical Yearbook 1995*). Especially attractive to those who wanted to climb further up the career ladder, these enterprises induced middle income population to move from *Puxi* to *Pudong*. Larger population, increased income and enhanced surrounding all led to property boom. It was no wonder that residential price in *Pudong* reached its first peak in 1996, in accordance with our findings that it takes two years for public expenditure to affect property price.

During the 9th “Five-Year Plan” between 1996 and 2000, a series of unexpected and expected events disturbed infrastructure investment in *Pudong*, such as the Asian Financial Crisis, the pass away of Deng Xiaoping, and central government’s rigid regulation over the property sector. The market was calming, for fear that the looming deflationary pressure and uncertain policy climate could be detrimental to what would otherwise be profitable investment opportunities. Even the Shanghai government itself became more conservative. Between 1990 and 1995, infrastructure expenditure multiplied by 5.8 times, whereas in the 9th “Five-Year Plan” it was sharply reduced to merely 1.19 times. Accompanying this trend was the declining property price between 1997 and 1999. Yet there were still a number of infrastructure projects going on in *Pudong*, including *Pudong* Airport, Underway Line 2, Century Venue, and Central Park. During this period, the most influential event happened on 1 May, 2000, when Shanghai government abolished tunnel tolls from *Puxi* to *Pudong*. It was not unexpected that this waive quickly ended the property recession around 2000, for the cross-river tunnel had already been built and did not produce information lag for construction. This transportation enhancement immediately initiated another round of property boom in *Pudong*, and in Shanghai generally since 2000.

During the 10th “Five-Year Plan” between 2001 and 2005, Shanghai government continued the “Infrastructure First” development strategy in *Pudong* District. The primary goal of this round’s plan was to better manage and protect a major river across Shanghai: *Suzhou River*. The *Suzhou River* was seriously contaminated by over-industrialization during the early rise of *Pudong* District. However, in the 10th “Five-Year

Plan” their riversides were assigned to provide “suitable residence for increasing population in Shanghai”. The first stage of “*Suzhou River Renovation*” started in 1999, when 7 billion (RMB) was invested to dredge the river courses. The second stage added another 4 billion (RMB) to construct riverside landscapes in 2003. Frequent resettlements were carried out to meet the goal. For example, 76% of resettlements in Pudong were related to the renovation plan in 2005. During this period, residential price index in Pudong more than doubled from 1039 in 2000 to 2572 in 2005 (*Pudong New Area Statistical Yearbook 2006*).

5.4 CHAPTER SUMMARY

Shanghai’s property boom has been largely boosted by local government’s infrastructure expenditure plan. Three conclusions emerge from empirical results. First, infrastructure expenditure and residential investment are positively cointegrated at 1 year lag, indicating infrastructure expenditure not only increases land revenue as documented in literatures, but also supports local economic growth and encourages residential investment. Second, residential investment and residential price are also positively cointegrated. However, much land acquired has not been immediately developed. Thus the interaction between residential investment and residential price is probably attributable to developer’s land hoarding strategy. Third, infrastructure expenditure is deterministic to the property boom through promoting land sale and property investment. Therefore, the fluctuation of public expenditure cointegrates with ups and downs of residential price in Shanghai.

Empirical results from this chapter amend or respond to some theoretical findings of existing literatures. For example, Deng (2003) suggests that public land leasing helps to include private firms into local government's alternative revenue sources. Ding (2003) states that increasing land revenue leads to more infrastructure projects as public goods provided by local governments. However, infrastructure projects do not only serve as public goods, but also induce higher property investment and support local economic growth.

The conclusion of this chapter also sheds light on forecasting the impact of central government's most recent policy changes on residential price. Due to the latest "financial tsunami" triggered by sub-prime property mortgages crisis in the US, China's economy faced the greatest challenge ever since the Asian financial crisis in 1997. To overcome the difficulty and sustain economic growth, central government announced 4 trillion (RMB) increase in government spending on 5 November, 2008 (*Xinhua News Daily*, 10 November, 2008). Out of the expenditure about 40% (1.5 trillion) is earmarked for infrastructure spending. In line with central government's policy changes, Shanghai government also authorized a 140 billion (RMB) additional investment plan for transportation from 2009 to 2012 (*Morning Oriental*, 13 November, 2008). On average, an additional increase of 35 billion (RMB) is anticipated in the next four years. Shanghai's investment for transportation is 84 billion (RMB) in 2008 (*Shanghai Statistical Yearbook 2009*). According to the result of this chapter, expenditure on transportation would boost residential price significantly in the coming years. In reality, residential housing price increased by 27% while infrastructure expenditure increased by

22% from 2008 to 2009 (*Shanghai Statistical Bureau*), indicating the positive impact of infrastructure on promoting economic growth and housing price.

There are certain limitations of findings in this chapter though. In the US, the anticipated future revenue from growth is used to issue bonds and thus finance infrastructure. Hence it is likely that anticipated growth may lead to more infrastructures even if there are no growth benefits of infrastructure. However, local governments in China do not issue such bonds. Thus the growth induced infrastructure cannot be easily measured in China's context. In addition, due to data constraint it is difficult to find an appropriate instrument variable which statistically supports that infrastructure expenditure is exogenous.

After discussing local governments' roles affecting land (Chapter 4) and housing (Chapter 5) price, the central government's roles as well as central-local conflicts on land and housing price fluctuations remain unexplored. Chapter 6 will investigate the roles of central and local governments affecting land price fluctuations. Chapter 7 will comprehensively investigate the roles of central and local governments affecting housing price fluctuation, with further elaboration of the impacts of infrastructure expenditure on housing price using national data sets.

CHAPTER 6 CENTRAL-LOCAL INCENTIVE CONFLICTS AFFECTING LAND PRICE

6.1 INTRODUCTION

Because of China's soaring real estate price, the central government recently implemented restrictive to cool down the market¹⁰: On March 24 2010, The Ministry of Land and Resources ordered a temporary ban on the sale of land for commodity housing. Instead, land used for low-income housing, for rebuilding shanty areas and for self-occupied small- or medium-sized houses must account for more than 70 percent of the overall supply this year. This measure however, is perceived to be beating around the bush. The main reason is that the measures do not specify the percentage of the total supply for specifically low-income housing. Cao Jianhai, Director of the Investment and Market Research Office in the Institute of Industrial Economics of Chinese Academy of Social Sciences, states that the soaring prices cannot be controlled unless the Ministry makes clear the percentage of low-income houses among the overall supply.

Cai's opinion, among other critical comments, points to the fundamental conflict that features China's urban land market: On the one hand, the central government requires more land to be used for affordable (low-income) housing. On the other hand, local governments for their own interests are not motivated to fulfill such task. For example¹¹,

¹⁰ Sale of residential land temporarily halted: *China Daily*, 24 Mar 2010.

¹¹ Other than footnote specifications, data sets in this paragraph are based on *China Statistical Yearbook 2008*. Calculation is made by the author.

from 2000 to 2007 the proportion of affordable housing investment to total property investment declined from 10.88% to 3.25% nationwide, whereas the annual growth rate of land price from 2000 to 2007 was 16.31%, surging from 418 Rmb/m² in 2000 to 1211 Rmb/m² in 2007. Meanwhile, the annual average growth rate of land revenue amounted to 31.44% between 2000 and 2007. Land revenue as a percentage of local government's total revenue rose sharply from 5.1% in 1998 to 19.5% in 2006¹². The land being granted for free, affordable housing does not contribute to local governments' land sale revenue. Local governments do not want to "waste" these pieces of land, so they have often stalled on centrally directed projects¹³. Failure of providing enough affordable housing results in an unrelenting real estate boom, which has a profound impact on land price as well.

So far, none of the previous studies have attempted to empirically study the extent to which affordable housing project affects land price. Hence the understanding of land price components is incomplete, as the roles of the central and local governments in the urban land market are not considered. This chapter studies the impact of affordable housing project on land price to illustrate the central-local incentive conflicts affecting land price. Section 6.3 proposes a research proposition to explain land price fluctuation. Section 6.4 describes data and discusses empirical results. Section 6.5 concludes the study with research limitations.

¹² Data Source: *China Statistical Yearbook 2007; Statistical Yearbook of China Land Resources 2007*.

¹³ Beijing's 'Legless' Stimulus. *The Wall Street Journal*, April 2, 2009.

6.2 PROPOSITION AND METHODOLOGY

This chapter discusses the determinants of land price in 33 major Chinese cities between 2003 and 2007 on a fixed effect panel data model. **Proposition 4** and **Proposition 5** will be tested to study the central government's incentive structure as well as central-local incentive conflicts affecting land price.

Proposition 4: *Other than stability incentive, the central government also has revenue incentive. For example, affordable housing at the expense of fiscal revenue loss will be provided, but to limited extent only. In the urban land market, provision of social welfare such as affordable housing (Proposition 4.1) that negates fiscal revenue can be compelled by the central government (Proposition 4.2). Thus the null hypothesis of Proposition 4.1 is that affordable housing development is positively related to land price. Descriptive statistics will be provided to test Proposition 4.2.*

Proposition 5: *Other than social stability incentive, the central government also has growth incentive. For example, housing price could be suppressed by new housing supply in the pipeline, hence attenuating local governments' effort to promote economic growth by increasing public land sales. In the urban land market, the central government tends to tolerate connections between local officials and real estate developers to increase land sales by volume (Proposition 5.1) while hoarding land pieces for housing development (Proposition 5.2). The null hypothesis of Proposition 5.1 is that developers' market concentration is positively related to land price. The null hypothesis of Proposition 5.2 is that land development ratio is significantly affecting land price.*

The proposition concerning the central government's incentive structure as well as central-local incentive conflicts is formulated on the basis of the supply-demand analysis. Further, the tensions between national and local government policies affecting market supply and demand are also considered. In general, the central government wants price stability for social welfare consideration, whereas local governments want higher land price to increase their revenue. The conflicting objectives and hence the actions of the central and local governments in the urban land market affect market supply and demand, and hence land price.

Upon such analysis, one independent variable under discussion is the affordable housing ratio, which is defined as the proportion of affordable housing investment to total property investment. The proportion of affordable housing investment to total property investment is expected to be negatively related to land price. Literature shows that attempts based on planning policies and regulations have little effect on producing enough supply of low-income housing in market economies. For example, Paris (2007) finds that attempts to utilize planning policies and regulations have little effect on producing enough supply of affordable housing in various developed countries. An and Bostic (2008) find that aggressive government purchases for low-income housing crowd out other market suppliers in the US. Shaly (2006) also argues that low-income homeownership is not well supported or sustained in the US. Beer et al. (2007) find that the Australian government has limited influence on improving low-income housing, in accordance with Yates and Wulff (2005). In China's context, affordable housing project

has a 3% profit margin due to price regulation. But if the land is developed for commodity usage, developers can enjoy much more profit through free land acquisition, plus extra profit from lower construction cost. Such drastic profit change can lure real estate developers to collude with local officials for granting more land in the name of developing affordable housing projects (Meng and Feng, 2005).

The empirical model includes other independent variables to control the influence of local governments and real estate developers. Public auction ratio, defined as the proportion of public auctioned land to total land sales, is used to represent local governments' interference in the urban land market. If a higher proportion of land is sold by public auction, land price is expected to increase. Market concentration ratio, defined as the proportion of First Tier Ranked¹⁴ Enterprise Revenue to Total Enterprises Revenue, is used to represent real estate developers' concentration in the land market. Higher market concentration ratio is expected to lower the land price due to real estate developers' increased negotiation power with local officials.

Apart from the abovementioned controlling variables, the empirical model also includes housing price to indicate the interaction between real estate market and land market, as housing price is found to positively affect land price by various studies (Guntermann, 1997; Leung and Chen, 2006; Bostic et al., 2007). Land development ratio, defined as proportion of floor space that is developed on land purchased in a particular year, is also included in the model to represent the actual land demand. If land development ratio is

¹⁴ China's real estate developers are classified into five tiers regarding their relative positions in capital, production, sale, revenue, and reputation. This classification is available from *China Real Estate Yearbook*.

high, real estate developers will buy more land. Therefore, land development ratio is expected to be positively related to land price. Table 6.1 gives detailed definitions of dependant and independent variables involved in this paper, followed by the research hypothesis.

Table 6.1 Variable Definition

<i>Variable</i>	<i>Abbreviation</i>	<i>Definition</i>
Land Price	LP	Residential land price
Affordable Housing Ratio	AHR	Affordable housing investment / Total property investment
Public Auction Ratio	PAR	Land sale by public auction / Total Land sale
Market Concentration Ratio	MCR	First Tier Ranked Enterprise / Total Enterprises (by Revenue)
Housing Price	HP	Residential housing price
Land Development Ratio	LDR	land developed / land purchased this year

The empirical model is defined as follows, where λ_i represents the time-invariant region effect, ε_{it} represents the stochastic disturbance:

$$lp_{it} = \alpha_0 + \alpha_1ahr_{it} + \alpha_2par_{it} + \alpha_3mcr_{it} + \alpha_4hp_{it} + \alpha_5ldr_{it} + \lambda_i + \varepsilon_{it} \quad (6.1)$$

$$(1 \leq i \leq N, 1 \leq t \leq T)$$

6.3 DISCUSSION OF EMPIRICAL RESULTS

6.3.1 Data Description

Due to data availability, the empirical data for testing the hypothesis is formed by a 33 by 5 matrix, covering the period from 2003 to 2007. *China Real Estate Yearbook* includes the corresponding data sets for 35 major Chinese cities. However, because the cities of

Shanghai and *Shenzhen* do not have data for affordable housing development, panel data analysis is based on 33 major Chinese cities. Figure 6.1 describes the city locations.

