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Sentiment, Expectations and Real Estate Prices —Evidence from China

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Sentiment, Expectations and Real Estate Prices —Evidence from China

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Abstract

From the perspective of behavioral finance, this thesis utilizes the real estate data since China's market-oriented reform to investigate the influence of sentimental variables and expectations on real estate prices.

As the first topic of the research, Chapter 2 of this thesis takes China's state level Consumer Expectation Index as proxy variable of consumers' aggregated sentiment, and adopts the method of time series to empirically research on the relationship between the sentiment and China's real estate prices. The research result indicates that there is long-term cointegrating relationship between the consumers' aggregated sentiment and real estate prices, and the influence of the sentiment on real estate prices is stronger than the fundamental indicators in the traditional analytical framework such as M2, GDP, etc.

For the purpose of further distinguishing the influence of psychological factors on real estate prices, and investigating data at a more detailed level, Chapter 3 of the thesis adopts panel data model to research the influence of sentiment of the market opinion leaders (entrepreneurs) on house prices of different provinces. The estimation result of the overall panel data indicates that the sentiment of entrepreneurs significantly affects house prices. Then, the country is divided into three areas: eastern, central and western areas, of which the estimation results indicate that the degree of the sentimental influence on house prices is positively correlated with the degree of market maturity. The maturer the market is, the more likely it is to be affected by the psychological factors. The conclusion of endogenous test shows that the sentiment of entrepreneurs is independent of other economic fundamentals and directly affects the prices of housing property.

Chapter 4 of the thesis examines the influence of the promotion expectations of Chinese local officials (governors) on house prices from the perspective of public administration. China adopts a unique promotion system of local officials similar to yardstick competition, which has had a broad and profound influence on China's real estate market. This chapter first illustrates the theoretical mechanism that triggers China's land finance. And on this basis, it carries an empirical study on the influence of promotion

expectations of local officials on land prices and then the house prices. The test results indicate that the promotion expectations of China's local officials have long-term and profound influence on house prices, which help us to better understand the unique mechanism of China's sustained rapid development. The public administrative policies outlined in Chapter 4 have important reference to other developing countries.

Declaration

The ideas and materials within this thesis are the sole ownership of me; please do not quote without my consent.

I declare that this thesis is my own and has not been submitted to any other institution for credit or another degree.

Disclaimer

This thesis is the author's property and, as such, any omissions or errors are my sole responsibility. I retain the right to modify and change the material here or in future research paper whenever I feel it is necessary.

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Chapter 1

Introduction

1.1 Research background

1.1.1 Behavior and rationality

Understanding the law of asset price fluctuation is one of the world's most challenging problems. So far, there has been no convincing theory or method that can stand the test of time.

Aggarwal (2014) pointed out that, in general, economic reasons for deviations from perfect markets fall into four broad categories. The first is that demand shocks brought about by macroeconomic development cannot cause enough immediate reaction. The second is transaction costs and arbitrage limits. Both of these phenomena are fundamentally derived from non-zero and risky transactions costs. According to transaction costs economics, transactions costs generally consist of search, negotiation, contracting, and enforcement costs of establishing a business relation-ship so that exchange of goods, services, and compensation can take place. Likewise, the effects of arbitrage on market efficiency are also limited by costs include the costs of overcoming the risks involved, any short-selling costs, costs of leverage, and constraints on margins and on equity capital (Shleifer and Vishny, 1997). The third reason for market inefficiency is behavioral biases and other deviations from rationality (Statman, 2008). The fourth is that the Herding Effect and other positive feedback loops deviates the market from equilibrium prices. These forces opposing market efficiency can be regulated and reduced but cannot be eliminated. Therefore, while there are many self-correcting forces pushing markets toward efficiency, there are also many hurdles and costs. Therefore, in practice, an unregulated free market is an unreachable fantasy (Stiglitz, 1982). Behavior bias and positive feedback loops will be discussed below.

(1) Behavior bias

Traditionally, financial economists think that economic agents are completely rational, self-interested, and pursue the maximization of expected utility (the view of economic man).

However, more and more scholars point out that human beings are not completely rational and that our actions and decisions are influenced by psychological biases. Behavioral finance focuses on studying the impact of cognitive biases, heuristics, and conscious emotions. Starting with the groundbreaking work of Taversky and Kahneman (1974), literature on the behavioral effects of decision-making has been rapidly evolving in recent decades (e.g.: Daniel et al., 2002; Fudenberg, 2006; Hirshleifer, 2001). Humans seem to value their own feelings when assessing risks (Lucey and Dowling, 2005). In studying the role of behavioral biases in financial decision-making, the economic and financial literature began to ponder on the effects of "animal spirits" (Keynes, 1936). This effect is manifested by psychological biases and emotional effects in financial decision-making.

First, there is psychological bias. Scholars generally agree with three psychological biases: biases, heuristics, and framing effects (e.g., Shefrin, 2007). Bias is a tendency to make wrong decisions. A heuristic is a psychological shortcut or rule of thumb that facilitates decision making. Framing means a person's decisions are influenced by the manner in which the setting for the decision is described. It is also convenient to place many other psychological phenomena into these categories. For example, overconfidence and over-optimism, as well as confirmation bias and illusion of control all fall into the category of biases; representativeness, availability, anchoring, and affect (or emotion) fall into the category of heuristics; loss aversion and prospect theory fall into the category of framing effects.

Second, in addition to psychological bias, human decisions are also influenced by emotions (Lucey and Dowling, 2005). One way to assess the effect of emotion on financial decisions is to assume that the economic entity is rational, *"but their utility consists of a payoff resulting from a particular decision or action (such as an effort level) plus utility from the resulting sentimental state." (Aggarwal, 2014, p182).* Therefore, economic agents choose actions (and time-paths of emotions) in order to maximize both rational and emotional future discount returns (Elster, 1998). Scholars apply the theories of Freud and other psychologists to assess emotional returns. For example, Taffler and Tuckett (2008) and Eshraghi and Taffler (2009) assess the role of emotions in finance by analyzing the impact of unconscious and infantile emotions on investor decisions. In many cases, investors are significantly affected by the weather and mood (Baker and Wurgler, 2006; Hirshleifer and Shumway, 2003; Kamstra et al., 2003).

Animal spirits can be proved by modern neurology (Eadie, 2003). By recording the physiological changes in emotions in the decision-making process so as to demonstrate that the investor has a physiological positive feedback effect in winning and losing situations, neuroscientists show that market fluctuation is correlated with emotion (Coates, 2012).

(2) Positive feedback loops

There are positive feedback effects in commercial and macroeconomic variables (Arthur, 1996; Aggarwal 1999b). There is clear evidence that traders usually show herding behavior when making transactions (Hirschleifer and Teoh, 2003). Herding behavior is the behavior of individuals in a group acting collectively without centralized direction. It is a human instinct reduces the danger to itself by moving as close as possible to the center of the fleeing group. Thus, the herd appears as a unit in moving together, but its function emerges from the uncoordinated behavior of self-serving individuals (Hamilton, 1971). The herding behavior leads to a positive feedback loop of prices, which means that price increase will further aggravate the price increase, and that price decrease also leads to spiraling price decrease (Cutler and Poterba 1991; Shiller 2005). The positive feedback effect induced by the herding effect have a significant impact on asset prices, creating a "kinetic energy" that deviates asset prices from the long-term price trends over a longer period of time and causing dramatic market fluctuation (Shiller, 2005). The initial herding can start with any kind of shock or news message under the right conditions. Repeated loops of positive feedback create a price bubble, and only when the price deviation exceeds a certain threshold, the error correction mechanism of asset prices' return to equilibrium will play a role and there will be a negative feedback loop of prices. As a result, the stock and real estate markets are always governed by bubbles and downturns of all sizes and durations. But the bubble can create far-reaching destructions when it grows big enough to attract attention.

1.1.2 Expectations and sentiment indices

(1) Expectations

The impact of behavioral biases on expectations also led to long-standing arguments in academia. The rational expectation hypothesis, as a revision of the theory of adaptive expectations, has been challenged by economic experiments in recent years.

The Rational Expectations Hypothesis (REH), first proposed by Muth (1961) and then systematized by Lucas Jr. and Prescott (1971), is the mainstream understanding of the

expectation theory. According to this hypothesis, the agent takes into account all available information when making expectation, and there is no systematic forecast error. However, it is noteworthy that there is also a dispute between individual rationality and collective rationality in the process of proposing the rational expectation hypothesis (Colasante et al., 2017). After his reference to Galton's (1907) early work, Muth pointed out that individual expectations can be wrong (overestimated or underestimated), but aggregated individual predictions can provide correct expectations. Lucas Jr. and Prescott (1971) considered individual predictions to be rational. According to simulation and experimental evidence, the hypothesis of rational expectation is often unrealistic. Individually, agents are unable to make rational forecast, and cannot show consistent behavior even in the case of given objective probability (Ellsberg, 1961; Branch, 2004; Evans and Honkapohja, 2001; Sargent, 1993). Collectively, although collective decisions (which can also be made in a decentralized and non-communicative manner) move near to optimal decisions, it is still impossible to reach the optimal state (Colasante et al., 2017).

Another hypothesis is that agents form their expectations based on an adaptive rule, that is, expectations are a function of past expectations and past realizations. The academic mainstream does not accept the hypothesis of adaptive expectation because the hypothesis does not satisfy the necessary condition of that the errors' unconditional mean is equal to zero. This means that any forecast error in the series forecast by the agent will be a systematic forecast error, and the expected error cannot be corrected in the long run. However, more and more empirical evidence (Anufriev and Hommes, 2012; Hommes, 2011; Granziera and Kozicki, 2015) showed that although individuals often mistakenly forecast the price of future assets or commodities, different combinations of rules of adaptive expectation result in very good experimental results.

It is noteworthy that Colasante et al. (2017) pointed out clearly in their experimental premises that in order to correct the theoretical flaw in adaptive expectation that the errors' unconditional mean is not equal to zero, the expectant must predict the fluctuations of future economic variables. That is, in order to make the assumptions of adaptive expectations more perfect in theory, it is necessary to revise the assumption to be that the agent's expectations should not only focuses on historical expectations and historical facts, but also integrate elements of rational expectations.

Recent literature attempts to incorporate the above two expectations theories, considering

aggregated expectations as the fusion of rational expectations and irrational expectations, and irrational expectation as a subjective Knightian uncertainty (Drerup et al., 2017). This theory of expectation holds that different agents make decisions through two ways of decision-making or the integration of two ways of decision-making: one is rational decision making based on theory or complete information; the other is purely based on intuition (Kahneman, 2011; Binswanger and Salm, 2014; von Gaudecker, 2015) or rules of thumb (Ameriks and Zeldes, 2004). Irrational decision-making demonstrates the characteristics of being rudimentary, diffuse, and unstable, which cannot be eliminated by hedging and is independent of other economic variables (Drerup et al., 2017).

(2) Sentimental variables

For a long time, people thought that the sentimental variables contain the information about the future fluctuations of the real economic activities. The information is not only the disorder disturbance of the economic variables, but contains the independent influence (which comes from subjective expectations) on the economic variables (Barsky and Sim, 2012).

From the existing literature, the measure of sentimental variables usually adopts two approaches, namely the market-based sentiment measure indicator and the publicly available sentiment (confidence) index. But no matter which approach is adopted, it is to measure such investment sentiment as optimism, pessimism or neutralism in the market.

A market-based sentiment measure indicator (whether in stock markets or real estate markets) usually refers to the changes in market sentiment by constructing a combination of the relationship between trading volume and other variables. For example, Khcherem and Bouri (2009) and Dhaoui (2014) quantified the overconfidence in the market by correlating the current stock trading volume with the previous trading returns, believing that the return increase in the previous period will enhance the confidence of traders and increase the current trading volume; another example, Hui and Wang (2014) measure such investment sentiment as optimism or pessimism in the market by examining the deviation of the expected and actual trading volume of Hong Kong's real estate market; Hui et al. (2017) separately adopted the linear combination of the trading volumes of real estate and land markets with other macro variables to proxy the buy-seller sentiment and developer's sentiment in Shanghai's real estate market.

The publicly available sentimental (confidence) index usually refers to consumer

confidence (sentiment) indices and the investor confidence (sentiment) indices, and the entrepreneur confidence index used in this thesis also falls into this category. Such indices usually take the form of questionnaires, asking the interviewees to make optimistic, pessimistic or neutral subjective judgments on the status quo and the future economic conditions. Introducing sentimental (confidence) indices into empirical systems has significantly improved the model performance. For example, research by Matsusaka and Sbordone (1995) showed that consumer confidence adds important information to GDP projections; Batchelor and Dua (1998) pointed out that if forecasters take consumer confidence into account, the GDP forecasts for 1991 recession can be improved; Christiansen et al. (2014) argued that sentiment indices (consumer sentiment and investor sentiment) are the best predictor of economic downturn, both in a single variable and in combination with other predictor variables. In addition, studies by Kauffman (1999), Lindsey and Pavur (2005), Banerjee and Marcellino (2006) and Lahiri and Monokroussos (2013) also showed that sentiment should be used as important variables in forecasting GDP and business cycles. As Koenig (2002) pointed out, using sentiment indices has two important advantages over alternative metrics: that they are real-time available and not affected by subsequent revisions. Lahiri and Monokroussos (2013) pointed out that there are not any economic variables of equal importance having the same timeliness. In contrast, macroeconomic variables are often postponed and often undergo substantial revisions after their initial release.

It is worth pointing out that although scholars generally agree that sentiment (or confidence) can explain macroeconomics, there is still controversy over the source of this explanatory power.

The mainstream view is that the explanatory power of the sentimental index comes from the "animal spirits" which was proposed by Keynes (1936) and then refined by Akerlof and Shiller (2009), that is, there are the impulsiveness of spontaneous action and the general optimism or pessimism that cannot be hedged in the market, and these psychological characteristics lead to the deviation of trading volume and price from equilibrium. Keynes argued that human behavior is influenced and guided by instincts, proclivities and emotions, and in most cases, people's decision is uncertain and is not the result of rational calculation. Besides, human tends to make positive activities depend on spontaneous optimism. In this particular framework, Keynes defined the animal spirits as "a spontaneous urge to action rather than inaction", which

can be measured in terms of, for instance, consumer confidence. Thereafter, based on the evidences from modern experimental psychology, Akerlof and Shiller (2009) extended the definition of animal spirits to include optimism and pessimism. They considered that economic failure, especially the financial market failure, is the result of the failure of investors to reasonably expect future earnings and stock returns. Therefore, they attribute the economic dysfunction to the animal spirits pointed out by Keynes and extend his theory. They held the necessity of incorporating animal spirits into macroeconomic theory for improving the framework. That is, they hope to introduce beliefs and emotional variables to the traditional economic analysis framework to explain economic operation.

The view of animal spirits has been held in some studies. For example, Dhaoui (2014) constructed explanatory variables based on the assumption of rational expectations and animal spirits and studied data from five major stock markets, and he found out that the rational expectation hypothesis could not explain trader behavior, and that economic fluctuations were driven by behavioral biases, namely investor sentiment and confidence. Another example, Shiller (2007) pointed out that the positive feedback on asset prices mainly came from the investor confidence brought by the sustained growth of past prices, rather than abrupt changes.

Another view is that the explanatory power of sentimental index comes from *"confidence measures contain fundamental information about the current and future states of the economy" (Barsky and Sim, 2012, p1344),* and these basic information will be perceived by people in the form of "news", and in the longer term, the confidence index shows a combination of expected productivity growth and noisy measures.

Generally speaking, sentimental variables refer to the aggregated subjective expectation on the fluctuation trend of future economic variables produced by the combination of rational and irrational decision-making processes in the market. This variable has digested the news in the market and includes the influence that psychological factors exert on the decision making.

1.2 Chinese real estate market

The market reforms of China's real estate began in 1998, which was manifested in policy changes, that is, the introduction of a series of policies to stimulate real estate development. The first was to cancel the welfare housing distribution to solve the housing problem through the

market. This policy resulted in surging effective demand in a short period of time as well as drastic and rapid increase. The second was the abolition of price control, as the price of commodity housing was strictly controlled by Price Bureau back then. The third was that the People's Bank of China promulgated *the Measures for the Administration of Individual Housing Loans* to advocate purchasing an apartment on mortgage. The fourth was the establishment of housing provident fund system for urban workers. Since then, real estate has entered a period of rapid development and has become one of the pillar industries of the economy. Overall, China's real estate market is characterized by the following obvious features.

(1) Sustained rapid price growth accompanied by improved living conditions

House prices have soared in China's major cities since the market reforms of real estate, bringing unprecedented wealth to both the Chinese government and residents. As shown in Figure 1.1, during the data period studied in this thesis, the actual average residential house prices in 35 cities increased rapidly from 2,426 yuan per square meter in 2003 to 5,937 yuan per square meter in 2011, registering a compound annual growth rate of 11.8% and surpassing the GDP growth rate of China in the same period (Wu et al., 2015). Even the financial crisis in 2008 failed to curb house prices significantly. House prices in first-tier cities have seen higher growth rates, taking Beijing and Shanghai as an example, their house prices quadrupled in 2012 compared to that of 2000 (Zhao et al., 2017). Such a soar in house prices has drawn great attention and controversy, sparking widespread debate over the existence of a bubble.
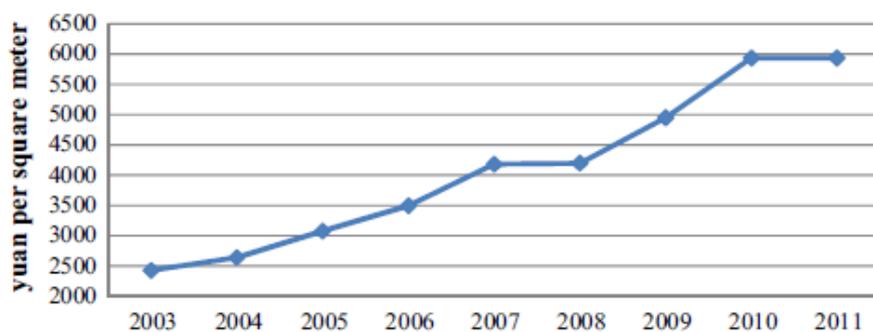
Data sources: China Real Estate Statistic Book 2004-2012.

Figure 1.1: Evolution of real residential house prices of 35 cities in China 2003-2011 (Wu et al., 2015)

High prices bring high investment. From 1999 to 2013, China's urban real estate market generally showed high investment growth (compound annual growth rate of 20%). By the time of 2013, the dwelling demand is almost saturated and housing development moves towards quality improvement. In 1978, the average residential area per capita in urban China was only 6.7 square meters, but that figure increased to 33 square meters by the end of 2013, approximating that of most developed countries such as Britain (35.4 square meters), Japan (36.6 square meters) and South Korea (26 square meters) but lower than that of the United States (67 square meters).

(2) Skyrocketing house prices causing continued regulation and its effects

Within five years after the marketization of real estate industry in 1998, the government decided to drive real estate development to stimulate domestic demand, promulgating such incentives as tax rebates in major cities. These policies became the turning point for the improvement of market demand after the Asian financial crisis. The effect lasted 10 years and made the real estate industry one of the pillar industries of the Chinese economy. In correspondence with it, the real estate craze not only bred a large number of magnates in China, it also widened the poverty gap and became the main corruption quagmire of government officials. Continued price increases have also brought controversy over the existence of a bubble. Since 2004, a number of regulatory measures to curb speculation and stabilize house prices have been put in place.

The main feature in 2004 was to tighten the two channels of land and credit to regulate supply. The new *State Eight* of real estate regulations promulgated in 2005 introduced credit policies on the basis of the tax policy and raised the threshold of pre-sale of commodity housing. The *State Six* of real estate regulations promulgated in 2006 introduced the construction of low-rent housing and affordable housing on the basis of improving the intensity of the previous policies, and then released the detailed rules governing the foreign exchange of overseas buyers to purchase domestic commodity housing. The policy against overseas buyers was strengthened again in 2007. Regulatory policies were introduced less frequently from 2008 to 2010 for the sake of recovery after the financial crisis. After 2010, control measures staged a comeback, including land, finance, taxation and other means of regulations and controls, and there has been a control means in the form of administrative order: property-purchasing limitation. After 2016,

control means in the form of administrative order (including restrictions on purchases and transfer, and price controls) was further intensified due to a new upswing in house prices.

Long-term and continuous increase in house prices in parallel with the macro-control shows that regulations merely focus on economic variables is not the ideal way out (Hui and Wang, 2014; Zhou, 2018). Burnside et al. (2016) predicts that when optimistic agents hold a firmer view than others, there will be a protracted housing boom until economic uncertainty is resolved. As far as the Chinese housing market is concerned, although previous tightening policies took aggressive measures, the housing prices in China is still rising too quickly relative to the growth of income (Wei et al., 2017). Zhou (2018) find that tightening policies cannot decrease sentiment and that high sentiment hurts the effectiveness of tightening policies. When a tightening policy meets with high sentiment, housing prices initially drop and then quickly rebound. The rebound is especially significant in the zones where housing prices are sensitive to increasing sentiment. When There is strong optimism in the market, many households with two or above houses that are prohibited from buying houses, conduct "fake divorce" to buy the third house. Such phenomenon indicates that the tightening policies convey very limited information for long-run fundamentals, at least in the optimists' view. It is noteworthy that, the most recent research indicates that, comparing with regulation measures such as tax, land auction and credit tightening, administrative imperative of home purchase restriction reflects more observable effect in curbing excessively house price rising (Li et al., 2017, Sun et al., 2017). However, the authors also admit that, without the reversal of market sentiment, lift the policy of purchase restriction could probably significantly cause the price rebound.