Figure 6.1 Location of 33 Major Chinese Cities (Drawn by the author)



Empirical data are collected from various sources. Land price and housing price are from *China Statistical Yearbook*. Affordable housing, market concentration and land reserve data are from *China Real Estate Yearbook*. Public auction data is from *Statistical Yearbook of China's Land Resource*. Table 2 gives the descriptive statistics of dependant and independent variables, of which the values vary widely across cities. For example in 2007, *Xiamen* had a land price of 5307 RMB/m², while in *Hohhot* it was only 390 RMB/m². *Beijing* had an average housing price of 11553 RMB/m², while in *Xining* it was

merely 2421 RMB/m². Land price and housing price are treated with ortho-normalization, so that the means of LP and HP are both one.

Table 6.2 Data Description

<i>Variable</i>	<i>Observation</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
LP	165	1.00	0.43	0.31	1.43
AHR	165	0.10	0.10	0.01	0.59
PAR	165	0.28	0.19	0.01	1.00
MCR	165	0.02	0.03	0.00	0.16
HP	165	1.00	0.17	0.92	1.17
LDR	165	0.70	0.46	0.00	3.56

6.3.2 Discussion of Empirical Results

Estimation results are presented in Table 6.3. Empirical results show that affordable housing ratio, public auction ratio, market concentration ratio and housing price altogether explain 43% of the variations in land price changes. Specifically, Column (1) provides the interaction between affordable housing ratio and land price, without controlling other factors. Column (2) controls local government's interference by public auction ratio. It also controls real estate developer's market concentration. Column (3) adds housing price to indicate market demand. Column (4) shows that land development ratio is not significant in affecting the land price.

Table 6.3 Determinants of Land Price

Dependent variable: Land Price				
Coefficient	(1)	(2)	(3)	(4)
<i>AHR</i>	-0.44(-3.18) ^{***}	-0.44(-3.36) ^{***}	-0.37(-2.76) ^{***}	-0.36(-2.75) ^{***}
<i>PAR</i>		0.09(2.42) ^{**}	0.08(2.11) ^{**}	0.08(1.98) [*]
<i>MCR</i>		-0.53(-2.76) ^{***}	-0.50(-2.65) ^{***}	-0.53(-2.75) ^{***}
<i>HP</i>			0.13(2.66) ^{***}	0.13(2.67) ^{***}
<i>LDR</i>				0.01(0.74)
<i>Constant</i>	0.11(12.28) ^{***}	0.10(6.74) ^{***}	0.08(5.19) ^{***}	0.07(4.48) ^{***}
<i>F-Statistic</i>	3.65	4.20	4.46	4.34
<i>Adjusted R-Squared</i>	0.35	0.40	0.43	0.43
<i>Durbin-Watson Statistic</i>	2.00	1.89	2.03	2.01

In Column (1), affordable housing ratio is negatively correlated with land price. However, from 2003 to 2007 affordable housing ratio declined from 8.05% to 4.32% nationwide¹⁵. It is noteworthy that while the central government that initiates the affordable housing development policy, local governments control the quantity and quality of affordable housing projects through land transaction, capital injection, welfare provision, and resettlement plan. According to *Document No.761 [1994] from Ministry of Construction*, autonomy is left to local governments at the provincial and municipal level or below to execute regional plans for affordable housing development. Local governments identify low or middle income families who are qualified for affordable housing purchase. They even have the priority to reserve land for affordable housing development.

Given local governments' dominant influence on affordable housing project, it is essential to consider local governments' gains and losses from the project before explaining the reduction in the affordable housing ratio. Politically, affordable housing

¹⁵ Data Source: *China Statistical Yearbook 2007*. Calculation is made by the author.

benefits local governments because it enables local officials to comply with the goals of their leaders. For example, *Beijing Residential Development Plan (2006-2010)* has emphasized that 15 million m² affordable housing will be provided to *Beijing* local residents, to accommodate in particular those who are resettled to make way for the 2008 Olympic Games and other municipality-oriented projects. Economically however, affordable housing is not beneficial to local governments. In recent years, land revenue constitutes up to 70%-80% of extra-budgetary income in some major cities¹⁶. Land parcels for affordable housing development are granted to developers for free, thus affordable housing development would directly reduce local government's land revenue. This revenue imperative of local governments partly explains why affordable housing ratio kept declining against the wish of the central government. In short, local governments' economic incentive has outweighed their political incentive when dealing with the affordable housing project.

Another reason why affordable housing ratio kept decreasing lies in real estate developers' strategy. Because affordable housing is sold at constrained price, developers are often compensated for reduced profit by free land, favorable taxes and charges¹⁷, and easier access to more commodity housing projects. However, the continuous decline of the affordable housing ratio in the study period suggests that developers may not have been motivated enough to take advantage of affordable housing projects. It is likely that the exemption from land cost cannot compensate for developer's profit loss due to price

¹⁶ Regulation failure of central policy: a regional property boom in 2005, *Financial Times (caijingshibao)*, 5 January, 2006.

¹⁷ Affordable housing development enjoys a series of free or reduced taxes and charges, such as property tax, additional education fee, and transaction management fee. There is not consistent definition for those items, and the amount of reduced proportion differs across regions.

regulation. For example, in 2007¹⁸ the average commodity housing price in China is 3864 RMB/m², affordable housing price is 1754 RMB/m², land price is 1211 RMB/m², and cost of building construction is 1657 RMB/m². The revenue from affordable housing cannot exceed 97 RMB/m² (1754 minus 1657). The revenue from commodity housing is 996 RMB/m² [3864 minus 1211 (land cost) minus 1657 (construction cost)]. Hence, the revenue from commodity housing is ten times that from affordable housing. Because local governments and real estate developers are not attracted to develop affordable housing, the central government's directive to provide more low-income housing is not well executed. The decline of affordable housing ratio contributes to the increase of land price.

Other than the affordable housing ratio, Column (2) to Column (4) shows that public auction ratio and housing price are positively related to land price. According to the Ministry of Land Resource, almost 95% of land pieces are sold for commercial, industrial and residential usage, while the rest are for public utility and building, transport and water conservancy, and other special purposes.

Table 6.4 shows that industrial land is much cheaper than residential land. Although some pieces of industrial land are sold by public auction, their average price is still lower than residential land price, even when compared to residential land sold by private negotiation (except in year 2007).

¹⁸ Data Source: *China Statistical Yearbook 2008*.

**Table 6.4 Land Sale Price by different Usage and Residential Housing Price
(RMB/Hectare)**

Proportion/Year	2003	2004	2005	2006	2007
<i>Industrial land by negotiation</i>	114	119	130	117	146
<i>Industrial land by public auction</i>	389	271	263	175	445
<i>residential land by negotiation</i>	390	435	300	330	375
<i>residential land by public auction</i>	1230	1256	1241	1246	2184
<i>residential housing price</i>	2197	2608	2937	3119	3645

Data Source: *Statistical Yearbook of China's Land Resource 2004-2008*, *China Statistical Yearbook 2008*.

One reason why residential land price far outweighs industrial land price is the real estate boom in our study period¹⁹. Residential investment increased from 68 billion Rmb in 2003 to 180 million Rmb in 2007, an average annual growth rate of 33%. An incremental investment of 25 billion Rmb in 2005 alone equaled the aggregate property investment of 1993 and 1994. Residential housing price increased from 2197 Rmb/m² in 2003 to 3645 Rmb/m² in 2007 at an average annual growth rate of 13%. These growth rates indicate that China's real estate market was fast expanding. Given the positive correlation between housing price and land price in Table 6.3, it is understandable why residential land provides local government with the best channel to collect revenue through public auction.

Column (2) to Column (4) in Table 6.3 also shows that market concentration ratio is negatively related to the land price, indicating real estate developers play an active role in determining land sales and hence land price. Still take the affordable housing project as an example. In the sample city of *Beijing*, the Land Resource Bureau sold 2 million m² of

¹⁹ Data Source: *China Statistical Yearbook 2008*, calculation made by the author.

land for affordable housing development in 2005, yet only 0.8 million m² was planned to be carried out in the following year²⁰. However, without the effective monitoring or regulating system, the selling prices of affordable houses have escalated beyond the limit of the 3% profit margin. In the sample city of *Tianjin*, average unit size of affordable housing was an astounding 126 m² per unit in 2003²¹, far out of the reach of the low-income people, the standard of which is 70 m² per unit. Though not direct evidence, it is observed that from 2003 to 2007, the estimated profit margin of affordable housing²² increased from 5.53% to 14.05%, while in the same period real estate developers' market concentration ratio increased from 2% to 5.7%. In other words, increasing market concentration gives real estate developers more power to negotiate with local governments. On the one hand, they lower the land price by acquiring more affordable housing projects. On the other hand, they sell these projects at prices higher than the ceilings. It is difficult to believe that local governments are unaware of developer's behavior. Therefore, the almost miraculous pricing of affordable housing project can be an indirect proof that real estate developers and local governments are somehow connected and in collusion.

6.4 CHAPTER SUMMARY

This chapter explores the central government's incentive structure as well as central-local incentive conflicts affecting the land price. By studying the impact of affordable housing

²⁰ Further macroeconomic control: Commodity housing versus affordable housing ratio 2:8? *21st Century Daily (ershiyishijiribao)*, 28 September, 2005.

²¹ Why is affordable housing unaffordable? *Economic Reference (jingjicankao)*, 19 February, 2003.

²² Estimated profit margin = (affordable housing price - average cost of building completed) / average cost of building completed, defined by the author. Data Source: *China Statistical Yearbook 2008*.

ratio and public auction ratio, it is found that the targets of central government and local government are not consistent, due to their diverse and sometimes conflicting preference between economic growth and social stability. The central government is a social server, thus the central government's policies are mainly formulated to control the property boom. As a policy tool, the affordable housing project is introduced to satisfy central government's need of low-cost housing provision. Yet the central government also cares about revenue incentive and growth incentive, which undermines the effectiveness of affordable housing provision. Moreover, local government officials are not very responsive and cooperative with the project, because their first and foremost incentive is to manipulate fiscal and financial resources to gain political or career advantage. To ensure speedy economic growth, local governments would rather sell land for purposes other than developing affordable housing for the poor. Other than delaying or cutting off affordable housing projects, local governments also increase the proportion of public land auctions to increase their revenues. These measures result in land price escalation.

The next chapter will discuss the roles of central and local governments affecting housing price. The comprehensive impacts of land sale, infrastructure expenditure, and inflation concern on housing price fluctuation will be analyzed using monthly data on a national basis. However, the major focus of Chapter 7 is the interaction between housing price and overall inflation, which serves to explain the central government's social stability incentive.

CHAPTER 7 CENTRAL-LOCAL INCENTIVE CONFLICTS AFFECTING HOUSING PRICE

7.1 INTRODUCTION

This chapter discusses central-local incentive conflicts affecting housing price. The fiscal, financial, and land use conflicts between central and local governments are revisited, concluding their impacts on housing price fluctuation. Section 2 revisits the conceptual framework in Chapter 2 and derives testable hypotheses. Section 3 deals with methodology and data. Section 4 discusses empirical results. Section 5 provides conclusion and implication.

7.2 PROPOSITION

This chapter summarizes the conflicted issues proposed in the conceptual framework from Chapter 3, which are crucial to governments' incentive structure and hence influential to housing price fluctuation.

The independent variable under discussion is inflation. The Asian Financial Crisis in 1997 gave Chinese leaders a shock on the economic front, yet the actual crisis was remote to the country because of government's regulation on foreign exchange market. Despite strict control over capital flight, the economy still suffered from a lack of capital

injection from People's Bank of China. In the aftermath of the Asian Financial Crisis, the Chinese economy experienced a deflation period from 1998 to 2002. In the Sixteenth Party Congress of the Chinese Communist Party in 2002 however, a "well-off society" campaign was launched to stimulate fixed asset investment for the 11th "Five-Year Plan". This campaign marked the prelude of an upcoming developmental euphoria. Motivated to stimulate local economic growth, banks and other financial institutions expanded their loans to fixed asset investment projects. It is believed that Chinese local officials are always in favor of monetary expansion to boost economic growth, which also renders inflationary pressure. However, because of political tension, central leaders would be cautious with vigorous growth trajectory if high inflation has been persistent. This central-local conflict in financial stability gives rise to **Proposition 6**.