It can be argued that the driving force behind the continuous increase of house prices is that home buyers expect continuous increase in property prices, thus the fundamental and upstanding way to control house prices is to manage expectations. more and more severe land, credit, tax policies and administrative measures tend to be counterproductive. More regulation and control will cause investors to expect future increase and enhance their confidence in speculation and thus form an investment sentiment of general optimism in society.

The ineffectiveness of regulation and clearly observable herding behavior (Wei et al., 2007) in China's housing market prompts a rethink of the driving force behind the industry, and shifts the aim of regulation from the traditional economic fundamentals to include animal spirits,

namely, for instance, consumer confidence in chapter 2 and entrepreneurial confidence in chapter 3.

(3) Land Finance promotes growth

The development of China's land market lags behind the real estate market, but the continuous growth of house prices has also brought about the prosperity of the land market. Under Chinese law, the ultimate ownership of all land belongs to the state. Any individual or organization cannot occupy the land without permission by the government. In practice, local government is the monopoly supplier of urban land. In a typical case of land use, the local government first compensates peasants to transform agricultural land on the outskirts of rural areas into urban land, and then sells the land use rights to developers for land transfer fees. Developers build commodity houses on the land and sell them to individual property buyers. During the lease term of 70 years, property buyers have the right to occupy, lease and resale their houses.

Land use rights were not traded publicly until 2003. Developers gain access to land through private negotiation with the government or previous land owner, but the process is highly vulnerable to bribery and corruption and results in land prices far below market values. In April 2001, the State Council announced the land market reform by emphasizing the importance of market forces in land allocation. In May 2002, the Ministry of Land and Resources requested all residential properties and commercial plots leases to be sold through public auctions after July 2002. At present, all land transactions must be conducted through auction, listing or bidding. After the land market reform, land transfer fee has become the most important extra-budgetary income that the local government can freely dispose. Urban average land transfer fees accounted for 57% of government revenue between 2003 and 2011, even exceeding 70% in some years (Wu et al., 2014). This unique financial phenomenon is called Land Finance.

As China adopts a selection model based on relative performance appraisal (Li and Zhou, 2005) for local officials, as a consequence, local officials on the one hand are obliged to pay undue attention to the preferences of their superiors while neglecting the needs of the public. On the other hand, they focus only on the short-term benefits during their terms of service, ignoring the long-term development. In contrast to long-term economic development goals such as improvement of people's livelihood and sustainable development, local officials are more

concerned about the targets of enhancing the "image" of economic development in the short term, as these projects are better able to facilitate their promotions. Local governments continue to invest heavily in infrastructure due to Land Finance, raising the value of land and creating positive interactions with house prices.

1.3 Research objectives

1.3.1   Consumer expectations and real estate prices

By adopting industry data from China, chapters 2 and 3 of this thesis are mainly aimed to prove the influence of market sentiment on house prices from different perspectives.

The decision-making process of a market participant cannot be tied to an explicit maximizing objective because the future is not known, and, at best, it is a mixed judgment of probabilistic outcomes (Alchian, 1950). One of the major challenges facing human assessment of the future is to clearly separate uncertainty from risk. Keynes (1936) distinguished between the two with risk as a situation where the future outcomes can be enumerated and probabilities assigned to each outcome, versus uncertainty where no probabilities can be assigned to these future outcomes. The uncertainty comes from two aspects: imperfect foresight and human inability to solve complex problems with a host of variables. The irrational expectation mentioned above in this chapter is one indication of that (Drerup et al., 2017). Uncertainty and probabilistic outcomes make the maximization of any objective function difficult to achieve. Although we may study whether people are rational or is capable of making the best decision in theoretical research, in actual economic decision-making, we should pay more attention to identifiable criteria which is crucial to successful judgments (Alchian, 1950). From this perspective, although the debate about whether the explanatory power of the consumer sentiment (confidence) indices on macroeconomic and business cycle comes from the consumers' wise expectations or animal spirits still exists, it seems more important to confirm the impacts of these indices on a particular industry.

Current literature usually studies the impact of confidence index on GDP and economic cycles (e.g., Matsusaka and Sbordone, 1995; Batchelor and Dua, 1998; Christiansen et al., 2014) and rarely touched the real estate sector. And through the study of the American economy, the industry of real estate is often been regarded as a leading indicator of the economic cycle

(Leamer, 2015). In fact, the real estate prices have maintained a co-movement trend together with GDP, consumption, investment, working hours and real wage (Lambertini et al., 2017) in the United States in the past three decades. China's real estate prices and GDP also showed similar evolutionary trends. So, what is the relationship between real estate prices and Consumer Expectation Index (a sub-index of Consumer Confidence Index)? And whether or not the fluctuation of Consumer Expectation Index can be used to explain the trend of macro real estate prices?

The empirical results of Chapter 2 show that the Chinese Consumer Expectation Index has a long-term and stable cointegration relationship with the real estate prices in China. Thus, the Chapter verifies the bidirectional-influence mechanism of aggregated mass sentiment and real estate prices by taking China's macroeconomic data as the example. In addition, the robustness check and additional analysis shows that the consumer expectations have a greater impact on the macro-real estate price than M2 and GDP and should be treated as a more important influential variable.

1.3.2 Entrepreneurs' confidence and house prices

Based on Chapter 2, Chapter 3 of this thesis verifies the influence of entrepreneurs' confidence on the house prices at the provincial level in China. By referring the control variables (GDP per capita, housing construction costs, land prices, urbanization levels, the proportion of FDI, interest rates, and unmarried population proportion) that influence China's house prices from existing literature (e.g. Qiang Li et al., 2013; Zhi Wang et al., 2014), we use panel data of China's provincial level from 2003 to 2011 and introduce Entrepreneur Confidence Index as the new explanatory variable to empirically study it's influence on house prices. First of all, we test the overall influence of Entrepreneur Confidence Index on house prices. On the basis of this, all provinces have been divided into three regions (the east, middle and west regions) according to their level of development and geographic location, with an aim to respectively examine the influences of entrepreneurs' confidence on house prices. Empirical results show that the overall confidence indices of entrepreneurs have a significant impact on house prices. In sub-regional tests, the entrepreneurs' confidence has a significant impact on house prices in the eastern and central regions, while the impact in the western region was not significant. The conclusions of this Chapter show that the entrepreneurs' confidence has a significant impact on house prices,

and the degree of such impact is related to the degree of economic development, that is, the more developed the economy, the higher the degree of impact.

The entrepreneurs' confidence is similar to investors' confidence, and the latter has a greater influence on the macroeconomic than consumers' confidence (Christiansen et al. 2014). Entrepreneur's confidence on the one hand affect the entrepreneur's own investment in housing or other properties; on the other hand and more importantly, it influences the price of housing by influencing the purchasing expectations of the general public, which embodies the expert effect and the herd behavior. Entrepreneurs are often identified as opinion leaders by the general public, influencing social investment psychology through their comments or taking the lead in buying or selling behavior (Chaudhry and Irshad, 2013). Shiller (2005) has summarized the effect of group psychology on market fluctuations and listed causes including the influence of authority (Asch, 1952; Milgram, 1974), herd behavior, information cascade (Bikhchandani et al., 1992) and tale spreading surpasses theoretical. All these effects are reflected in the influences of entrepreneurs on the public.

The "Circle Marketing" (resort to social organizations such as chamber of commerce for marketing) strategy, which is quite important in China's real estate marketing, is the typical embodiment of this effect. The empirical result points out that the impacts of entrepreneurs' confidence on real estate prices are positively correlated with the degree of economic development. It also offers a possible explanation to address the fact, which is indicated by Qiang Li et al. (2013) and Zhi Wang et al. (2014), that the fundamental factors found in empirical studies had a decreasing impact on house prices in provinces or cites in China with a more developed economy: a more liberal market environment and a more developed economy may be accompanied by broader psychological effects.

The additional contribution of Chapter 3 comes from changes in the measurement model. Due to the time-series cointegration analysis of macro data, it is difficult to simulate the impact of "news" (changes of fundamentals) on sentiment by setting control variables in Chapter 2. But based on the features of panel data model, we can set multiple control variables to better control for the impact of objective news on expectations. Therefore, if the influence of sentimental index is significant after the control variables are set, we may presume that the impact mainly comes from the psychological factors of the subjective expectation.

1.3.3 Local officials' promotion expectations and house prices

Zhuravskaya (2000) argued that China's high-speed economic growth in the 1980s and 1990s stemmed from the strong incentives for promotion of local officials through fiscal decentralization. Chapter 4 of this thesis, through empirical analysis, mainly discusses the impact of local officials' promotion expectations on land prices and then on house prices under the fiscal decentralization mechanism from the perspective of behavioral science.

According to behavioral science, performance-based promotion provides a powerful motivating force for individuals to exert efforts (Milgrom and Roberts, 1992). Performance-based promotion exams create a tournament-style system in an organization, and the reward is to promote the winner. And, theoretically, the ex-ante probability of a promotion will induce effort, thus leading to improved performance (Demeré et al., 2015). Chapter 4 applies this theoretical judgment to the public administration of China.

The fiscal decentralization of the Chinese government is an important part of the reform of the market-oriented mechanism, but it is quite different from the fiscal decentralization system in other countries: China's fiscal system is decentralized, but its administrative system is a top-down authorization system. Among the officials at or below the provincial level in China, there is the mode of promotion and selection of officials in the form of yardstick competition (Caldeira, 2012), that is, the Chinese central government, in an effort to achieve overall development, creates a yardstick competition system based on relative performance appraisal among local government officials by reward or punishment. The competition yardstick of local officials usually comes down to the rate of economic growth (Chen et al., 2005; Li and Zhou, 2005; Chen, Qin and Wei, 2016) or the "image" of local economic growth, which is mainly reflected in urban infrastructure and amenity (Han and Kung, 2015; Ding, Niu and Lichtenberg, 2014; Wu and Heerink, 2016).

To launch the image project, local officials must focus on the source of funds. Under China's fiscal decentralization system, construction investment must be raised by local governments themselves. However, after the fiscal reform in 1994, the central government greatly increased its share of tax revenue and reduced the fiscal revenue of localities for consideration of centralization of state power. Land Finance emerges in this context (Han and Kung, 2015; Ding, Niu and Lichtenberg, 2014; Wu and Heerink, 2016). As the most important

extra-budgetary revenue that local governments can freely allocate, land transfer revenue is closely related to the promotion of local officials. Therefore, although politically local officials need to obey the central authorities' call for the stabilization of house prices, they have in essence become the promoters of high real estate prices.