***Proposition 6:** The central government has social stability incentive which local officials do not have. The central government tends to monitor the overall price level and financial stability. In the commodity housing market, capital injection (mainly from bank loans) increases property development. Being cautious that property boom would add to inflation pressure, the central government tends to control monetary supply and increase interest rate to mediate inflation. This stability incentive has negative impact on housing price as well. The null hypothesis of Proposition 6 is that inflation and housing price are negatively correlated.*

One controlling variable is economic output. During fiscal decentralization from 1980s to early 1990s, Chinese local governments seized overwhelming power. During this period,

China's economic development in transition is characterized by lessening state control while favoring local interest (Han, 2000). To maximize their utility, local governments have economic incentive to support long term goals (Montinola et al., 1995; Lau et al., 2000; Jin et al, 2005). However, the 1994 tax and fiscal reform ended the era of fiscal decentralization. Although decentralization gives rise to faster economic growth, conflicts between central and local governments are persistent, owing to their divergent policy preferences towards growth and development. On the one hand, local officials favor fiscal decentralization which also increases inflationary pressure, since provincial and municipal leaders always compete with one another to boost their own economic growth for motives that may be shortsighted and at the expense of others. On the other hand, central government favors centralizing fiscal and financial resources in order to ensure social welfare. As a consequence, the incentive of local government in economic development has been largely reshaped after 1994²³. More capitals from banks and financial institutions are welcomed by local governments to stimulate economic growth. Hence GDP and housing price should be positively correlated.

Another controlling variable is land sale. There is a growing literature on the interaction between land sale and housing price (Peng and Wheaton, 1994; Hui and Lui, 2002; Wu, 2007). It is usually agreed that land sale and property price are positively related in the short term (without lag length), but negatively related in the long run (with lag length). The theoretical explanation is that in the short term property boom induces land supply, but in the long run the market would adjust itself due to increased supply, and reach a

²³ Broadly speaking, it is growing competition, tax and fiscal reform, and banking reforms that combined to leads to local government's short-sighted goals. Tao and Yang (2008) makes a comprehensive review on this changing incentive of China's local authorities in post-reform (1994 till present) times.

new equilibrium at lower price level. In China, local authorities seek to get a lump sum of money in selling residential and commercial land. Therefore land sale is expected to be positively related to housing price.

7.3 METHODOLOGY AND DATA

7.3.1 Methodology

Time series analysis requires that variables should be stationary, or else the least square regression estimation techniques will become inappropriate, and ignoring such requirements would produce unreliable results. First order differencing is thus recommended if variables have a unit root. However, the main argument against differencing is that useful information may be thrown away, which leads to poor forecast (Chen and Patel, 1998). The cointegration theory (Engle and Granger, 1987) can be a solution to both problems. Therefore, this chapter applies cointegration and Granger causality test to the defined variables in the hypothesis.

7.3.2 Data

Housing price is represented by HP, which is the average selling price for residential, commercial, and luxurious housing. Consumer price index (CPI) represents inflationary pressure. Value of land sold for commodity housing (LS) represents local governments' land supply to the market. Property investment (PI) including aggregate investment in

residential, commercial, and luxurious housing represents real estate developers' market supply. Economic output (GDP) represents overall market demand. There are three data sources. First, LS and PI are directly available or calculated from *China Monthly Statistical Indicator* of various issues. Second, HP and GDP²⁴ come from *China Statistical Bureau*. Third, CPI is collected from *China Economic Information Network*. The data expansion covers 2000 to 2009 on a monthly basis, altogether 120 data points in chain index in logarithm forms, as shown in Figure 7.1 to Figure 7.5.

Figure 7.1 HP

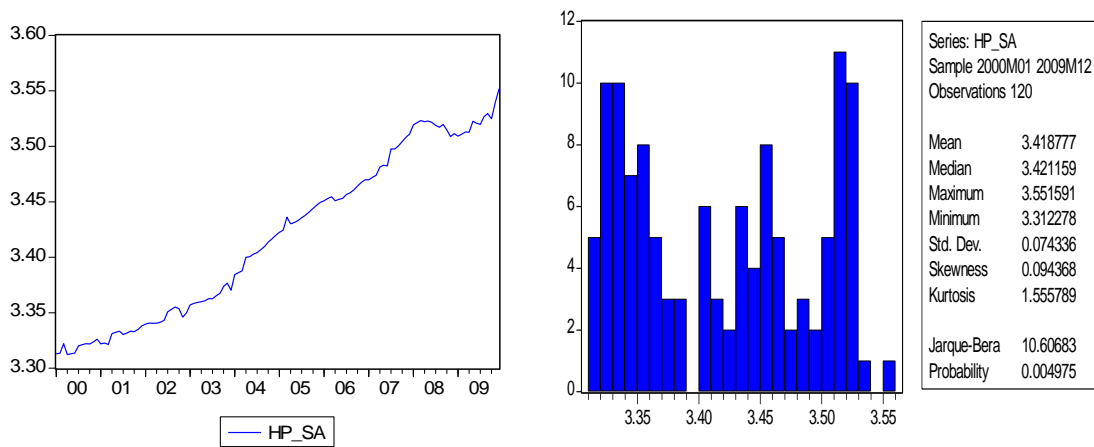
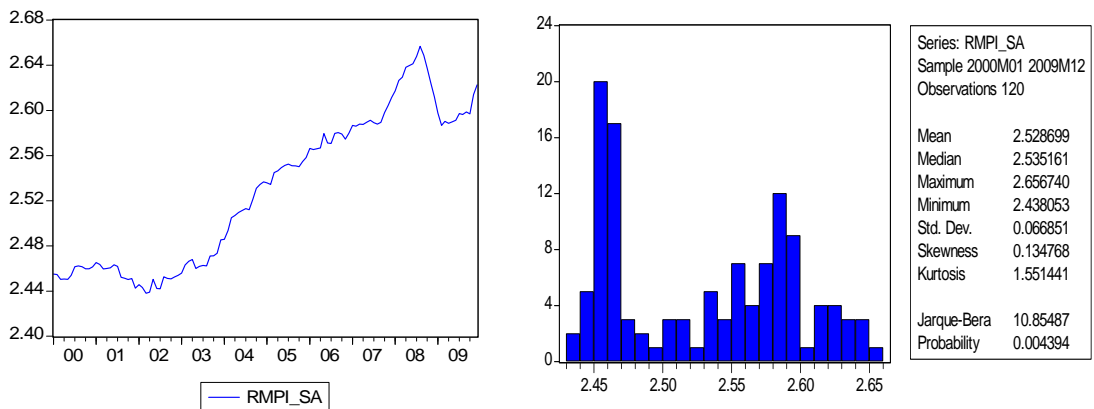


Figure 7.2 CPI



²⁴ GDP is quarterly data with Census X 12 seasonal adjustment.

Figure 7.3 PI

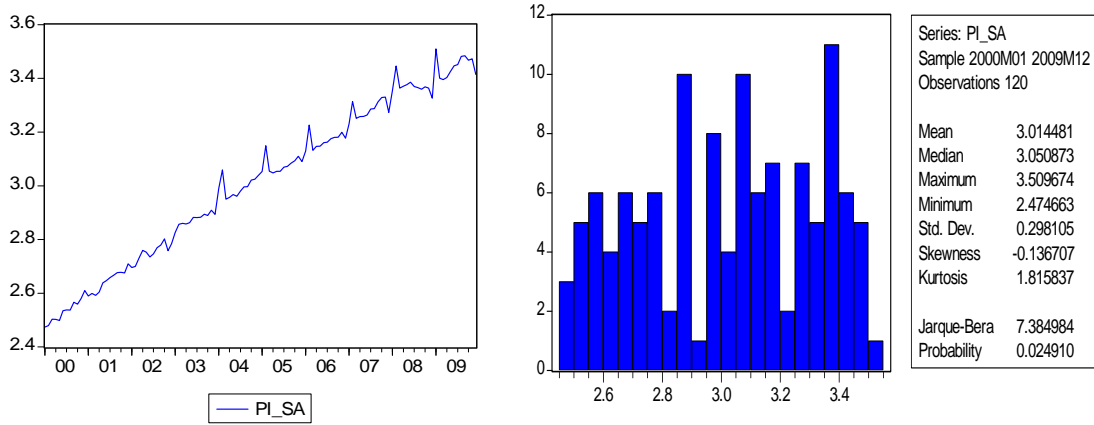


Figure 7.4 LS

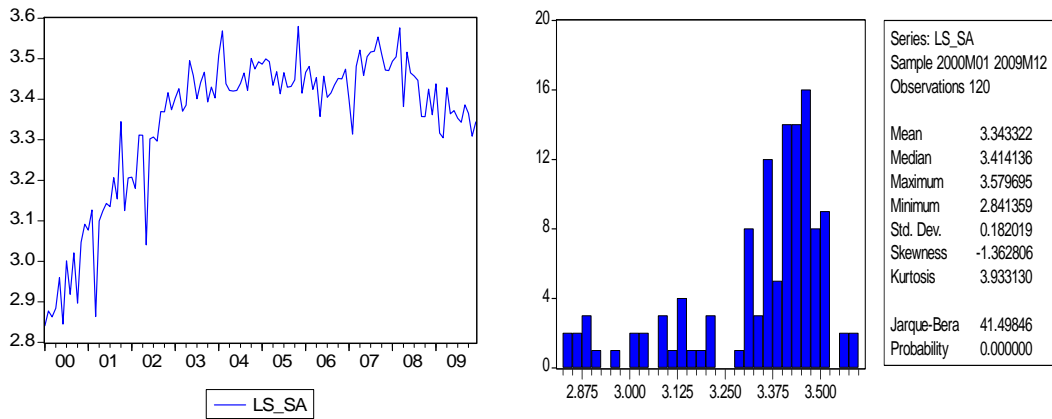
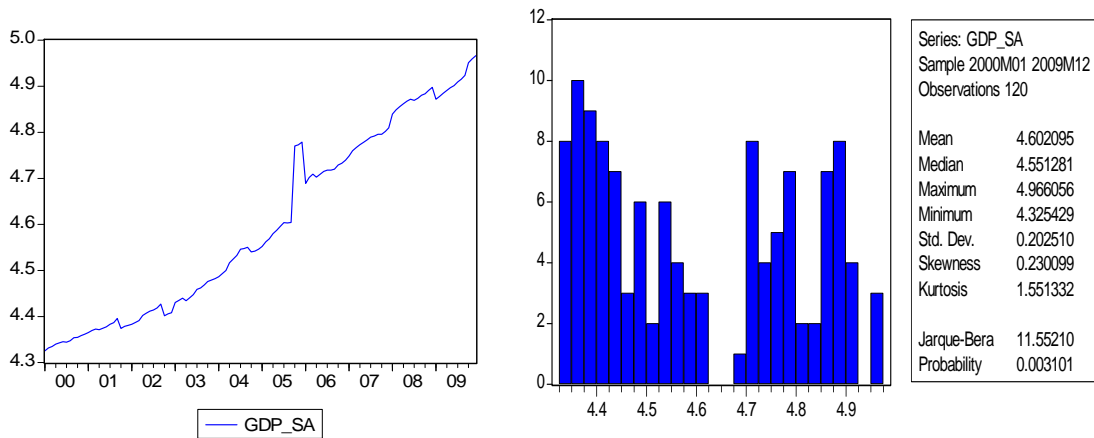


Figure 7.5 GDP



7.4 DISCUSSION OF EMPIRICAL RESULTS

Before processing empirical tests, the time series properties of variables must be confirmed with unit root test to variables in logarithm forms. If the levels of time series are non-stationary but become stationary after first differencing, their order of integration is defined to be I (1). Unit root tests show that all variables included in the model are I (1) series, thus meeting the requirements to run cointegration test. Because too short lags in VAR will not capture the dynamic properties of variables, lag length is selected by both AIC and SC criteria. Consequently, lag term of 3 months is considered to be most appropriate for the model. Cointegration results are shown in Table 7.1.

7.4.1 Empirical Results

Table 7.1 Cointegration Test for Housing Price

Trace Test				
Hypothesized CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	p-value
None *	0.24	72.06	60.06	0.00
At most 1	0.16	39.66	40.17	0.06
At most 2	0.12	19.42	24.28	0.18
At most 3	0.04	4.50	12.32	0.64
At most 4	0.00	0.00	4.13	1.00
Maximum Eigenvalue Test				
Hypothesized CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	p-value
None *	0.24	32.40	30.44	0.03
At most 1	0.16	20.23	24.16	0.16
At most 2	0.12	14.92	17.80	0.13
At most 3	0.04	4.50	11.22	0.55
At most 4	0.00	0.00	4.13	1.00

Trace test indicates 1 cointegration at the 0.05 level. Max-eigenvalue test indicates 1 cointegration at the 0.05 level. * denotes rejection of null hypothesis at the 0.05 level.

A time series X is said to Granger-cause Y if it can be shown that lagged values of X provide statistically significant information about future values of Y (Granger, 1969). If X and Y are stationary series, unrestricted vector autoregressive (VAR) models will be used to implement Granger causality test. However, if the variables are cointegrated, this kind of test should be carried out with vector error correction (VEC) models (Engle and Granger, 1987). Table 7.2 provides the details of adjustment coefficients in the VEC models, including t-statistics in brackets.