From the analysis of Chapter 4, we find that under the influence of the Chinese-style fiscal decentralization (both administrative concentration and fiscal decentralization) and yardstick competition, the higher (lower) promotion expected from local officials (the governor in this chapter) will result in a more radical (moderate) Land Finance policy during his term of office. This is a process in which the price of land keeps soaring, and the visible hands of the government help fueling the price of land. Radical Land Finance will raise land prices and forms a positive feedback loops with house prices.

1.4 Thesis outline

The thesis consists of five chapters. Chapter 1 is the main introduction chapter. Chapter 2, 3 and 4 respectively study the influences of consumer expectations, entrepreneurs' confidence and local officials' promotion expectations on real estate prices. Chapter 5 summarizes the findings and implications.

Chapter 2, 3 and 4 follows the usual sequence of introduction, literature review, empirical parts and conclusions. Since similar literature context, empirical model and data are cross-referred to investigate different issues about the topic, the discussion of the thesis may have some overlaps. However attempts have been made to minimize the duplication.

The empirical strategies of Chapter 2, 3 and 4 are as follows. By analyzing China's monthly macro data from 2001 to 2012, Chapter 2 of this thesis demonstrates the relationship between the time series by empirically examining the cointegration relationship between Consumer Expectation Index and the integrated real estate prices. First, it demonstrates the cointegration relationship between Consumer Expectation Index and real estate prices and the impact on mutual changes, and then introduces M2 and quarterly GDP as extended variable sets for robustness check.

The empirical analysis in Chapter 3 first uses provincial panel data to analyze the overall impact of entrepreneurs' confidence on house price; second, it constructs instrumental variables

of Entrepreneur Confidence Index to study the possible endogenous problems caused by possible missing variables and to test whether Entrepreneur Confidence Index affects house prices by influencing underlying variables and unobservable variables; then, it divides all provinces into eastern, central and western regions, and then estimates the impact of regional Entrepreneur Confidence Index on house prices; finally, it analyzes the impact of laggard Entrepreneur Confidence Index on house prices.

The empirical analysis in Chapter 4 mainly include the following aspects: Firstly, revises variables based on the promotion expectation estimate of the private sector to estimates the promotion expectations of Chinese governors by the probit model; secondly, estimate the relationship between promotion expectations, land prices and the prices of housing properties through panel data model; finally, carry out an endogenous test based on the possible existence of common factors affecting both the promotion expectations and land prices.

Chapter 2

Consumer Expectations and Real Estate Prices

2.1 Introduction

In the past several decades, the prosperity and depression of the stock market has triggered a heated debate in academia. In addition to the fundamental analysis, more and more scholars try to use the psychological and irrational behaviors of investors to explain the fluctuations in stock prices, that is, how investor sentiment affects the future of stock prices. As defined by Baker and Wurgler (2007), investor sentiment is a belief about future cash flows and investment risks that cannot be explained by existing market information. But this is a relatively new field, most of the literature is confined to the analysis of developed stock markets in Europe and America (Brown and Cliff, 2005; Lemmon and Portniaguina, 2006; Baker and Wurgler, 2006, 2007; Baker et al.; 2012). Even though with a huge market value and often suffered from bubbles and drastic fluctuations, the real estate markets have not been given the same attention as the stock markets with regard to the investor sentiment and expectation impacts.

This is most especially true for the research on the real estate market in China. Since the reform in 1998, China's housing market has experienced a period of rapid development. Before the global financial crisis in 2008, house prices grew at an alarming rate. After that, house prices suffered from tremendous fluctuations under the influence of the regulatory policies and the financial crisis. In recent years, although China's economy has experienced a decline in growth and stock market crash, while the government has also taken different policies and measures regulating the real estate market, especially the attempt to contain the rampant speculations in first-tier cities, major cities in China have still experienced a sustained fast rise in the house prices as a whole.

In this context, majority of existing studies concerning China's real estate market reflected in the following aspects: first, by taking the city or provincial house prices as the dependent variable, from the views of supply and demand, the studies aim to investigate macro

and micro prices as well as the mutual relationship and influence between their conventional factors (e.g. per capita disposable income, population, land prices, construction prices, money supply, housing characteristics and regional differences) with the method of house price equilibrium equation which is generally used in the study of international housing markets (Wang et al., 2014; Zhang et al, 2013; Wen et al, 2013; Li et al, 2013; Wu et al, 2012）; second, the studies are conducted on the price rationality (whether a price bubble exists or not) from the perspective of return on assets (Shen, 2012; Ren et al, 2012; Jin et al., 2014; Shih et al., 2014).

Recent literature findings show that the market fundamentals cannot fully explain the changes in the house price, and the real estate market often suffers from bubbles (Wong et al., 2005; Jin et al., 2014; Shih et al., 2014).In other words, there is independent influence factors in addition to the fundamentals in the real estate market, and these factors are either considered as psychologically based animal spirits (Keynes, 1936; Akerlof and Shiller, 2009) or agents rationally and intelligently processing current or future fundamental news (Barsky and Sims, 2012).

Akerlof and Shiller (2009) attributed economic dysfunction to human psychology and took "animal spirits" as one of the factors that affect the economy and the market. To define "animal spirits", the author magnifies the definition given by Keynes (1936) in his summary, and introduces confidence, fairness, corruption and association behavior, money illusion, and stories as items of animal spirits. For Keynes (1936), animal spirits was defined as "a spontaneous urge to action rather than inaction". In addition, Shiller (2000, 2005) described the impact of social sentiment on the investment market in his famous book *Irrational Exuberance*, indicating that it is difficult to calculate the real value of the market and investors rely on many psychological factors to assess asset valuations. In other words, irrational exuberance makes the asset price higher than the basic value.

However, no matter from the psychologically based angle or news angle, all information is interpreted and processed by agents subjectively, and these studies lay the foundation for investor (consumer) sentiment (confidence) research, which is one of the most important factors leading to stock market fluctuations, and one of the factors that lead to the anti-equilibrium of real estate assets pricing.

From the perspective of the behavioral economics, this chapter introduces China's

Consumer Expectation Index—a sub-index of Consumer Confidence Index as the proxy variable of subjective expectations for macro-economy, and studies the relationship between them and China's real estate prices, thereby clarifying the interaction between such expectations and macro real estate prices fluctuations. The real estate prices referenced in this chapter are the comprehensive national urban real estate prices involving China's residential and commercial real estates, and Consumer Expectation Index are also the nationwide subjective expectations on the economic development in the future. Therefore, the data collection is characterized by the relevance and consistency.

According to the conclusion of this chapter, a long-term cointegration relationship is found between China's Consumer Expectation Index and real estate prices, namely, there is a long-term common trend between China's consumer expectations and real estate prices, and they are also mutually corrected in the process of change. Thereby, this chapter verifies the correctness of bidirectional-influence mechanism of aggregated mass sentiment and real estate prices by taking China's macroeconomic data as the example.

The result of this chapter is of significance on the aspect of macroeconomic policy. While developing macro-control policies for the real estate market, we are usually more concerned about the impact of some traditional macroeconomic factors on the real estate prices, such as land supply, population and monetary policy. In addition, during the policy development, we also focus to adjust the real estate market prices by adjusting these factors. However, two issues are often overlooked. One is that these market factors usually affect people's investment expectations and then the decision of buy or sell a property by affecting their subjective psychological feelings. The other is, due to the impact of people's irrational behaviors, people's real estate investment expectations are also influenced by media and other subjective information acquisition channels in addition to objective economic factors. Shiller (2005, 2008) has pointed at "animal spirits" as a factor that drives the stock markets and the real estate markets, and Akerlof and Shiller (2009) have argued that over-optimism played an important role in generating and amplifying the most recent international financial crisis. In other words, the government should take managing the investors' subjective expectations as the appropriate way while developing real estate control policies, rather than the traditional economic transmission mechanism.

To our knowledge, this chapter is amongst the first studies on the relationship between the

aggregated sentiment and real estate prices in the current literature. The most recent study with similar focus is from Abildgren et al. (2018). By using both aggregated data from Danish consumer confidence survey as well as the household-level microdata, the research indicated that house prices are partly driven by sentiment decoupled from economic fundamentals. However, although alike study objective employed (real estate price and Consumer Confidence Index), Abildgren et al.'s study failed to distinguish Consumer Confidence Index from its two sub-indices – Consumer Satisfaction Index and Consumer Expectation Index, and roughly proxied sentiment with consumer confidence in the econometric analysis. In this chapter, the influence of Consumer Confidence Index, Consumer Satisfaction Index and Consumer Expectation Index on real estate price has been distinguished, and the results clearly point out that there is only one cointegration relationship between Consumer Expectation Index and real estate prices, which is more in line with the theoretical expectation.

The result of this chapter adds new evidence from the strand of behavioral perspective. The conclusion in this chapter can provide useful reference and helpful insights for further research.

2.2 Literature review

2.2.1 Animal spirits and psychological influences

In recent decades, financial and economic literature argues that investors' trade is rational, even if they are engaged in trade irrationally (such as random trade). The deviation from equilibrium caused by the irrational trades can be offset by other irrational trades from other irrational investors. Hereby, it can be presumed that the market is effective, and all isolated rare events cannot significantly affect the price-making process, which may naturally reduce market return and trade volatility. The Efficient Markets Hypothesis has achieved a success in academia since the mid-1960s with impressive theory and been deemed as academic orthodoxy (Jensen, 1978). However, the Efficient Markets Hypothesis has been seriously challenged and criticized by the behavioral economics in the recent three decades.

The Effective Market Hypothesis argues that asset prices generally reflect all relevant basic information and provide appropriate resource allocation signals, but some researchers try to test if the actual mode of operation of the economy is affected by human psychology. Keynes

realized the problem in 1936 for the first time and made a clear statement. He held that all investor decisions are deviated from rational assumptions and he attributed economic failure to psychological factors and irrational behaviors - animal spirits. Based on experiments, Tversky and Kahneman (1986) posed direct challenge on rationality assumptions of human behaviors, in which experimental subjects' preferences were affected predictably by the framing of decision problems, or by the procedure used to elicit performance. That is to say, human sensitivity of framing violates the basic assumptions about the rationality of human behavior. Later, Keynes's viewpoint was inherited and developed by Akerlof and Shiller (2009). Akerlof and Shiller (2009) replaced the rational hypothesis with investor's behavior bias to explain the fluctuations in stock returns and trading volume. They argued that the concrete framework of behavioral economic explanation should inclusive of changing confidence, temptations, envy, resentment, and illusions, and all those sentiment had been witnessed in the financial crisis of 2008.