Table 7.2 Vector Error Correction Model

Error Correction:	D(HP_SA)	D(GDP_SA)	D(CPI_SA)	D(PI_SA)	D(LS_SA)
CointEq1	0.090251	0.419558	-0.011936	0.648804	0.610282
	(0.02573)	(0.11856)	(0.02413)	(0.24159)	(0.44278)
	[3.50736]	[3.53877]	[-0.49469]	[2.68556]	[1.37829]
D(HP_SA(-1))	-0.233746	-0.309709	0.306220	0.381841	1.817488
	(0.11516)	(0.53060)	(0.10799)	(1.08119)	(1.98159)
	[-2.02977]	[-0.58370]	[2.83575]	[0.35317]	[0.91719]
D(HP_SA(-2))	-0.189544	0.090091	0.242759	-1.609924	1.155790
	(0.12460)	(0.57411)	(0.11684)	(1.16985)	(2.14409)
	[-1.52120]	[0.15692]	[2.07769]	[-1.37618]	[0.53906]
D(HP_SA(-3))	0.144211	0.279214	0.290388	0.050807	-2.813481
	(0.11129)	(0.51279)	(0.10436)	(1.04491)	(1.91510)
	[1.29576]	[0.54450]	[2.78249]	[0.04862]	[-1.46910]
D(GDP_SA(-1))	0.031382	0.009337	-0.006069	0.057602	0.442219
	(0.01962)	(0.09042)	(0.01840)	(0.18424)	(0.33768)
	[1.59918]	[0.10326]	[-0.32981]	[0.31264]	[1.30958]
D(GDP_SA(-2))	0.027615	0.010966	-0.010560	0.055124	-0.097373
	(0.01967)	(0.09063)	(0.01844)	(0.18467)	(0.33847)
	[1.40390]	[0.12100]	[-0.57252]	[0.29849]	[-0.28769]
D(GDP_SA(-3))	0.022676	-0.322134	0.013710	0.163722	-0.106977
	(0.01958)	(0.09020)	(0.01836)	(0.18379)	(0.33685)
	[1.15839]	[-3.57148]	[0.74685]	[0.89080]	[-0.31758]

D(CPI_SA(-1))	0.404601	-0.294621	-0.319117	0.665186	0.034096
	(0.10664)	(0.49133)	(0.09999)	(1.00117)	(1.83494)
	[3.79424]	[-0.59964]	[-3.19136]	[0.66441]	[0.01858]
D(CPI_SA(-2))	0.080524	0.170421	-0.213373	0.677362	-4.532732
	(0.11728)	(0.54037)	(0.10997)	(1.10110)	(2.01809)
	[0.68660]	[0.31538]	[-1.94020]	[0.61517]	[-2.24605]
D(CPI_SA(-3))	-0.034492	0.043454	-0.168000	1.296968	1.627692
	(0.11043)	(0.50879)	(0.10355)	(1.03675)	(1.90014)
	[-0.31235]	[0.08541]	[-1.62245]	[1.25100]	[0.85662]
D(PI_SA(-1))	-0.000502	-0.016453	-0.009317	-0.562134	-0.057936
	(0.01199)	(0.05522)	(0.01124)	(0.11253)	(0.20624)
	[-0.04185]	[-0.29795]	[-0.82905]	[-4.99559]	[-0.28092]
D(PI_SA(-2))	0.003444	-0.052687	-0.005831	-0.454406	-0.085740
	(0.01199)	(0.05524)	(0.01124)	(0.11257)	(0.20631)
	[0.28725]	[-0.95374]	[-0.51866]	[-4.03674]	[-0.41558]
D(PI_SA(-3))	0.001421	-0.027151	0.001063	-0.182515	-0.144060
	(0.01134)	(0.05223)	(0.01063)	(0.10643)	(0.19506)
	[0.12535]	[-0.51984]	[0.09999]	[-1.71490]	[-0.73853]
D(LS_SA(-1))	-0.003279	0.028654	-0.010291	0.101473	-0.658348
	(0.00635)	(0.02924)	(0.00595)	(0.05959)	(0.10921)
	[-0.51658]	[0.97985]	[-1.72911]	[1.70290]	[-6.02810]
D(LS_SA(-2))	-0.006689	-0.009478	-0.008698	0.101803	-0.343986
	(0.00683)	(0.03147)	(0.00640)	(0.06412)	(0.11753)
	[-0.97934]	[-0.30117]	[-1.35815]	[1.58759]	[-2.92688]
D(LS_SA(-3))	-0.007063	-0.007861	-0.004020	0.050210	-0.102812
	(0.00561)	(0.02583)	(0.00526)	(0.05264)	(0.09647)
	[-1.25969]	[-0.30430]	[-0.76456]	[0.95386]	[-1.06569]
R-squared	0.189674	0.231844	0.221474	0.251175	0.481952
Adj. R-squared	0.068125	0.116621	0.104695	0.138851	0.404244

Based on results of Table 7.1 and Table 7.2, Granger causality tests are employed to examine the causality relationships between housing price and market fundamentals in Equation (7.1):

$$HP_t = 0.34GDP_t + 0.90CPI_t - 0.10PI_t + 0.10LS_t \quad (7.1)$$

Results of Granger Causality test are shown in Table 3.

Table 7.3 Granger Causality Test for Housing Price

Null Hypothesis	F-Statistics	P-value
GDP does not Granger cause HP	5.56	0.14
HP does not Granger cause GDP	0.95	0.81
CPI does not Granger cause HP	15.19*	0.00
HP does not Granger cause CPI	12.48*	0.00
PI does not Granger cause HP	0.12	0.99
HP does not Granger cause PI	3.20	0.36
LS does not Granger cause HP	1.66	0.45
HP does not Granger cause LS	4.56	0.21

* denotes rejection of the null hypothesis at 99% significance level.

Granger causality test in Table 7.3 shows that there is a significant bi-directional causality between housing price and inflation. Hence inflation rate and housing price are mutually and positively correlated with each other²⁵, consistent with *Proposition 6*. This relationship also substantiates the central government's most serious concern with housing price escalation and the consequent implication on overall price stability. When there is inflationary pressure caused by property boom, the central government would tighten monetary supply over the property sector.

7.4.2 Policy Implication

The most important policy implication from empirical results is the inflation hedge function of property price. The inflation hedging characteristics of real estate (Fama and

²⁵ Due to data availability, variables such as monthly lending or interest rate are not included in the model. When trying quarterly data to include real interest rate (nominal interest rate – inflation), we found that real interest rate and housing price are not cointegrated. However, under simple linear equation real interest rate and housing price are negatively related.

Schwert, 1977) has attracted extensive research attention in real estate literature and received many affirmative empirical supports (see for example, Kearl and Mishkin, 1977; Titman, 1982; Gatzlaff, 1994; Newell, 1996; Miles and Mahoney, 1997; Bond and Seiler, 1998; Ganesan and Chiang, 1998; Stevenson, 2000; Anari and Kolari, 2002), while there are still a few studies arguing that the hedging ability may not exist (Stevenson and Murray, 1999; Sing and Low, 2000).

In China's context, Chu and Sing (2004) find there is no evidence of long-term hedging ability of real estate using both country-level and city-level data. However, in the endnotes they suggest it is likely that construction cost component in the real estate price tracks the inflation rate in China, which is not presented in their empirical model. In this study, raw material price index is used to represent the construction cost inflation, yet empirical results indicate real estate has a negative hedge against inflation. To explain this relationship, Table 7.4 outlines a series of governments' corrective controls or supportive policies are introduced to influence property demand in the study period.

Table 7.4 Government Interference on Housing Market

Issue Time	Issue Authorities	Main Contents
Feb 1999	People's Bank of China	Encourage personal consumption loan to boost property demand
Oct 1999	People's Bank of China	Reduce housing loan rate, extend installment to 30 year period
Oct 1999	State Administration of Taxation	Exempt taxes on Housing Provident Fund
Jun 2000	People's Bank of China	Raise self-owned fund proportion to 30% for loan accessibility
Sep 2000	State Administration of Taxation	Reduce rent income tax
Jun 2001	People's Bank of China	Forbidden residential loan without down payment
Feb 2002	People's Bank of China	Reduce Housing Provident Fund loan rate
Jun 2003	People's Bank of China	Raise down payment level for house purchasing to 20%
Apr 2004	The State Council	Raise self-owned fund proportion to 35% for loan accessibility
Aug 2004	China Banking Regulatory Commission	Control the personal housing installment-income ratio below (or equal to) 50%
Mar 2005	People's Bank of China	Cancel favorable policy for residential loan rate, Raise down payment level for house purchasing to 30%
Mar 2005	The State Council	Put up for the first time the notice on preventing property price

		from going up too quickly
Apr 2005	The State Council	<i>National Eight Regulations</i> ²⁶
Apr 2006	People's Bank of China	Raise residential loan rate and Housing Provident Fund loan rate
May 2006	The State Council	<i>National Six Regulations</i>
May 2006	State Administration of Taxation	Fully charge business tax on second hand housing transaction within 5 years' holding period
Jul 2006	State Administration of Taxation	Charge individual income tax on second hand housing transaction
Sep 2006	Ministry of Foreign Exchange, Ministry of Construction	Forbidden foreign currency to purchase domestic commodity housing any longer
Mar 2007- Aug 2008	People's Bank of China, Ministry of Construction	Continually raise residential loan rate 6 times, deposit reserve 13 times, Housing Provident Fund loan rate 6 times
Sep 2008- Oct 2008	People's Bank of China, Ministry of Construction	Reduce residential loan rate and Housing Provident Fund loan rate 2 times

Table 7.4 shows that People's Bank of China, China Banking Regulatory Commission, and State Administration of Taxation are more powerful than Ministry of Construction and Ministry of Land Resource in providing more frequent and intense policies. It also indicates the relative importance between central and local governments in affecting the property price fluctuation. During the period that inflationary pressure arose after 2002 and extended for more than 5 years until 2008, the central government gradually became concerned with the growingly overheated property sector. Table 7.4 shows that relaxed financial policies over property demand between 1998 and 2002 were intended to fight against the deflationary pressure caused by the Asian Financial Crisis. Notice that central government began to caution the inflationary pressure in 2005, when loan rate controlled by People's Bank of China turned from upward to downward track. Fearing the extraordinarily tremendous growth in property sale amongst mid 2005, the State Council as representative of the central government put up a notice on preventing property price from going up too quickly, in a very rigid tone, in March 2005. From then on, frequent and intense restrictive monetary polices were issued to control property demand.

²⁶ Detailed interpretation of "*National Eight Regulations*" and "*National Six Regulations*" will be given in the next section.

Compared to their influence on land sales, local governments enjoy less autonomy in affecting financial institutions. The positive correlation between housing price and inflation can thus be largely attributed to the central government's effective and efficient control over financial tools that affect property demand.

Other than the inflation hedging characteristics, the positive cointegration between land sale and housing price indicates central and local governments' incompatible incentives in land sales. Although the central government has intention to increase land supply as repeatedly emphasized in the "*National Eight Regulations*"²⁷ and the "*National Six Regulations*"²⁸, the local governments are slow to respond. Rather than providing for more land for low-income housing, the local governments would auction commercial and residential land for higher income. Real estate developers hence tend to hoard more land to achieve higher selling price as compensation for increased land acquisition cost. Due to the combined effects of real estate developers' land hoarding strategy and local governments' enthusiastic capital construction plan, housing price keeps increasing and the central government's measures against property boom is counteracted.

Compared to the limited restrictions and regulations on the supply side, central government's polices and actions towards property demand are more frequent and intense, as indicated in Table 4. One reason is that People's Bank of China, China Banking

²⁷ The contents of "*National Eight Regulations*" include (1) Stabilize property price; (2) Local governments should take charge of controlling property price; (3) Increase land supply for affordable housing; (4) Strictly control resettlement projects; (5) Encourage rational consumption; (6) Closely monitor property market; (7) Strengthen policy execution; (8) Establish censorship for price control.

²⁸ The contents of "*National Six Regulations*" include (1) Encourage constructing middle-sized housing; (2) Raise self-owned capital requirement for bank loan; (3) Forbid mortgage loan to commodity houses with 3-year vacancy; (4) Raise down payment for large-sized housing; (5) Charge vacant land higher taxes; (6) Encourage Affordable housing construction.

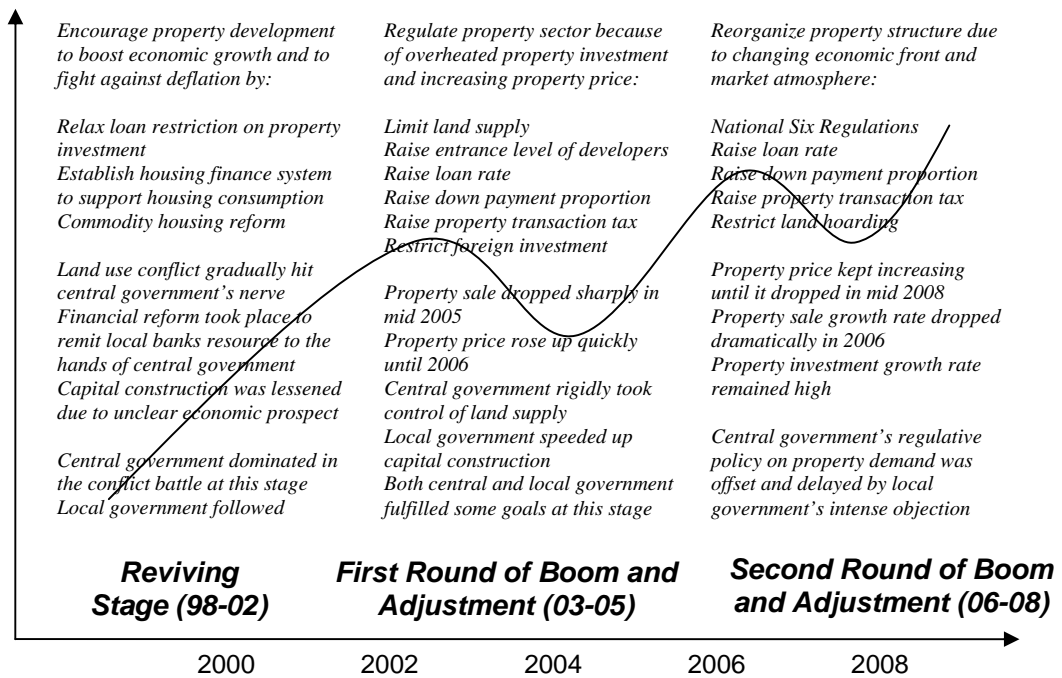
Regulatory Commission, and State Administration of Taxation are more powerful than Ministry of Construction and Ministry of Land Resource in policy executions. Another reason is that individual housing buyers are less capable of dealing with regulations and restrictions than real estate developers, thus facilitating fulfillment of policy changes affecting demand.

7.4.3 Summary of Governments' Incentives affecting Housing Price

With reference to the empirical results presented from Table 7.1 to Table 7.3, together with government's policy changes in Table 7.4, it is concluded that governments' incentive affects housing price movements in recent years, as summarized in Figure 7.6.

Figure 7.6 illustrates housing price fluctuation in the most recent decade. When central-local conflict was not very intense, as shown in the reviving stage, housing price grew slowly. The main reason is that the central government dominated policy changes and executions in the property sector. During the deflationary period between 2000 and 2002, local governments were constrained by the lack of financial support and fiscal autonomy. Therefore, capital construction was not as intense as they had wished for. Thus, the reviving stage saw less government conflicts than preceding stages. Therefore, housing price grew slowly at the reviving stage. Property investment and sale remained at a relatively stable level. The implication is that the central government's stimulating policy did not have an immediate and drastic impact on property sector.

Figure 7.6 Housing Price and Government Interference



Inflationary pressure arose after 2002 and extended for more than 5 years until 2008. Meanwhile, the central government gradually became concerned with the overheated property sector. Table 8 shows that financial policies imposed to curb property demand between 1998 and 2002 were relaxed to fight against the deflationary pressure caused by the Asian Financial Crisis. The impact was not immediate, as property sale only grew more mildly in the coming years till 2004. Afterward, the central government began to become cautious of the inflationary pressure in 2005, when loan rate controlled by People's Bank of China turned from upward to downward track. For example, the State Council put up for the first time a notice on regulating housing price escalation in March 2005. From then on, frequent and intense restrictive monetary policies were issued to reduce property demand. Compared to land sales, local governments had less influence

on financial resources as they lack direct control over local financial institutions. When deflation receded in 2003, local governments were allowed to embark on more capital construction projects with strong financial support and more fiscal autonomy. Housing price quickly entered into a rising trend. Responding to soaring housing price, the State Council issued a series of restrictive policies, including the famous “*National Eight Regulations*” on 27 April 2005. The regulation results turned out to be barely effective, for housing price continued to increase. In essence, it is the central government’s partly remittance of fiscal and financial resource to local government that led to local governments’ efficient stimulation in property sector. Nevertheless, the central government still benefited from this exchange, as more rural land was preserved for cultivation usage.

In the recent boom and adjustment period, the most influential policy is the “*National Six Regulations*” issued by the State Council on 29 May 2006. The regulative measures in this document are specifically designed for the property sector, indicating the central government’s growing concerns with the negative impacts of the property boom on social welfare. It also implies that local governments acquire more from fiscal, financial, and land resource, hence compelling the central government to resort to more detailed political measures to react. In this regard, local governments gain advantage in the incentive conflict battle at this stage and the property boom is sustained.

7.4 CHAPTER SUMMARY

This chapter explores how changes and conflicts of governments' incentives affect housing price movement in China. Variables of land sale, consumer price index, property investment and GDP are included in the cointegration analysis and Granger causality test, utilizing monthly data (2000-2009) on the national basis. Test results empirically support the notion that central and local governments' incentives significantly affect housing price fluctuations: First, there is a unilateral positive Granger causality from inflation to housing price, indicating that the central government has posed regulative and restrictive measures from time to time to attenuate inflation, which curbs housing price escalation as well. Second, land sale and housing price are positively correlated, indicating that the central government's intention to increase land supply does not effectively prevent housing price from going up. Third, local governments have endeavored to stimulate economic growth which inflates housing price. According to the model of housing prices, inflationary pressure, government expenditure in terms of capital construction, and land sales contribute to the escalating housing price over the past decades. Concerning the model's predictability, inflation and housing price are most highly consistent with a few months lagged effect (housing price index lags CPI), as indicated by their trends in Figure 7.1 and Figure 7.2, as well as the adjustment coefficient in Table 7.2. It is concluded that when the central government takes control, property market turns to adjustment; when local governments gain advantage, property boom emerges.

CHAPTER 8 CONCLUSION

8.1 INTRODUCTION

This chapter is the final chapter of the thesis. It starts with conclusions of the entire research in terms of literature review and empirical models. It is followed by a description of the contribution of this research to knowledge. The limitation of this research and future direction are addressed finally.

8.2 RESEARCH CONCLUSION

8.2.1 Conclusion from Literature Review

Literature review in **Chapter 2** shows that property investment fluctuation is deeply influenced by central-local government conflicts pertaining to financial systems, fiscal distribution, and land usage over the past two decades. The literature divides the past two decades into three historical stages: Pilot Experimental, Double Track, and Complete Commercialization. At each stage, there are persistent and repetitive conflicts over financial, fiscal and land resources between central and local governments. When the central government takes control, the property market turns to adjustment; when local governments gain advantage, a property boom emerges. As commodity market reform steps forward, the central government's influence on property adjustment is gradually lessened; while local governments' impact on property boom is increasingly intensified.

Analysis of literature also indicates that housing price fluctuation in China's property market is not well explained by economic fundamentals alone, for government conflicts have invalidated or lessened their impacts on the commodity housing market and the urban land market. What remains to be explored after the extensive literature review is to identify the determinants of land price and housing price that are affected by the changes and conflicts of central and local governments' incentive structures.

8.2.2 Conclusion from Empirical Models

Chapter 4 discusses local governments' incentive structure affecting land price. The interaction between GDP growth and local officials' choice of land sales has been investigated. It is concluded that the incentive structure that values the political promotion incentive most affects local governments' choice of land sales. Public land auction is conducive to economic growth, which enhances local officials' political promotion probability. Empirically, the proportion of land sale by public auction is positively correlated with local GDP growth. Because of different competition environment and market demand, most public auctions take place in selling commercial and residential land. These auctions have boosted the land price while satisfying local governments' growth incentive and promotion incentive. Otherwise, industrial land that is most conducive to fiscal revenue is sold by private treaty, satisfying local governments' revenue incentive.

After discussing local governments' incentive structure affecting land price, **Chapter 5** focus on local governments' incentive structure affecting housing price, illustrated by the case of Shanghai due to data availability. Three conclusions emerge from empirical results. First, infrastructure expenditure and residential investment are positively cointegrated at 1 year lag, indicating infrastructure expenditure not only increases land revenue as documented in literatures, but also supports local economic growth and encourages residential investment. Second, residential investment and residential price are also positively cointegrated. However, much land acquired has not been immediately developed. Thus the interaction between residential investment and residential price is probably attributable to developer's land hoarding strategy. Third, infrastructure expenditure is deterministic to the property boom through promoting land sale and property investment. In summary, local governments do not have social stability incentive. Increasing infrastructure satisfies both of local officials' revenue incentive in terms of increased land sale and growth incentive in terms of increased housing price.

Chapter 6 discusses the central government's revenue incentive and growth incentive affecting land price (*Proposition 4&5*). Empirical result shows that although affordable housing development is negatively related to land price and hence housing price, affordable housing keeps declining. Meanwhile, public land sales and developers' market concentration increases land price, while land hoarding has no effect on land price. The implication is that the central government also cares about revenue and growth, hence mediating the regulative policies on the land market.

Chapter 7 explores the central government's stability incentive affecting housing price. Controlling local governments' influence (public expenditure and land sale), empirical result shows that housing price and inflation are positively related. Concerning the model's predictability, inflation and housing price are most highly consistent with a few months lagged effect (housing price index lags CPI), as indicated by the bi-lateral Granger causality relationship between CPI and HP. The co-movement of their trends is also seen in Figure 7.1 and Figure 7.2, as well as being confirmed by their adjustment coefficients of the vector error correction model in Table 7.2. Recent reports from National Statistical Bureau also show that housing price escalation and increasing inflationary pressure remained consistent in movements after 2010.

8.3 CONTRIBUTION TO KNOWLEDGE

Although in theory land and housing prices are largely influenced by transformation forces (Roulac, 1996), little has been done to explore this interaction empirically. This study intends to fill in this gap by studying the roles of central and local governments in China's urban land market and commodity housing market. An instrumental transformation force is the persistent conflicts between central and local governments in revenue distribution. This study represents the first attempt to integrate government's revenue conflict and housing price fluctuation into a self-explanatory framework.

In addition, this study divides China's land and housing price fluctuations into three historical stages in the process of housing reform: Pilot Experimental Stage (1985-1991), Double Track Stage (1992-1997), and Complete Commercialization Stage (since 1998).

During the reform process, many natural experiments were carried out to balance between central and local interests. This study analyses what each of these stages means in terms of policy implications to the urban land market and the commodity housing market. It also explains why previous literature is unsatisfactory to explain China's housing price fluctuation, and what can be improved when government conflict issues are taken into consideration.

Furthermore, this study represents one of the first attempts to apply cointegration approach and panel data analysis to explore housing price fluctuation in China. Previous empirical models are inappropriate for markets undergoing profound transformation. These models also fall short in finding a long-run equilibrium between price fluctuation and its determinants. Besides, panel data analysis facilitates comparison study among different regions, which controls other factors affecting land and housing price fluctuations.

Finally, this study is based on the supply-demand nexus, considering government's roles and goals in affecting property supply and demand that lead to land and housing price fluctuations. This type of study is of particular importance to China as government plays a dominant role in the urban land market and the commodity housing market. The study provides suggestions for central leaders in implementing policies and decisions on allocating fiscal resources and regulating the land market. It is also beneficial to satisfy practical purposes directly related to the housing market, such as stabilizing housing price and offering better shelters for the poor.

8.4 LIMITATION OF THE STUDY

There are two limitations of this study. The first limitation is the quality of data. Currently, the database used in this study is mainly established by data selection from statistical yearbooks. There are still few studies using first-hand data to study housing price fluctuation in China. This thesis is with no exception. Thus there is room left for the improvement in the quality of empirical data. Apart from the problem of data source, the time span is limited within the past two decades, which undermines the credibility of time series analysis. This is not only a pure technical problem, but also an industry problem. That means it can only be addressed as time progresses and so that more time series data can be accumulated for further research.

The second limitation is the complexity of evaluating governments' institutional conflicts affecting the land and housing markets. In this research econometric analysis is employed to interpret the governments' roles and conflicts. However, explanations from empirical results are sometimes subjective, due to lack of matching data sets for further econometric analysis. One significant constraint is that the frequent policy changes are difficult to be modified into independent or dummy variables. Therefore, the conclusion of the extent to which government's incentive structure affects market performance should be treated with caution.

8.5 RECOMMENDATIONS FOR FUTURE RESEARCH

Two bodies of future research could be followed with respect to the problems identified in the study. First is to trace and explain the cyclical behavior of the property market

which is yet to emerge. So far, China has not faced a complete property cycle with both boom and bust phases. This would help to extend the literature in terms of the cyclical mechanism in an emerging property market with influential transformation forces. Second is to extend the institutional analysis of the land and housing market, under the framework of government's incentive structure-price fluctuation mechanism. Effort is needed to promote the data accuracy of the sample cities as well as to carry out more comparative studies in different cities.

8.6 CHAPTER SUMMARY

The research study meets the objectives set out in Chapter 1, and the main conclusions and the value of the research are summarized. More research work could be conducted to yield more reliable results, and future research directions have been suggested.