Animal spirits phenomenon can be understood as the investor-driven irrational behavior. Keynes (1936) held that for most cases, the full consequences of people's decision is uncertain and is not the outcome of cool-headed calculation, which can only be deemed as the results of animal spirits. In this particular framework, Keynes defined the animal spirits as "a spontaneous urge to action rather than inaction". However, Akerlof and Shiller (2009) extended this definition to include optimism and pessimism. Therefore, Animal Spirits include spontaneous behavior as well as optimistic and pessimistic beliefs.

Previous literature (De Bondt and Thaler, 1987; Barberis et al., 1998; Daniel et al., 2001) linked stock price volatility and price anomalies with underreaction and overreaction. Underreaction and overreaction are driven by the investors' pessimism, optimism and overconfidence. On this line, early studies such as Ciccone (2003) show that investor sentiment and behavior plays a decisive role in the stock market. Investors' optimism and pessimism are particularly reflected in the stock price. Haruvy et al. (1999) argued that optimistic investors are those who incline to choose the potential investment strategy with highest payoff. These authors define optimistic investors as "those who are motivated by worst-cases scenarios and hence tend to choose a secure action." Wenstein (1980, 1986, 1989) and Otten (1989) argued that optimistic investors consider that positive events have greater probability of happening on them while negative events are unlikely to occur as compared to other investors. On the contrary, pessimistic

investors hold that they are more likely to be exposed to negative events while are unlikely to have positive events. These beliefs have led to an increase in the trading of optimistic investors, while a decrease in the trading of pessimistic investors. In terms of trading strategy, Chen (2013) deemed that optimistic agents will be more positive in trading while pessimistic agents will be relatively conservative in trading.

King (2009) agreed with Akerlof and Shiller (2009) and discussed the key role of investors' irrational behavior, such as optimism or pessimism, or more specifically, what they call animal spirits. His conclusion is that behavioral bias can explain the main part of the economic fluctuations. Optimistic and overconfident investors are more inclined to risky investment. They are engaged in the trades irrationally, and their irrational reaction will lead to abnormal fluctuations in trading volume, and then will affect the stock returns. Empirical studies show that irrational investor behavior not only exists in the international stock market, but also has a significant impact on price fluctuations (Chuang, 2010).

Another important psychological factor affecting the stock market is overconfidence. Overconfident investors will overemphasize the accuracy of the information they own, while ignoring public information (Daniel, et al., 1998). They also overestimate their ability of judgment while underestimating the ability of others. As a result, they have overreacted to private information and underreacted to public information (Odean, 1998). The asymmetric reaction of overconfident investors leads them to underestimate the risks and take positive actions to increase the trading volume (De Long et al., 1990; Kyle and Wang, 1997; Benos, 1998; Odean, 1998; Wang, 1998,2001; Daniel et al., 1998; Hirshleifer and Luo, 2001), and De Bondt and Thaler(1985) argued that overconfidence is a key behavior factor in unlocking the mystery of market transactions. In particular, Gervais and Odean (2001) have developed a model, which is used to predict that overconfident investors attribute market returns to the accuracy of their private information, their ability of judgment and their ability to choose the stock; and sustained wealth accumulation also leads them to overreact in the market.

2.2.2 Consumer confidence (sentiment) and its influences on economy

Scholars have deemed that sentiment (or confidence) variables contain information about future fluctuations in real economic activity for a long time. The former chairman of the United States Federal Reserve Ben S. Bernanke once revealed in a speech in 2008 that "as in all crises, at

the root of the problem is a loss of confidence by investors and the public in the strength of key financial institutions and markets"[1]. In addition, "*our measures of consumer confidence are not merely noise, nor are they simply reflections of information contained in other variables with which they are correlated*" *(Barsky and Sim, 2012, P1344)*. The research of Matsusaka and Sbordone (1995) showed that consumer confidence adds important information to GDP forecast. Batchelor and Dua (1998) pointed out that if the predictors take into account the consumer confidence, GDP forecast of the recession in 1991 can be improved. Christiansen et al. (2014) argued that whether the single variable or combination with other forecast variables, the sentiment index (consumer sentiment and investor sentiment) are the best forecast variables of economic recession. Carroll et al. (1994), Bram and Ludvigson (1998) and Howrey (2001) showed that measurement of consumer confidence contain the information about consumer spending. Howrey (2001) took into account the relationship between consumer confidence and business cycle. Similarly, Dasgupta and Lahiri (1993) demonstrated the positive significance of Purchase Management Index (PMI) for GDP forecast. In addition, Kauffman (1999), Lindsey and Pavur (2005), Banerjee and Marcellino (2006), Lahiri and Monokroussos (2013) showed that sentiment shall be considered as an important variable in predicting GDP and business cycle. As Koenig (2002) pointed out, there are two important advantages to use the sentiment index as compared to the alternative leading index, that is, they are available in real time and subject to no subsequent revisions. Lahiri and Monokroussos (2013) pointed out that no economic variables of equal importance have the same timeliness. In contrast, macroeconomic variables are often delayed in release and are often subject to considerable revisions after initial release.

It is worth pointing out that although scholars generally agree that sentiment (or confidence) has explanatory power for GDP or consumption forecasts, there is little insight into the source of the explanatory power. One viewpoint holds that the explanatory power of the sentiment indices comes from the animal spirits mentioned above, that is, the urge of spontaneous action can be found on the market as well as the general optimism or pessimism that cannot be hedged, and these psychological characteristics lead to the deviation of trading volume and price from equilibrium. For example, Ghaoui (2014) constructed the explanatory variables from assumptions of rational expectations and animal spirits and found from the study of the data of

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[1] Quotation from speech by Bernanke (2008)

five major stock markets that the rational expectation assumption cannot explain the behavior of traders, and the economic fluctuation is driven by behavioral bias, that is, investor sentiment and believes. For another example, Shiller (2005, 2007) pointed out that the positive feedback on asset prices mainly comes from the investor confidence due to sustained price growth in the past, rather than a sudden change. Another viewpoint considers that the explanatory power of the sentiment indices comes from *"confidence measures contain fundamental information about the current and future states of the economy" (Barsky and Sim, 2012, P1344)*, and these basic information will be perceived by people in the form of "news", and confidence index is expressed as the combination of the expected productivity growth and noisy measures from a relatively long term.

It is believed that the animal spirits view holds more compelling reasons because of the following possible causes. First, all current or future fundamental information (or news) must be interpreted and accepted before it can be used to guide economic behavior. As the basic economic information—news (including the spot and long-term) cannot be accurately obtained, and will be affected by Framing and other psychological mechanisms in the perception process, deviation can be found in people feedback of news, leading to economic fluctuations. Second, Barsky and Sim (2012) presumed that animal spirits may cause "transitory changes" and "that attenuate over time" only. But if we agree with Shiller (2005, 2007) on his positive feedback theory of asset prices, that is, asset prices mainly come from the growth in investor confidence due to the sustained growth in price in the past, and people will produce adaptive expectations of future fluctuations from intuitive changes in price or trading volume, while sentiment impact may not certainly confined to a short term (bubble or depression with a longer period is not uncommon in history).Coupled with other influence factors of exogenous sentiment in specific history period, optimistic or pessimistic social convergence behavior will be produced, amplifying the fluctuations in asset prices and trading volume. From this point of view, news angle does not exclude animal spirits, while the view of animal spirits is more explanatory to the fluctuation. In the long run, the trend is determined by the increase in productivity brought about by technology growth.

A growing strand of microeconometric literature investigating behavioral implications of household expectations also echo the theory of animal spirits. A recent contribution is the study

by Hyytinen and Putkuri (2017). They find that households making large optimistic forecast errors tend to carry greater levels of debt than other households. Abildgren et al. (2018) argue that overoptimistic households were more likely to purchase real estate compared to other households, and they leveraged more when purchasing real estate. Previous studies along the same line include Brown and Taylor (2006), Puri and Robinson (2007) and Souleles (2004).

In the research on the impact of sentiment (or confidence), the real estate market is given less attention. As Baker and Wurgler (2006) pointed out, assets with limit arbitrage were more susceptible to sentiment, less liquidity and higher transactions costs make the real estate market more vulnerable to the impact of the bubble and its burst, and in fact, the policy control over China's real estate market has long been aimed to avoid such impact. Lambertini et al. (2017) found that there is expectation-driven economic cycle through research on the housing market in the United States, while the expectation is affected by "news shocks". Especially when the expectation is found inconsistent with monetary policy or inflation, people's investment or consumer sentiment will be impacted, and the turning point of the economic cycle will appear. Hui and Wang (2014), Wang and Hui (2016), Hui et al. (2017) constructed the sentiment index mainly through the trading volume to research different real estate markets, and the results show that sentiment index has an impact on the real estate market as a whole, and has a predictive effect on price, trading volume and returns.

2.2.3 Hypothesis and empirical strategy

Leamer (2015) pointed out that when it comes to 11 economic recessions since 1985 from the perspective of the economic fluctuations in the United States, 9 housing investments begun to decline 3-4 quarters before the recession, and the development of the housing industry is a key leading index of the economic cycle. In fact, the real estate prices has maintained a co-movement trend together with GDP, consumption, investment, working hours and real wage (Lambertini et al., 2017) as a whole from the perspective of the economic development in the United States in the past three decades. On the one hand, the real estate cycle is correlated with the basic economic indices. On the other hand, the said literature also shows that the real estate prices are affected by psychological factors with animal spirits as the internal driving force. So, what is the relationship between real estate prices and Consumer Confidence Index? And whether or not the fluctuation of Consumer Confidence Index can be used to explain the trend of macro real estate

prices?

This chapter demonstrates the relationship between the time series by empirically examining the cointegration relationship between Consumer Confidence Index and its two sub-indices—Consumer Expectation Index and Consumer Satisfaction Index and the integrated real estate prices. First, it demonstrates the cointegration relationship between Consumer Expectation Index and real estate prices and the impact on mutual changes, and then introduces M2 and quarterly GDP as extended variable sets for robustness check.

2.3 Data of Consumer Expectation Index and real estate prices

2.3.1 Mechanism between consumer behavior and real estate prices

This Chapter analyzes the factors influencing real estate prices from the perspective of consumer behavior. The indicators measuring consumer behavior are Consumer Confidence Index and its two constituent indices, i.e. Consumer Satisfaction Index and Consumer Expectation Index.

The above literature review shows that the real estate prices are closely related to the expectations, so we may seek the empirical relationship between the two. According to the definitions of Consumer Confidence Index, Expectation Index and Satisfaction Index mentioned above, Consumer Satisfaction Index refers to a social individual's evaluation on the current situation, Consumer Expectation Index is the subjective expectation on individual's economic situation in the future, and Consumer Confidence Index is the weighted average of Consumer Expectation Index and Consumer Satisfaction Index, representing the comprehensive evaluation of social individual on the current economic situation and the future expectation. Although these three indices are not set up specifically for the real estate market, they stand for all social individuals' comprehensive subjective feelings about the overall macroeconomic situation, and can be used to proxy the aggregate sentimental changes in the real estate market in the case that China is in lack of the data from relevant industries. Meanwhile, according to Shiller's (2005) theory, the public psychological expectations on the house price movements is the result of a world view, more similar to a Zeitgeist that is encouraged by stories and theories whose contagions as ideas are amplified by the excitement surrounding the price increases, and not just limited to the public understanding on the real estate industry. From this point of view, Consumer

Confidence Index and its two sub-indices are of representative significance.