Appendix 1
Empirical Data for Chapter 4

APPENDIX 1: Empirical Data for Chapter 4

GDP Growth (2000-2007)

Area/Year	2000	2001	2002	2003	2004	2005	2006	2007
Bei Jing	18.05%	17.38%	16.71%	16.01%	20.63%	13.63%	14.29%	19.45%
Tian Jin	13.39%	12.76%	12.07%	19.87%	20.67%	18.86%	17.89%	19.25%
He Bei	10.39%	9.37%	9.09%	15.00%	22.49%	19.09%	15.49%	16.82%
Shan xi	22.49%	9.96%	14.55%	22.81%	25.08%	17.03%	13.71%	20.94%
Inner Mongolia	21.36%	11.35%	13.25%	23.06%	27.33%	28.10%	23.00%	24.57%
Liao ning	11.92%	7.80%	8.45%	9.97%	11.15%	20.04%	15.51%	14.14%
Ji lin	17.50%	8.65%	10.76%	13.35%	17.28%	15.96%	18.09%	16.93%
Hei long jiang	8.77%	7.57%	7.29%	11.55%	17.08%	16.02%	12.29%	13.43%
Shang Hai	13.90%	9.20%	10.19%	16.60%	20.59%	13.52%	13.12%	16.19%
Jiang Su	11.12%	10.56%	12.16%	17.31%	20.58%	22.01%	18.24%	18.66%
Zhe Jiang	12.81%	12.33%	16.02%	21.26%	20.03%	15.36%	17.15%	19.16%
An hui	-0.22%	11.87%	8.41%	11.46%	21.31%	12.94%	14.39%	13.36%
Fu Jian	10.26%	8.19%	9.69%	11.55%	15.64%	13.98%	15.92%	14.21%
Jiang xi	8.06%	8.62%	12.63%	14.57%	23.13%	17.36%	15.13%	16.58%
Shan dong	8.81%	10.28%	11.75%	17.54%	24.37%	23.27%	19.23%	19.21%
He nan	10.42%	9.50%	9.08%	13.79%	24.55%	23.77%	18.03%	18.19%
Hu bei	-8.10%	9.45%	8.56%	12.93%	18.38%	15.77%	16.28%	12.21%
Hu nan	6.76%	7.90%	8.34%	12.25%	21.07%	15.41%	16.24%	14.66%
Guang Dong	16.11%	12.08%	12.15%	17.35%	19.06%	18.56%	17.16%	18.75%
Guang xi	6.49%	9.58%	10.72%	11.78%	21.71%	18.71%	18.47%	16.24%
Hai nan	11.79%	6.00%	11.39%	11.45%	15.25%	11.98%	17.69%	14.26%
Chong Qing	7.45%	10.14%	12.71%	14.21%	18.48%	14.03%	13.71%	15.12%
Si chuan	5.84%	9.30%	10.05%	12.87%	19.62%	15.76%	16.96%	15.07%
Gui zhou	12.94%	10.04%	9.71%	14.71%	17.63%	17.96%	15.31%	16.38%
Yun Nan	5.86%	6.32%	8.16%	10.52%	20.57%	12.69%	15.23%	13.23%
Shaan xi	21.27%	11.45%	12.08%	14.84%	22.72%	15.75%	23.07%	20.20%
Gan su	12.97%	6.89%	9.47%	13.62%	20.62%	14.54%	17.72%	15.97%
Qing hai	10.62%	13.80%	13.50%	14.57%	19.45%	16.57%	18.09%	17.76%
Ning xia	22.16%	14.37%	11.80%	18.08%	20.59%	12.85%	17.27%	19.52%
Xin jiang	16.69%	9.39%	8.12%	16.97%	17.11%	17.88%	16.94%	17.18%

Data Source: China Statistical Yearbook (2001-2008)

Proportion of Land Sale by Public Auction (2000-2007)

Area/Year	2000	2001	2002	2003	2004	2005	2006	2007
Bei Jing	0.20%	0.52%	2.42%	2.67%	4.29%	5.65%	11.00%	11.32%
Tian Jin	1.14%	1.84%	4.03%	11.71%	21.20%	21.20%	18.57%	9.57%
He Bei	19.38%	26.38%	2.66%	30.07%	25.66%	29.84%	32.19%	42.24%
Shan xi	12.37%	24.16%	39.64%	23.97%	33.41%	40.18%	30.07%	32.33%
Inner Mongolia	10.59%	14.18%	14.37%	16.60%	24.87%	32.51%	32.21%	47.01%
Liao ning	5.69%	7.22%	14.70%	26.05%	24.19%	32.03%	25.35%	55.21%
Ji lin	1.53%	0.59%	9.92%	20.45%	20.03%	17.97%	18.95%	37.35%
Hei long jiang	0.42%	0.68%	4.69%	40.96%	34.04%	45.93%	46.30%	57.23%
Shang Hai	0.07%	6.87%	15.36%	21.91%	15.13%	25.02%	8.27%	34.36%
Jiang Su	23.73%	16.09%	23.11%	18.86%	20.39%	21.71%	21.18%	36.02%
Zhe Jiang	16.87%	16.22%	11.87%	12.99%	17.08%	23.07%	17.97%	50.49%
An hui	6.22%	5.13%	13.50%	22.01%	23.97%	37.28%	28.02%	47.04%
Fu Jian	14.70%	13.38%	27.37%	27.07%	28.55%	29.73%	16.55%	22.17%
Jiang xi	17.15%	20.17%	43.42%	59.80%	60.95%	68.95%	65.14%	80.06%
Shan dong	3.08%	1.72%	8.33%	9.73%	18.96%	23.91%	25.02%	39.51%
He nan	18.31%	19.28%	36.20%	51.27%	47.55%	54.63%	54.01%	51.60%
Hu bei	0.64%	11.10%	13.83%	20.42%	21.49%	23.88%	24.54%	23.57%
Hu nan	21.49%	24.22%	36.81%	35.34%	41.54%	45.16%	45.92%	38.16%
Guang Dong	2.25%	7.78%	16.05%	25.13%	24.99%	18.18%	18.51%	18.14%
Guang xi	9.49%	8.26%	17.65%	27.92%	30.23%	28.86%	28.50%	27.77%
Hai nan	0.00%	26.30%	17.37%	36.18%	74.02%	65.87%	64.73%	88.62%
Chong Qing	13.23%	12.36%	34.50%	37.38%	29.23%	36.52%	40.20%	37.05%
Si chuan	5.48%	2.50%	6.21%	11.84%	8.53%	8.78%	6.95%	7.24%
Gui zhou	33.93%	16.15%	37.67%	52.72%	43.00%	52.83%	58.92%	58.18%
Yun Nan	47.81%	41.86%	46.13%	49.14%	51.26%	51.70%	34.24%	54.72%
Shaan xi	13.38%	21.45%	23.39%	40.94%	49.56%	38.66%	36.59%	41.23%
Gan su	7.06%	33.70%	26.86%	40.84%	36.40%	50.13%	44.43%	53.58%
Qing hai	5.76%	9.45%	6.02%	41.48%	60.66%	30.09%	23.95%	51.84%
Ning xia	0.20%	0.08%	5.50%	15.41%	27.42%	16.31%	54.64%	74.80%
Xin jiang	6.45%	6.85%	5.58%	13.86%	12.52%	17.50%	9.83%	16.23%

Data Source: Statistical Yearbook of China's Land Resource (2001-2008)

Population Growth (2000-2007)

	2000	2001	2002	2003	2004	2005	2006	2007
Bei Jing	9.94%	0.07%	2.91%	2.33%	2.49%	3.03%	2.80%	3.93%
Tian Jin	4.38%	0.30%	0.32%	0.38%	1.29%	1.86%	3.07%	1.93%
He Bei	1.97%	-0.67%	0.53%	0.51%	0.59%	0.61%	0.69%	0.71%
Shan xi	-47.75%	-3.58%	0.68%	5.29%	1.81%	2.07%	2.08%	-6.57%
Inner Mongolia	214.90%	-1.12%	0.35%	0.34%	0.36%	0.57%	1.00%	36.07%
Liao ning	12.13%	-1.37%	0.74%	0.71%	0.85%	3.78%	1.67%	3.09%
Ji lin	125.21%	5.71%	0.16%	1.14%	0.80%	-5.28%	-0.16%	21.26%
Hei long jiang	139.43%	-0.42%	0.45%	0.47%	0.60%	0.74%	0.66%	23.66%
Shang Hai	527.95%	3.23%	0.61%	0.56%	0.52%	-3.47%	0.13%	88.25%
Jiang Su	-16.43%	-0.88%	0.22%	0.23%	0.23%	-5.09%	-0.30%	-3.67%
Zhe Jiang	43.91%	2.42%	0.49%	0.52%	0.53%	-5.55%	0.25%	7.10%
An hui	38.56%	-9.94%	0.97%	1.21%	4.40%	10.72%	1.20%	7.85%
Fu Jian	35.37%	6.66%	0.71%	0.73%	0.66%	-4.68%	1.27%	6.79%
Jiang xi	96.86%	3.73%	0.39%	0.31%	0.28%	-5.88%	-0.52%	15.86%
Shan dong	-65.21%	0.23%	0.32%	0.74%	-0.26%	-10.38%	0.36%	-12.37%
He nan	-64.88%	-0.76%	0.66%	0.62%	0.64%	0.60%	0.58%	-10.42%
Hu bei	-59.99%	0.04%	0.07%	0.06%	0.18%	0.09%	0.25%	-9.88%
Hu nan	-35.12%	-1.04%	0.21%	0.17%	0.17%	0.09%	1.18%	-5.72%
Guang Dong	-62.48%	-1.36%	0.31%	0.17%	0.18%	0.26%	0.26%	-10.44%
Guang xi	-21.73%	3.31%	0.05%	0.05%	0.05%	0.08%	0.08%	-3.02%
Hai nan	355.51%	-0.89%	0.76%	0.63%	0.66%	0.68%	0.65%	59.67%
Chong Qing	34.63%	1.11%	0.87%	0.75%	0.70%	0.65%	0.65%	6.56%
Si chuan	-90.80%	1.14%	0.90%	0.98%	0.84%	1.24%	0.95%	-14.12%
Gui zhou	-4.99%	7.77%	1.01%	0.85%	0.88%	-4.46%	6.04%	1.18%
Yun Nan	2.29%	-0.02%	1.08%	0.99%	0.90%	0.80%	0.73%	1.13%
Shaan xi	-0.36%	1.50%	0.40%	0.44%	0.41%	0.40%	0.40%	0.53%
Gan su	0.75%	0.51%	0.68%	0.40%	0.61%	-0.93%	0.45%	0.41%
Qing hai	1.57%	0.97%	1.07%	1.02%	0.86%	0.85%	0.83%	1.20%
Ning xia	3.50%	0.18%	1.52%	1.48%	1.38%	1.39%	1.26%	1.79%
Xin jiang	8.51%	-2.55%	1.56%	1.51%	1.51%	2.41%	1.97%	2.49%

Data Source: China Statistical Yearbook (2001-2008)

Fixed Investment Growth (2000-2007)

	2000	2001	2002	2003	2004	2005	2006	2007
Bei Jing	20.70%	26.21%	12.38%	16.94%	22.25%	17.82%	22.54%	23.14%
Tian Jin	18.83%	25.46%	13.02%	17.67%	20.17%	17.89%	22.84%	22.65%
He Bei	18.46%	23.74%	12.14%	12.17%	21.46%	24.65%	20.55%	22.19%
Shan xi	21.43%	28.64%	15.46%	24.36%	24.87%	28.84%	36.91%	30.08%
Inner Mongolia	23.76%	29.11%	23.28%	13.64%	26.13%	20.88%	19.10%	25.98%
Liao ning	13.14%	22.65%	8.73%	13.53%	18.74%	29.31%	18.13%	20.71%
Ji lin	11.10%	25.23%	11.08%	12.85%	24.08%	24.29%	13.82%	20.41%
Hei long jiang	12.64%	25.24%	11.21%	6.21%	23.48%	12.94%	22.94%	19.11%
Shang Hai	14.06%	16.36%	21.78%	26.21%	27.02%	19.08%	9.07%	22.26%
Jiang Su	22.00%	23.40%	17.90%	21.79%	25.23%	27.54%	20.31%	26.36%
Zhe Jiang	25.36%	38.49%	25.55%	19.59%	18.53%	19.06%	16.30%	27.15%
An hui	12.08%	24.83%	13.14%	11.07%	18.54%	18.54%	31.86%	21.68%
Fu Jian	16.10%	15.12%	6.53%	13.77%	14.23%	14.78%	22.87%	17.23%
Jiang xi	7.53%	26.96%	20.33%	11.93%	18.83%	24.20%	23.49%	22.21%
Shan dong	11.47%	22.95%	14.18%	17.43%	17.69%	23.28%	25.04%	22.01%
He nan	15.93%	14.15%	23.71%	13.89%	22.80%	26.83%	29.04%	24.39%
Hu bei	23.50%	16.57%	5.57%	5.68%	19.59%	20.49%	34.45%	20.98%
Hu nan	11.08%	24.11%	23.47%	7.64%	25.41%	21.39%	21.88%	22.50%
Guang Dong	3.42%	23.51%	15.12%	11.48%	9.28%	23.54%	11.54%	16.31%
Guang xi	14.89%	36.04%	19.31%	5.73%	14.40%	20.50%	19.30%	21.70%
Hai nan	12.92%	23.12%	16.87%	14.24%	20.69%	18.90%	15.40%	20.36%
Chong Qing	24.90%	26.60%	28.76%	11.68%	15.85%	23.16%	21.93%	25.48%
Si chuan	24.35%	31.44%	18.10%	4.37%	22.25%	20.88%	24.51%	24.32%
Gui zhou	18.07%	36.53%	14.67%	5.32%	25.90%	24.45%	17.27%	23.70%
Yun Nan	9.54%	19.88%	6.14%	11.47%	12.99%	15.47%	16.61%	15.35%
Shaan xi	31.59%	28.81%	15.67%	3.28%	23.46%	23.76%	28.99%	25.93%
Gan su	27.37%	25.09%	16.60%	9.27%	18.98%	20.29%	23.12%	23.45%
Qing hai	22.51%	48.39%	17.21%	2.79%	12.53%	23.61%	26.45%	25.58%
Ning xia	22.82%	53.82%	22.43%	-7.67%	16.30%	30.27%	20.57%	26.42%
Xin jiang	7.19%	37.90%	37.16%	2.02%	14.27%	23.27%	30.72%	25.42%

Data Source: China Statistical Yearbook (2001-2008)

Average Years of Education (2000-2007)

	2000	2001	2002	2003	2004	2005	2006	2007
Bei Jing	11.40	11.54	11.21	11.43	11.66	11.89	11.26	11.22
Tian Jin	10.30	10.43	10.13	10.33	10.54	10.75	10.18	10.14
He Bei	8.69	8.79	8.54	8.71	8.88	9.06	8.58	8.55
Shan xi	9.24	9.36	9.09	9.27	9.46	9.64	9.14	9.10
Inner Mongolia	8.70	8.81	8.55	8.72	8.89	9.07	8.59	8.56
Liao ning	9.46	9.58	9.30	9.48	9.67	9.87	9.35	9.31
Ji lin	9.19	9.31	9.04	9.22	9.40	9.59	9.09	9.05
Hei long jiang	9.02	9.13	8.87	9.05	9.23	9.41	8.92	8.88
Shang Hai	10.91	11.05	10.73	10.94	11.16	11.38	10.78	10.74
Jiang Su	8.74	8.85	8.59	8.76	8.94	9.11	8.63	8.60
Zhe Jiang	8.52	8.63	8.38	8.55	8.72	8.89	8.42	8.39
An hui	7.66	7.76	7.53	7.68	7.83	7.99	7.57	7.54
Fu Jian	8.07	8.17	7.93	8.09	8.25	8.41	7.97	7.94
Jiang xi	8.67	8.77	8.52	8.69	8.86	9.04	8.56	8.53
Shan dong	8.59	8.70	8.45	8.62	8.79	8.97	8.49	8.46
He nan	8.73	8.84	8.58	8.75	8.93	9.10	8.62	8.59
Hu bei	8.78	8.89	8.63	8.80	8.98	9.16	8.67	8.64
Hu nan	8.77	8.88	8.62	8.79	8.97	9.15	8.66	8.63
Guang Dong	9.25	9.37	9.10	9.28	9.47	9.65	9.15	9.11
Guang xi	8.37	8.48	8.23	8.39	8.56	8.73	8.27	8.24
Hai nan	8.77	8.88	8.62	8.79	8.97	9.15	8.66	8.63
Chong Qing	8.07	8.17	7.93	8.09	8.25	8.41	7.97	7.94
Si chuan	7.75	7.85	7.62	7.77	7.93	8.09	7.66	7.63
Gui zhou	7.33	7.43	7.21	7.35	7.50	7.65	7.25	7.22
Yun Nan	7.13	7.22	7.01	7.15	7.29	7.44	7.05	7.02
Shaan xi	8.87	8.98	8.72	8.89	9.07	9.25	8.76	8.73
Gan su	7.38	7.47	7.25	7.40	7.54	7.69	7.29	7.26
Qing hai	7.55	7.64	7.42	7.57	7.72	7.87	7.46	7.43
Ning xia	8.54	8.65	8.40	8.57	8.74	8.91	8.44	8.41
Xin jiang	9.02	9.13	8.87	9.05	9.23	9.41	8.92	8.88

Data Source: China Statistical Yearbook for Regional Economy (2001-2008)

Appendix 2
Empirical Data for Chapter 5

APPENDIX 2: Empirical Data for Chapter 5

Price, Investment, Expenditure and Revenue in Shanghai (1987-2008)

Year	Public Expenditure (100 Million RMB)	Residential Housing Price	Residential Investment (100 Million RMB)	Land Sale Revenue (100 Million RMB)
1987	32.64	223	35.79	NA
1988	37.08	253	44.73	NA
1989	36.09	246	34.67	NA
1990	47.22	322	42.94	NA
1991	61.38	419	48.92	NA
1992	84.35	576	61.23	31.16
1993	167.94	1146	77.14	106.93
1994	238.16	1625	300.65	32.40
1995	273.78	1869	433.76	32.98
1996	378.78	2585	466.99	28.50
1997	412.85	2818	458.22	42.71
1998	531.38	3627	404.96	52.26
1999	501.39	3422	378.82	54.60
2000	449.90	3565	443.90	80.20
2001	510.78	3866	466.71	70.10
2002	583.49	4134	584.51	139.90
2003	604.62	5118	694.30	173.30
2004	672.58	5855	922.61	172.10
2005	885.74	6842	936.36	170.40
2006	1125.54	7196	854.15	186.40
2007	1466.33	8361	853.13	131.00
2008	1733.18	9883	871.52	134.29

Data Source: Shanghai Statistical Bureau, Shanghai Statistical Yearbook (1990-2009); Shanghai Real Estate Market (1999-2009), China Statistical Yearbook of Real Estate (1999-2009)

Appendix 3

Empirical Data for Chapter 6

APPENDIX 3: Empirical Data for Chapter 6

Housing Price of 33 Major Cities (2003-2007)

City/Year	2003	2004	2005	2006	2007
Beijing	4737	5053	6788	8280	11553
Tianjin	2518	3115	4055	4774	5811
Shijiazhuang	1581	1547	1870	2068	2452
Taiyuan	3165	2675	3575	3579	3862
Huhehaote	1552	1648	2057	2368	2596
Shenyang	2916	2911	3187	3376	3699
Dalian	2921	3116	3747	4525	5568
Changchun	2155	2260	2393	2558	3250
Harbin	2353	2494	2700	2703	3053
Nanjing	3148	3516	4077	4477	5304
Hangzhou	3939	4248	5619	6218	7616
Ningbo	2865	3389	5027	5437	6251
Hefei	2088	2550	3006	3110	3307
Fuzhou	2347	2616	3212	4397	5179
Xiamen	3371	4146	5503	6340	8250
Nanchang	2367	2430	2587	3126	3558
Jinan	2327	3056	3133	3525	3776
Qingdao	2406	2965	3744	4249	5201
Zhengzhou	2045	2099	2638	2888	3574
Wuhan	2072	2516	3062	3690	4664
Changsha	2040	2039	2314	2644	3305
Guangzhou	4211	4537	5366	6548	8673
Nanning	2252	2761	2605	2872	3404
Haikou	2092	2237	2650	2786	3516
Chongqing	1596	1766	2135	2269	2723
Chengdu	2096	2452	3224	3646	4276
Guiyang	1949	1802	2169	2373	2902
Kunming	2233	2474	2640	2903	3108
Xi'am	2148	2624	2851	3317	3379
Lanzhou	1858	2282	2590	2614	2967
Xining	1644	1725	1877	2022	2421
Yinchuan	2139	2177	2593	2399	2408
Urumuqi	2361	2147	2373	2166	2667

Data Source: China Statistical Yearbook (2004-2008)

Land Price of 33 Major Cities (2003-2007)

City/Year	2003	2004	2005	2006	2007
Beijing	2861	2944	3099	3296	3786
Tianjin	815	951	1003	1070	1376
Shijiazhuang	771	809	824	854	922
Taiyuan	619	659	680	711	778
Huhehaote	238	252	295	337	390
Shenyang	564	657	729	804	919
Dalian	1172	1347	1721	1818	2064
Changchun	387	412	440	500	531
Harbin	557	572	614	670	773
Nanjing	1223	1295	1346	1409	1546
Hangzhou	1071	1505	1909	2112	3465
Ningbo	2462	2760	3202	3584	5264
Hefei	861	934	1037	1072	1204
Fuzhou	1472	1602	1983	2182	2663
Xiamen	3262	3681	4094	4585	5307
Nanchang	477	587	619	675	748
Jinan	852	919	975	1058	1176
Qingdao	672	712	738	781	839
Zhengzhou	645	707	803	860	974
Wuhan	601	643	669	687	730
Changsha	743	778	832	1000	1268
Guangzhou	1855	1866	1898	1961	2051
Nanning	739	753	804	866	1130
Haikou	448	463	517	605	756
Chongqing	458	487	526	544	649
Chengdu	907	1073	1216	1307	1538
Guiyang	486	502	520	543	649
Kunming	612	632	693	716	787
Xi'am	970	1016	1070	1167	1333
Lanzhou	643	656	661	683	736
Xining	347	381	399	416	467
Yinchuan	421	453	478	508	583
Urumuqi	404	427	431	440	486

Data Source: China Statistical Yearbook (2004-2008)

Developers' Market Concentration Ratio of 33 Major Cities (2003-2007)

City/Year	2003	2004	2005	2006	2007
Beijing	3.88%	2.38%	1.22%	7.48%	3.37%
Tianjin	3.81%	1.99%	2.57%	14.45%	1.95%
Shijiazhuang	0.00%	0.18%	0.49%	2.77%	0.41%
Taiyuan	0.40%	0.19%	0.47%	3.85%	0.34%
Huhehaote	8.93%	0.00%	0.00%	1.09%	0.36%
Shenyang	0.41%	1.12%	0.87%	3.52%	0.85%
Dalian	2.72%	1.12%	1.77%	7.90%	2.24%
Changchun	3.31%	0.99%	1.85%	3.95%	1.37%
Harbin	1.23%	1.49%	1.27%	2.96%	0.98%
Nanjing	5.45%	0.93%	3.08%	7.51%	2.40%
Hangzhou	3.25%	0.98%	2.24%	10.14%	2.65%
Ningbo	2.27%	0.98%	1.79%	5.59%	2.42%
Hefei	2.12%	0.84%	0.70%	2.21%	0.74%
Fuzhou	0.88%	0.63%	1.43%	6.19%	2.15%
Xiamen	1.85%	0.63%	1.71%	5.33%	1.64%
Nanchang	0.24%	0.17%	0.41%	1.57%	0.56%
Jinan	3.64%	0.87%	2.22%	8.25%	2.18%
Qingdao	0.54%	0.87%	0.90%	4.42%	1.00%
Zhengzhou	0.64%	0.68%	0.75%	4.81%	0.50%
Wuhan	1.80%	0.63%	0.96%	4.13%	1.45%
Changsha	1.75%	0.52%	1.04%	2.32%	0.97%
Guangzhou	0.39%	1.39%	0.45%	10.93%	0.68%
Nanning	0.53%	0.18%	0.36%	2.14%	0.30%
Haikou	0.00%	0.48%	0.00%	0.00%	0.00%
Chongqing	0.56%	0.88%	1.02%	5.09%	1.28%
Chengdu	1.16%	0.54%	0.69%	3.75%	1.38%
Guiyang	0.16%	0.27%	0.13%	3.00%	0.13%
Kunming	3.09%	0.72%	2.20%	15.10%	1.63%
Xi'am	0.75%	0.83%	1.00%	3.57%	1.35%
Lanzhou	0.00%	0.25%	0.23%	0.62%	0.19%
Xining	0.00%	1.03%	1.44%	5.62%	1.18%
Yinchuan	2.07%	1.89%	3.13%	11.06%	4.41%
Urumuqi	2.76%	1.13%	2.34%	7.03%	1.99%

Data Source: China Real Estate Yearbook (2004-2008)

Land Development Ratio of 33 Major Cities (2003-2007)

City/Year	2003	2004	2005	2006	2007
Beijing	22.06%	59.67%	59.39%	-184.89%	36.47%
Tianjin	32.28%	49.44%	-35.12%	-52.07%	-31.74%
Shijiazhuang	-5.50%	61.39%	35.82%	-33.08%	-76.09%
Taiyuan	32.46%	16.84%	72.74%	20.18%	64.75%
Huhehaote	5.67%	14.38%	70.08%	56.54%	59.73%
Shenyang	63.91%	63.89%	54.80%	48.78%	66.60%
Dalian	57.36%	53.92%	-27.50%	27.27%	27.00%
Changchun	24.02%	84.44%	92.21%	97.70%	99.38%
Harbin	58.78%	26.62%	75.52%	-29.68%	36.44%
Nanjing	59.62%	48.51%	-16.06%	7.42%	72.23%
Hangzhou	63.03%	30.84%	66.72%	64.20%	86.14%
Ningbo	47.68%	10.06%	-38.91%	-39.67%	-54.72%
Hefei	11.22%	73.79%	6.65%	14.47%	23.36%
Fuzhou	43.33%	74.09%	34.47%	71.95%	31.42%
Xiamen	41.59%	54.65%	84.47%	79.11%	98.51%
Nanchang	46.96%	0.83%	25.79%	-47.91%	-104.85%
Jinan	30.24%	75.13%	62.57%	10.81%	6.22%
Qingdao	-50.49%	-46.64%	17.81%	-26.91%	3.00%
Zhengzhou	12.74%	73.45%	37.50%	-0.12%	-12.67%
Wuhan	100.00%	49.97%	44.51%	-4.92%	-6.39%
Changsha	48.55%	30.14%	50.42%	24.65%	21.01%
Guangzhou	69.44%	24.92%	54.77%	19.85%	10.68%
Nanning	45.28%	48.91%	11.06%	44.78%	69.04%
Haikou	19.97%	54.43%	76.65%	92.67%	67.96%
Chongqing	20.29%	21.69%	33.86%	45.20%	31.42%
Chengdu	5.11%	95.92%	81.24%	66.31%	42.26%
Guiyang	97.74%	61.35%	65.27%	82.52%	80.66%
Kunming	-27.83%	51.04%	36.07%	48.69%	48.22%
Xi'am	6.66%	7.32%	19.72%	-70.84%	-15.42%
Lanzhou	34.68%	37.67%	86.99%	59.39%	73.29%
Xining	50.23%	11.81%	43.97%	-70.69%	-4.40%
Yinchuan	35.98%	78.69%	88.11%	74.93%	44.65%
Urumuqi	34.52%	19.81%	-84.02%	-3.69%	6.33%