In addition, this chapter adopts more comprehensive real estate prices (including commercial and residential real estates) to replace the residential real estate prices applied in traditional studies, which is of more macro significance, and more relevant to the three indices mentioned above.

2.3.2 Consumer Confidence Index and its two sub-indices

The calculation method of Consumer Confidence Index (CCI) varies in different countries. In United States, it is monthly issued by the Conference Board, an independent economic research organization, based on surveys on 5000 households. The Conference Board defines Consumer Confidence Index as a monthly report detailing consumer attitudes and buying intentions, with data availability by age, income and region.

In China, Consumer Confidence Index is an indicator showing the strength of consumer confidence, comprehensively reflecting and quantifying consumers' evaluation on the current economic situation and subjective feelings on the economic outlook, income level, income expectations and consumer psychological state; and refers to a view and expectation obtained by consumers after performing a comprehensive judgment on the employment, income, prices, interest rates, etc. according to the economic development situation of a country or region. China's Consumer Confidence Index is issued monthly. Consumer Confidence Index issued by the China Economic Monitoring Center of National Bureau of Statistics is compiled mainly based on the random sample questionnaires from 20 major cities nationwide. The consumer confidence (or emotion) survey aimed at households, belonging to an urban and rural resident survey. The questions in the questionnaire mainly involved five aspects: the respondents' judgment on the current economic situation, views on family income, the judgment on the current timing of purchasing goods, the judgment on the overall future economy and the judgment on their own incomes. There are three options for every question in the questionnaire: optimistic, so-so and pessimistic, and respondents can only choose one of them. The index is calculated based on a weighted average, and reflects consumers' attitude differences by comparing the ratios between the consumers who hold an optimistic view and a pessimistic view. The value range of Consumer Confidence Index is between 0 and 200, with 100 as the threshold. When the index is greater than 100, it indicates that the consumer confidence is positive and optimistic. The closer

the value is to 200, and the higher the degree of optimism will be; and when the index is less than 100, it indicates that the consumer confidence is negative and pessimistic. The closer the value is to 0, the deeper the degree of pessimism will be.

In general, Consumer Confidence Index of a country is composed of the national Consumer Satisfaction Index and Consumer Expectation Index depending on the different weights. Consumer Satisfaction Index refers to consumers' evaluation on the current economic life. Consumer Expectation Index refers to consumers' expectation for the change of the economic status in the future. Specifically, Consumer Expectation Index is ordinary consumers' expectation on the income, quality of life, macro economy, consumption expenditures, employment status, purchase of durable consumer items and savings in the coming year and the expectations on the purchase of decoration of a house the next two years as well as the purchase of a car and the stock market change in the next six months.

2.3.3　Data

The research data of this chapter comes from the statistics database of *China Economic Information Network* (CEInet). It is an organization specialized in economic data resources development and service, established by the State Information Center, and it is responsible for business data collection, providing data support and data integration to the government and government research institutions, as the only window to provide the economic information and data service to the society on behalf of the China Economic Information Network of the State Information Center. The database covers all areas like macro-economy, industrial economy, regional economy and world economy, and is a basic information database providing users from all sectors of the community with comprehensive, authoritative, timely and accurate statistical data regarding economy, including *the China Economic Statistics Database Series* and *the World Economic Statistics Database Series*. *The China Economic Statistics Database Series* is composed of the following five sub-databases, namely *the Macro Monthly Database*, *the Industry Monthly Database*, *the Consumer Monthly Database*, *the Comprehensive Yearly Database* and *the Urban Yearly Database*. The data used in this chapter is from *the Macro Monthly Database* which covers more than 2000 indicators under 14 special subjects, including national accounting, finance, trade, investment real estate, industrial transportation, wages and prices, etc.

The dependent variable in this chapter is the real estate prices. For the measurement of the

macro-level real estate prices, there are two representative methods: one is based on the real estate sales price indices of 70 nationwide large and medium-sized cities monthly issued by the National Bureau of Statistics starting from July 2005, which include the newly-built house sales price indices and the second-hand house sales price indices in 70 nationwide large and medium-sized cities, of which the newly-built houses include new affordable houses and commercial houses. However, the issue of such indices stopped as of January 2011 (Xu et al., 2012); the other is the method proposed by Liang et al (2006), namely, measuring the real estate prices (including residential and commercial buildings) via the commodity house sales prices. The commodity house sales prices are proposed according to the ratio between the commodity house sales and the sold area of buildings which are also monthly issued by the National Bureau of Statistics. The correlation coefficient between the unit prices of commodity houses calculated with this method and the house sales price indices monthly issued by the National Bureau of Statistics is 0.68. And then, deflating will be done according to the Consumer Price Index (CPI), uniformly converted to that value in 2001.

In this chapter, the core explanatory variables are Consumer Expectation Index, Consumer Confidence Index and Consumer Satisfaction Index which is monthly issued by the China Economic Monitoring Center of National Bureau of Statistics. In the robustness test, we also further consider other variable as M2 (after CPI deflation) affecting the real estate prices. Since this chapter applies cointegration as the method of analysis, and cointegration requires the non-stationary time series in terms of the selection of explanatory variables, in this case, some variables with stationary time series are not within the range of analysis, such as disposable income per capita of urban households, interbank offered rate, foreign direct investment and land acquisition[2]. In addition, the influence from some other variables, such as M2 and quarterly GDP were considered in the section of robustness check.

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[2] Refer to Section 2.3.5 of Chapter 2 for the stationary test of variables.

Table 2.1: Descriptive statistics of variables

Variable	Definition	Mean	Std. Dev.	Min	Max
price	Real estate sale price	3323.94	761.07	1748.44	5046.60
ln_price	Real estate sale price logarithm	8.0820	0.2350	7.4665	8.5265
confidence	Consumer Confidence Index	97.52	5.2432	85.7	108.5
expectation	Consumer Expectation Index	99.12	5.8014	83.7	111.8
satisfaction	Customer Satisfaction Index	96.33	4.8499	88.6	107.8
m2	Currency and basic currency M2	439689.5	239903.1	147809.7	944832.4
first difference					
price_fd		16.6780	235.0885	-1053.431	1306.834
ln_price_fd		0.0052	0.0808	-0.4716	0.5581
confidence_fd		0.0626	2.2259	-8.9000	12.8000
expectation_fd		0.0890	2.3633	-10.400	10.4000
satisfaction_fd		0.0187	2.3476	-7.0000	16.3000
m2_fd		6479.86	7265.97	-7897.23	31541.48

Note: monthly data from June 2001 to November 2012 except every January is included. sample size is 124.

2.3.4　Descriptive statistics analysis

(1) Evolution trend of real estate prices

As shown in Figure 2.1, China's real estate prices (average price per square meter) showed a steady increase trend from 2001 to 2012, rising from the averaged ￥2300/m^2 in 2001 to the averaged￥4400/m^2 in 2012. Within 12 years, China's real estate prices were nearly doubled. The real estate prices constantly fluctuated in the increase process. The lowest point of in real estate prices appeared in August 2005, i.e. ￥1748/m^2, and the highest point was appeared in February 2011, i.e. ￥5242/m^2. The averaged real estate prices was ￥3324/m^2, and the standard deviation was 761.07, indicating a large fluctuation in China's real estate prices.

Dynamics of house price
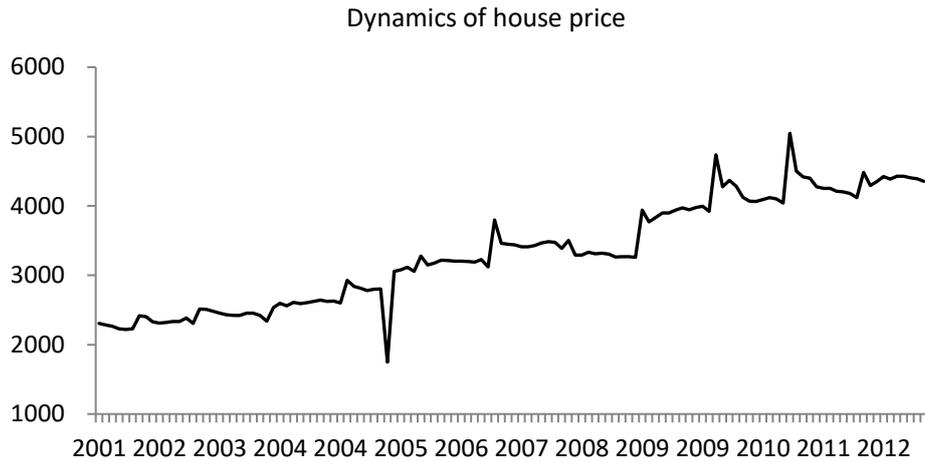
Figure 2.1：Evolution trend of real estate prices

(2) Evolution trend of consumer indices

Figure 2.2 shows the evolution trend of Consumer Confidence Index, Consumer Expectation Index and Consumer Satisfaction Index. In general, the change of Consumer Confidence Index is between Consumer Expectation Index and Consumer Satisfaction Index. According to the fluctuation features (Std. Dev), the standard deviation of Consumer Expectation Index is the largest, followed by that of Consumer Confidence Index, and the smallest one is that of Consumer Satisfaction Index. The evolution of Consumer Confidence Index, Consumer Expectation Index and Consumer Satisfaction Index from 2001 to 2012 can be divided into four stages. The first stage was from June 2001 to March 2003, the three indices varied within a small range, with an average value of about 97; the second stage was from April 2003 to November 2008, during which the evolution showed a trend of declining - rising - declining- rising, with a low overall level; the third stage was from December 2008 to May 2011, during which the consumer indices were higher than that in the previous stages. In addition, the gap between Consumer Confidence Index, Consumer Expectation Index and Consumer Satisfaction Index was decreasing; and the fourth stage was from June 2011 to November 2012, during which the main feature of the evolution was that the gap between the three was increasing, and the overall change was dramatic.
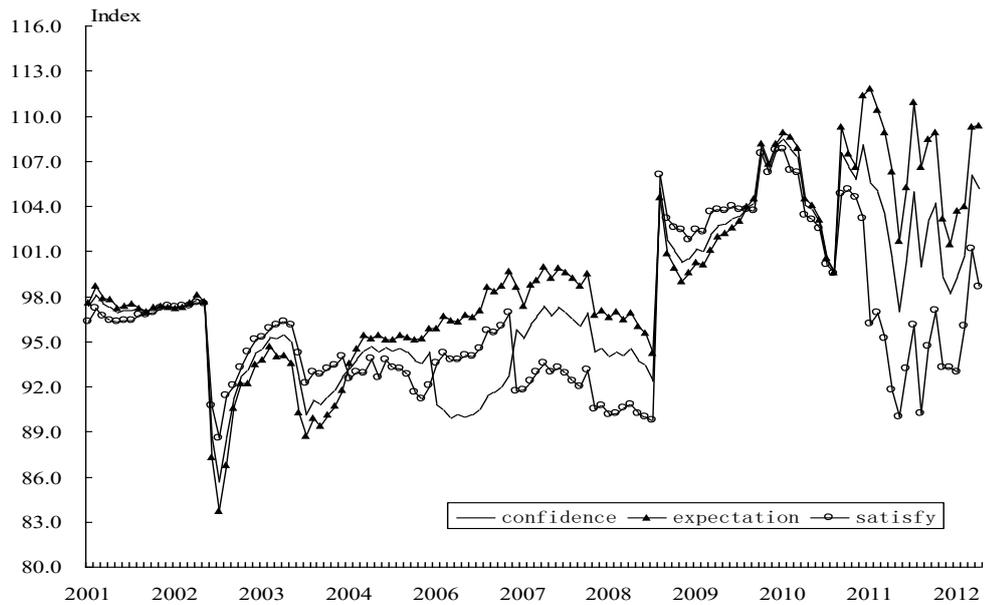
Figure 2.2：Evolution trend of consumer indices