Data Source: China Real Estate Yearbook (2004-2008)

Affordable Housing Ratio of 33 Major Cities (2003-2007)

City/Year	2003	2004	2005	2006	2007
Beijing	5.71%	4.93%	2.94%	2.60%	1.42%
Tianjin	20.53%	12.93%	6.48%	12.67%	9.80%
Shijiazhuang	9.58%	11.43%	10.52%	7.28%	4.83%
Taiyuan	11.24%	14.17%	4.04%	4.22%	4.98%
Huhehaote	11.37%	8.69%	3.59%	5.32%	4.00%
Shenyang	1.08%	3.18%	0.42%	5.79%	3.75%
Dalian	4.92%	3.18%	2.77%	3.09%	2.53%
Changchun	11.14%	9.29%	12.25%	6.78%	7.09%
Harbin	14.44%	11.76%	5.53%	5.87%	5.87%
Nanjing	5.49%	3.98%	5.66%	5.31%	7.04%
Hangzhou	7.32%	3.39%	8.15%	8.81%	6.41%
Ningbo	2.02%	3.39%	2.53%	4.65%	2.65%
Hefei	7.50%	3.39%	0.68%	0.28%	0.12%
Fuzhou	0.77%	1.54%	2.74%	1.06%	1.86%
Xiamen	0.96%	1.54%	1.04%	2.32%	0.82%
Nanchang	4.68%	5.10%	2.22%	2.16%	5.33%
Jinan	1.48%	6.12%	0.82%	1.08%	2.05%
Qingdao	5.58%	6.12%	5.86%	3.42%	4.51%
Zhengzhou	6.19%	7.99%	5.09%	4.99%	5.88%
Wuhan	8.53%	3.85%	1.75%	3.85%	5.91%
Changsha	21.19%	9.21%	1.73%	2.64%	2.29%
Guangzhou	0.96%	0.66%	0.06%	0.02%	0.64%
Nanning	4.99%	0.59%	6.57%	5.79%	3.15%
Haikou	9.21%	9.59%	5.27%	1.13%	1.61%
Chongqing	4.98%	2.73%	2.31%	4.17%	4.24%
Chengdu	6.54%	3.36%	0.99%	0.69%	0.45%
Guiyang	9.38%	8.91%	9.93%	9.17%	14.43%
Kunming	8.97%	11.31%	0.77%	1.29%	1.35%
Xi'am	6.15%	10.22%	2.98%	6.99%	4.43%
Lanzhou	17.15%	14.96%	3.67%	8.87%	14.43%
Xining	19.86%	14.39%	9.06%	4.22%	7.00%
Yinchuan	8.13%	7.29%	1.81%	3.33%	1.74%
Urumuqi	23.61%	18.62%	32.11%	38.59%	8.52%

Data Source: China Real Estate Yearbook (2004-2008)

Public Auction Ratio of 33 Major Cities (2003-2007)

City/Year	2003	2004	2005	2006	2007
Beijing	38.47%	49.95%	38.49%	53.40%	45.90%
Tianjin	4.96%	5.59%	5.32%	6.46%	9.39%
Shijiazhuang	1.19%	1.75%	2.60%	1.90%	3.38%
Taiyuan	0.71%	1.07%	1.42%	1.37%	1.32%
Huhehaote	0.44%	0.41%	0.55%	1.31%	1.71%
Shenyang	3.60%	5.82%	7.07%	9.11%	11.32%
Dalian	3.44%	5.45%	6.52%	8.81%	10.98%
Changchun	1.34%	2.13%	3.18%	3.27%	4.44%
Harbin	1.97%	2.32%	3.38%	3.01%	3.29%
Nanjing	4.41%	7.20%	7.45%	10.05%	13.50%
Hangzhou	10.43%	12.81%	12.61%	14.04%	16.74%
Ningbo	6.72%	9.50%	11.79%	10.33%	8.87%
Hefei	1.92%	2.77%	4.08%	6.86%	9.29%
Fuzhou	4.94%	6.64%	5.54%	8.05%	9.00%
Xiamen	2.15%	1.68%	3.10%	6.14%	8.60%
Nanchang	1.84%	2.74%	3.75%	3.74%	3.52%
Jinan	2.47%	3.17%	3.52%	3.22%	4.20%
Qingdao	3.29%	3.57%	4.48%	5.04%	7.34%
Zhengzhou	1.96%	2.71%	5.03%	5.08%	6.66%
Wuhan	5.11%	5.78%	8.56%	9.39%	15.43%
Changsha	2.70%	3.67%	4.08%	5.15%	8.48%
Guangzhou	21.96%	21.97%	16.60%	16.77%	22.48%
Nanning	1.60%	2.48%	3.38%	4.22%	6.05%
Haikou	0.74%	0.78%	1.08%	1.86%	1.17%
Chongqing	7.84%	9.00%	12.24%	16.46%	20.13%
Chengdu	6.68%	8.26%	9.54%	10.55%	17.34%
Guiyang	1.35%	1.81%	2.29%	2.48%	3.03%
Kunming	2.22%	2.25%	3.54%	3.39%	5.47%
Xi'am	3.26%	3.47%	4.61%	6.15%	7.88%
Lanzhou	0.59%	1.20%	1.20%	1.59%	1.81%
Xining	0.46%	0.49%	0.42%	0.38%	0.50%
Yinchuan	1.22%	1.35%	1.85%	2.17%	2.13%
Urumuqi	0.96%	0.71%	0.76%	1.33%	1.63%

Data Source: China Statistical Yearbook of Land Resource (2004-2008)

Appendix 4

Empirical Data for Chapter 7

APPENDIX 4: Empirical Data for Chapter 7

Capital Construction, Land Sale, Inflation and Housing Price (2000-2009)

Month	quarterly GDP	consumer price index	value of land sales	housing price index
Jan-00	18173	100.2	187.2	2019.6
Feb-00	18173	102.2	453.8	2054.0
Mar-00	18173	100.5	826.8	2031.6
Apr-00	21318	99.6	932.1	2054.3
May-00	21318	98.6	978.5	2035.7
Jun-00	21318	97.1	850.9	2005.0
Jul-00	22633	96.4	1181.7	2054.7
Aug-00	22633	97.3	732.3	2073.4
Sep-00	22633	98.9	900.4	2104.8
Oct-00	27280	98.8	713.7	2130.8
Nov-00	27280	99.5	934.8	2134.4
Dec-00	27280	99.6	6575.0	2126.4
Jan-01	19895	100.5	309.3	2062.5
Feb-01	19895	100.6	870.7	2060.6
Mar-01	19895	100.0	813.6	2058.9
Apr-01	23047	100.2	1425.1	2117.3
May-01	23047	99.7	1494.0	2108.7
Jun-01	23047	98.5	1753.8	2083.3
Jul-01	24285	98.0	1534.9	2145.6
Aug-01	24285	98.1	1411.8	2145.8
Sep-01	24285	99.0	1283.2	2163.3
Oct-01	28706	99.3	1906.8	2179.5
Nov-01	28706	99.1	1130.8	2163.7
Dec-01	28706	99.2	7726.6	2155.6
Jan-02	21020	99.5	428.0	2129.5
Feb-02	21020	100.5	1083.8	2148.7
Mar-02	21020	99.2	2340.7	2131.8
Apr-02	24516	98.9	2122.2	2150.0
May-02	24516	98.6	1217.1	2145.6
Jun-02	24516	97.8	2544.7	2126.2
Jul-02	26146	97.1	2203.1	2210.8
Aug-02	26146	97.4	1740.2	2215.5
Sep-02	26146	98.3	2229.2	2235.8
Oct-02	30716	98.5	2029.0	2239.4
Nov-02	30716	98.4	2307.6	2225.4
Dec-02	30716	98.7	10136.7	2221.5

Jan-03	23562	99.8	655.8	2239.9
Feb-03	23562	100.7	2044.5	2255.6
Mar-03	23562	100.1	2679.4	2253.7
Apr-03	26491	99.9	2313.6	2279.6
May-03	26491	99.2	3586.9	2265.8
Jun-03	26491	98.0	3789.2	2238.5
Jul-03	29061	97.5	2603.1	2312.4
Aug-03	29061	98.2	2519.1	2326.5
Sep-03	29061	99.4	2890.6	2352.4
Oct-03	37580	100.3	2263.7	2395.5
Nov-03	37580	101.3	2452.5	2406.8
Dec-03	37580	101.9	9166.6	2409.6
Jan-04	27128	103.0	844.2	2489.7
Feb-04	27128	102.8	3072.0	2479.9
Mar-04	27128	103.1	3250.5	2500.2
Apr-04	31645	103.6	2325.4	2579.8
May-04	31645	103.5	2888.4	2579.7
Jun-04	31645	102.8	3468.9	2561.5
Jul-04	34371	102.6	2890.0	2658.8
Aug-04	34371	103.3	2672.1	2675.0
Sep-04	34371	104.5	2612.9	2702.2
Oct-04	43371	104.5	3035.5	2764.5
Nov-04	43371	104.1	2826.8	2741.8
Dec-04	43371	104.2	9898.0	2731.5
Jan-05	31355	104.9	809.1	2782.9
Feb-05	31355	106.8	2839.1	2827.5
Mar-05	31355	105.8	3726.0	2816.6
Apr-05	36067	105.5	2342.2	2835.8
May-05	36067	105.3	3116.9	2832.8
Jun-05	36067	104.4	3466.4	2810.0
Jul-05	38853	104.4	3148.6	2871.3
Aug-05	38853	104.6	2567.3	2874.4
Sep-05	38853	105.4	2789.4	2892.1
Oct-05	76076	105.8	2727.5	2981.9
Nov-05	76076	105.5	3546.0	2957.4
Dec-05	76076	105.9	7131.4	2955.0
Jan-06	43313	107.3	766.2	3003.2
Feb-06	43313	107.8	2694.7	3012.3
Mar-06	43313	106.8	3224.2	3000.7
Apr-06	48130	107.1	2536.6	3042.1
May-06	48130	106.9	2365.5	3041.9
Jun-06	48130	106.4	4096.5	3026.6
Jul-06	50034	106.1	2836.4	3077.4
Aug-06	50034	106.4	2569.9	3083.9
Sep-06	50034	106.9	2964.2	3096.7

Oct-06	69394	107.1	2772.8	3177.2
Nov-06	69394	107.4	2632.5	3170.1
Dec-06	69394	108.9	7331.5	3199.1
Jan-07	50287	109.6	651.2	3241.2
Feb-07	50287	110.7	1757.8	3267.3
Mar-07	50287	110.4	3701.0	3274.3
Apr-07	56481	110.2913	3053.0	3331.5
May-07	56481	110.6221	3006.9	3344.7
Jun-07	56481	111.0646	4881.9	3357.9
Jul-07	59275	112.0642	3828.6	3517.1
Aug-07	59275	113.409	3409.7	3556.2
Sep-07	59275	113.7492	4056.3	3563.8
Oct-07	80576	114.0905	3004.4	3731.6
Nov-07	80576	114.8891	2680.2	3738.0
Dec-07	80576	116.038	6578.2	3757.4
Jan-08	61491	117.4304	780.8	3853.4
Feb-08	61491	120.4836	2489.5	3946.0
Mar-08	61491	119.6402	4651.8	3938.7
Apr-08	69128	119.7599	2253.6	3950.4
May-08	69128	119.2808	3659.5	3938.3
Jun-08	69128	119.0423	4725.8	3930.2
Jul-08	71012	119.1613	3412.8	3938.1
Aug-08	71012	119.0422	2968.3	3930.6
Sep-08	71012	119.0422	2594.6	3927.4
Oct-08	99039	118.685	2059.4	3901.2
Nov-08	99039	117.7356	2420.4	3849.8
Dec-08	99039	117.5001	4768.9	3823.7
Jan-09	65745	118.5576	707.0	3847.6
Feb-09	65745	118.5576	1581.1	3840.2
Mar-09	65745	118.2019	2453.6	3840.7
Apr-09	74117	117.9655	2524.4	3848.4
May-09	74117	117.6116	2608.7	3859.8
Jun-09	74117	117.0236	3769.2	3871.3
Jul-09	77955	117.0236	2664.5	3906.1
Aug-09	77955	118.4278	2322.2	3988.6
Sep-09	77955	118.4278	2762.6	4056.6
Oct-09	117536	118.4278	2046.2	4125.9
Nov-09	117536	118.4278	1825.4	4217.2
Dec-09	117536	118.4278	4480.1	4323.2

Data Source: The People's Bank of China Quarterly Statistical Bulletin (1996[1]-2009[3]); China Real Estate Index System (2000-2009); China Monthly Economic Indicators (2000-2009)

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