(3) Consumer indices and real estate prices

We firstly analyzed the evolution trend between Consumer Confidence Index and real estate prices. As shown in Figure 2.3, the two showed no similar trend of evolving over time. From 2002 to 2004, Consumer Confidence Index fluctuated significantly, but the change in real estate prices during this period was relatively stable; while in 2005, the real estate prices declined, but Consumer Confidence Index was relatively stable. Therefore, from the view of the evolution trend of Consumer Confidence Index and the real estate prices, we cannot determine whether there is a long-term cointegration relationship between the two or not. Secondly, we will analyze the evolution trend of Consumer Expectation Index and the real estate prices. As shown in Figure 2.4, there is a common evolution trend between Consumer Expectation Index and the real estate prices. However, as for whether there is a cointegration relationship between the two or not, it requires to be verified with the analysis method of time series.
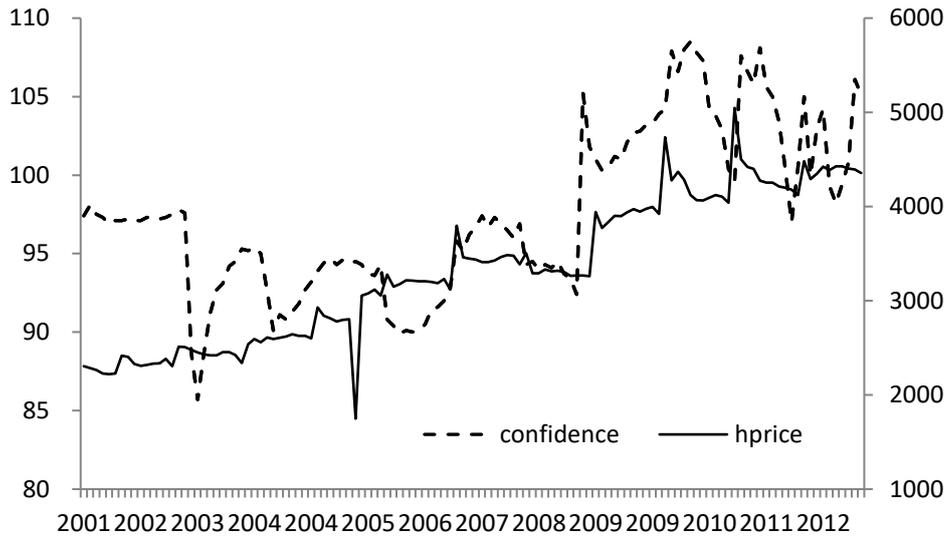
Figure 2.3: Consumer Confidence Index and real estate prices
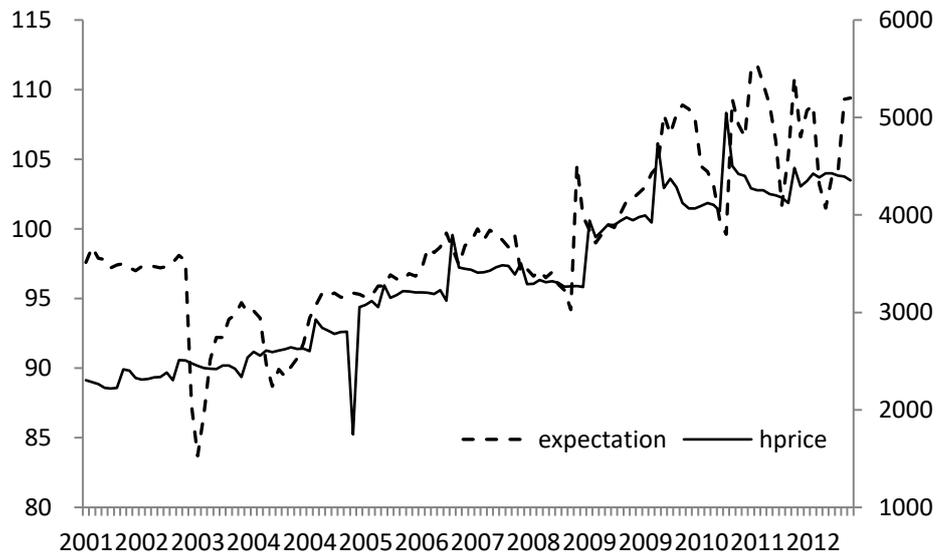
Figure 2.4 Consumer Expectation Index and real estate prices

Figure 2.5 Consumer Satisfaction Index and real estate prices

2.3.5 Non-stationary time series and unit root test

If a time series is not a stationary process, then we call it a non-stationary series. A non-stationary series may occur in any of following circumstances:

a. Deterministic trend: If a time series has a deterministic trend, then it is a non-stationary series. This type of non-stationary series may become a stationary series as long as the time trend is removed. Therefore, it is called a trending stationary series.

b. Structural change: if a series has structural changes, then it is a non-stationary series, which may be tested through the Chow test.

c. Stochastic trend: for example, the Random Walk Model: $y_t = y_{t-1} + \varepsilon_t$, wherein $\{\varepsilon_t\}$ is the white noise. As for the random walk, a stationary series may be obtained as long as the first order difference is performed on it. Therefore, it is also called the difference stationary series.

We call the stationary time series as the integrated of order zero, denoted as I (0). If the first order difference of the time series is a stationary process, it will be called the "integrated of order one", denoted as I (1), also known as the "unit root process". More generally, if the d-order difference of the time series is a stationary process, then it will be called the "integrated of order d", denoted as I (d). The I (0) series is stationary, so it has the trend to return to its expectations from a long-term point of view, and this property is called the "mean-reverting". However, the non-stationary I (1) series without such property will wander widely. In addition, the I (0) series only has limited memory for its past behavior, which means the impact of the past disturbance

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item on the future will decay with time; the I (1) series has infinite memory for past behavior, namely, any past disturbance will permanently change the whole series in the future.

We used Augmented Dickey-Fuller (ADF) method and Phillips-Person (PP) unit root test method respectively. And the original hypothesis of the both is H_0: a unit root exists.

a. ADF unit root test

ADF unit root test (Dickey and Fuller, 1981) is an extension of the Dickey-Fuller (DF) test method developed by Dickey and Fuller in (1979). In the DF Test, the first-order auto-regression is used to test the unit root, requiring the disturbance item to be the independent white noise, so there is no autocorrelation in the disturbance item. If the disturbance has the autocorrelation, a higher order lagged item may be introduced to control the disturbance item to be without autocorrelation. The critical value of the ADF test may be obtained through the Monte Carlo simulation, and the test is the left single-side test.

b. PP unit root test

In the PP test (Phillips and Perron, 1988, hereinafter referred to as PP), the first-order auto-regression is used, but the heteroskedasticity–autocorrelation robust standard deviation is used for the correction of statistics. The asymptotic distribution of the corrected PP statistics is the same as the statistic distribution in DF test, so the critical values are the same as well, which means the PP test is also left single-side test. In a sense, the PP test is equivalent to the heteroskedasticity-robust ADF test. Another advantage of the PP test is that specifying lag phases is not necessary.

The specific results of unit root test are shown in Table 2.2. The interest rate, foreign direct investment (FDI), land acquisition area and per capita disposable income of urban households are stationary time series; the real estate prices, Consumer Confidence Index, Consumer Expectation Index, currency and basic currency M2 are non- stationary time series. In the above stationarity tests, we considered the unit root tests excluding the trend term. If the trend term is considered, both the real estate prices and Consumer Expectation Index are stationary. On the significance level of 1%, the first order differences of all non-stationary time series are stationary, so each of the non-stationary variables is I (1), i.e. integrated of order one.

Table 2.2: Stationarity tests

Variable	Test Type	ADF Statistics	P-value	PP Statistics	P-value	Conclusion
price	constant	-1.994	0.289	-1.380	0.592	Non-stationary
	constant and trend	-7.667***	0.000	-7.946***	0.000	Stationary
	1st order difference	-18.098***	0.000	-21.977***	0.000	Stationary
confidence	constant	-2.161	0.221	-1.980	0.296	Non-stationary
	constant and trend	-3.363*	0.057	-3.283*	0.0691	Non-stationary
	1st order difference	-11.861***	0.000	-12.055***	0.000	Stationary
expectation	constant	-1.881	0.341	-1.699	0.4319	Non-stationary
	constant and trend	-4.168	0.005	-4.144	0.0054	Stationary
	1st order difference	-10.795***	0.000	-10.927***	0.000	Stationary
m2	constant	-0.434	0.904	-0.420	0.907	Non-stationary
	constant and trend	-2.166	0.509	-2.506	0.3248	Non-stationary
	1st order difference	-9.574***	0.000	-9.551***	0.000	Stationary
disposable income per capita	constant	-3.852**	0.014	-3.178**	0.0213	Stationary
interbank offered rate	constant	-3.501***	0.008	-3.323**	0.014	Stationary
FDI	constant	-6.151***	0.000	-6.123***	0.000	Stationary
land acquisition	constant	-7.068***	0.000	-6.983***	0.000	Stationary

Note: "constant" means that there is only constant term in the unit root test, and "constant and trend" indicates that both constant and trend items are included in the unit root test. All variables are logarithm based. *, **, and ***, respectively indicate significance levels of 10%, 5% and 1%. The sample of disposable income per capita of urban households is 59.

2.4 Analysis on the cointegration relationship of consumer expectations and real estate prices

2.4.1 Cointegration and Vector Error Correction Model (VECM)

(1) Cointegration

For the variables of unit root, the traditional processing method is to obtain stationary time series by performing the first order difference. However, the economic implication of variables after the first order difference is different from that of the original time series, while sometimes we still hope to use the original time series for regression. If there is a relationship of long-run equilibrium between multiple unit root variables due to some economic power, then the cointegration relationship may exist as well. The basic idea of the cointegration relationship is: if multiple unit root series have a "common stochastic trend", the stochastic trend may be eliminated through the linear combination of these variables.

Suppose the real estate prices $\{y_t\}$ and Consumer Expectation Index $\{x_t\}$ is the I (1) process, and they are respectively expressed as:

$$\begin{cases} y_t = \alpha + \beta w_t + \varepsilon_t \\ x_t = \gamma + \delta w_t + u_t \end{cases} \tag{2.1}$$

In which, w_t is the random walk, $w_t = w_{t-1} + v_t$; while ε_t, u_t, and v_t are all white noise. As $\{y_t\}$ and $\{x_t\}$ have a common stochastic trend, the linear combination of the two below is a stationary process:

$$\delta y_t - \beta x_t = (\alpha \delta - \beta \gamma) + (\delta \varepsilon_t - \beta u_t) \tag{2.2}$$

Under such circumstance, we call the real estate prices $\{y_t\}$ and Consumer Expectation Index $\{x_t\}$ as being in cointegration, and the vector $(\delta, -\beta)$ as the cointegration vector or the cointegration coefficient. Obviously, we can standardize the cointegration vector into $(1, -\beta/\delta)$. Besides, for the two variables in the I (1) process, only one cointegration relationship is possible; while for N variables in the I (1) process, the N-1 cointegration relationships are possible at most. The number of cointegration relationships among a group of I (1) process variables is the cointegration rank, i.e. the number of linearly-independent cointegration vectors.

(2) Maximum likelihood estimate (MLE)

We estimate VECM model based on MLE method of Johansen (1988):

$$\triangle y_t = \alpha + \Gamma_0 y_{t-1} + \Gamma_1 \triangle y_{t-1} + \cdots + \Gamma_p \triangle y_{t-p+1} + \varepsilon_t \tag{2.3}$$

Wherein $\Gamma_0 \equiv -\Phi(1) = -BA'$. In order to facilitate derivation, we assume that there is no time trend item. Suppose the number of samples is T+p, i.e. the observed data is $\{y_{-p+1}, y_{-p+2}, L, y_0, y_1, L, y_T\}$. Obviously, only when there is cointegration relationship for $\{y_t\}$, the VECM model can be established; otherwise, the left side of the above equation is stationary, and the right side is a non-stationary process. Suppose the cointegration rank is h, then the coefficient matrix Γ_0 must satisfy the constraint condition of "rank $(\Gamma_0) = $ h". Johansen's method is, in the case of meeting the said constraint condition and the given $\{y_{-p+1}, y_{-p+2}, L, y_0\}$, to maximize the log-likelihood function of $\{y_1, L, y_T\}$.

2.4.2 Estimation of cointegration and VECM

(1) Cointegration estimation

Firstly, we roughly estimate the long-term equilibrium relationship between the real estate prices and consumer indices through Ordinary Least Squares (OLS) regression. It is worth

pointing out that the estimate results could be spurious at this stage as we do not know yet we have cointegration among the series or not. However, the sign of coefficients and significance of the estimated results can assist us in judging the selection of cointegration variables in subsequent analysis.

As shown in Table 2.3, Consumer Expectation Index and the real estate prices are significant on the 1% level, and the estimate coefficient sign is consistent with the expectation, while the respective estimate coefficients between Consumer Confidence Index, Consumer Satisfaction Index and the real estate prices are negative and not significant.

Table 2.3: OLS estimation results of real estate prices and consumer indices

price	Coef.	Std. Err.	t-value	P>t	[95% Conf. Interval]	
confidence	-0.6258	0.8088	-0.77	0.441	-2.2273	0.9756
expectation	3.7817	0.5801	6.52	0	2.6330	4.9303
satisfaction	-0.2485	0.4823	-0.52	0.607	-1.2034	0.7064
constant	-5.2909	1.3288	-3.98	0	-7.9219	-2.6599

Note: the sample size is 124. All variables are logarithm based.

The conclusion of Table 2.3 generally conforms to the theoretical expectation. According to the definitions of the three indices, Consumer Satisfaction Index is consumers' self-assessment of their current incomes and consumption. Consumer Expectation Index represents consumers' subjective expectation of future economic changes, and Consumer Confidence Index is the weighting of the above two indices. As the most important component of household wealth, the fluctuation of house prices has a significant impact on household non-housing consumption. In theory, the effect of house prices on consumption can be driven by two main mechanisms. First, according to the wealth effect, the increase of house prices improves the total wealth of households or the expected total wealth, which can in turn stimulate household consumption by relaxing the credit constraint (Ludwig and Sløk, 2002). Second, substitution effect means that the increase of house prices will increase the cost of buying and renting a house, thereby reducing the household's expenditure on other commodities for those families who want to buy a new house or upgrade a house (Chamon and Prasad, 2010; Li, Li, and Chen, 2014). Therefore, from the perspective of spot observation, these two effects illustrate the uncertainty of the impact of house price fluctuation on household consumption in different markets. The corresponding results

reflected in Table 2.3 are that neither Consumer Satisfaction Index nor Consumer Confidence Index is significantly correlated with real estate prices.

The theoretical relationship between consumer expectations and house prices is completely different. Productivity explanation pointed out that the positive expectation of future income increases the demand for housing and household goods and leads to price increases (Attanasio, et al., 2009; Pagano, 1990). Besides, it is particularly noteworthy that China's Consumer Expectation Index contains useful information about pure expectation shocks, which are unrelated to economic fundamentals (Li, 2011). That is to say, consumers' subjective expectations have irrational composition and under the influence of animal spirits, which makes the study on the relationship between real estate prices and consumers' subjective expectations have the characteristics of behavioral finance.

Based on above analysis, we will mainly analyze the cointegration relationship between Consumer Expectation Index and the real estate prices. However, one drawback of the Engle and Granger ADF (EG-ADF) method is that it cannot process the cases with multiple cointegration relationships. Furthermore, the EG-ADF method should be applied by two steps. The estimate error in the first step will be taken into the second step. So, it is not an efficient way. Therefore, we have to conduct the Johansen cointegration test on the real estate prices and Consumer Expectation Index.

As shown in Table 2.4, the Johansen cointegration test shows that there is only one linearly-independent cointegration vector (* in the table) between the real estate prices and Consumer Expectation Index. The maximum eigenvalue test also shows that the original hypothesis of "cointegration rank is zero" is refused at the 5% significance level, but the original hypothesis of "cointegration rank is 1" cannot be refused at the same level. In other words, there is a cointegration relationship between the real estate prices and Consumer Expectation Index. According to Final Prediction Error (FPE) criteria, Hannan-Quinn Information Criterion (HDIC) and Schwarz's Bayesian Information Criterion (SBIC), it is determined that the lag order of the system is 2.

Table 2.4: Test on the cointegration relationship between real estate prices and Consumer Expectation Index

Original hypothesis H_0	trace test		max test	
	Statistic	5% critical value	statistic	5% critical value
0 cointegration relationship	21.3869*	15.41	20.4018*	14.07
At least 1 cointegration relationship	0.9850	3.76	0.9850	3.76

Note: * means significant on the result of "at least 1 cointegration relationship".

(2) VECM estimation

This chapter defines the lag order as 2 and rank as 1 to estimate the cointegration formula as:

$$\hat{ln}price = 4.346 \times \hat{ln}expectation \tag{2.4}$$

Consumer Expectation Index positively correlates with the real estate prices at a 1% significance level, the standard deviation of estimate coefficient is 0.5877, and such coefficient indicates that: the real estate prices will rise by 4.346% for 1% Consumer Expectation Index increases. The estimate coefficients of the error correction terms of real estate prices and Consumer Expectation Index are -0.0683 and 0.0565 respectively, which means that, ceteris paribus, the changes of real estate prices and Consumer Expectation Index can eliminate 6.83% and 24.52% of the unequal error of last period respectively.

Next, we will verify the stationarity of the cointegration relationship between Consumer Expectation Index and the real estate prices. As shown in Figure 2.6, except for the unit roots that the VECM assumed itself, all featured roots of the companion matrix fall within the unit circle, therefore, the cointegration system between Consumer Expectation Index and the real estate prices is stationary.
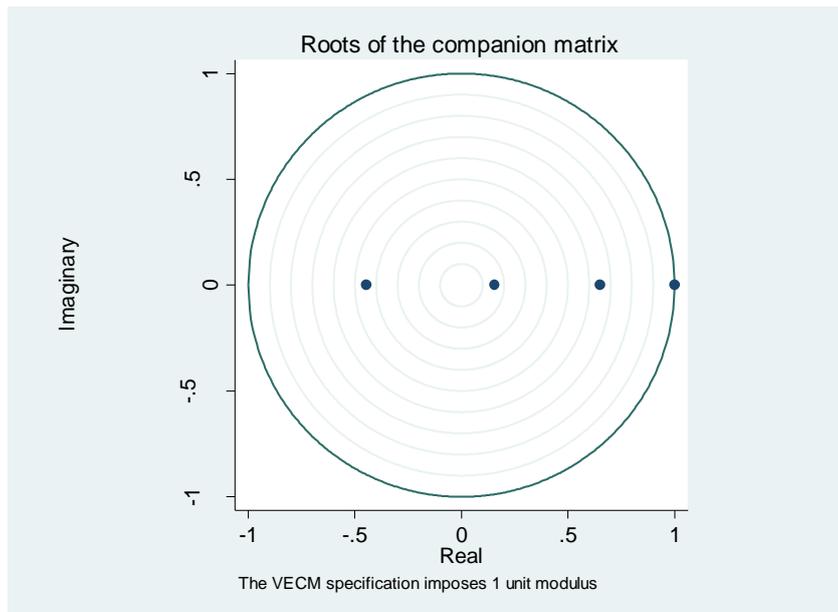
Figure 2.6: Stationarity test

2.5 Robustness check and additional analysis

In robustness check, we separately add money supply M2 and the quarterly GDP into the cointegration system for analysis.

2.5.1 Cointegration relationship between real estate prices, Consumer Expectation Index and M2

First, we have described the evolution trend of consumer expectations and money supply M2, as shown in Figure 2.7. The money supply M2 increased from 14.78 trillion at the beginning of the period to 94.48 trillion at the end of the period during 2001~2012, and increased for nearly 6 times during the sample period. The overall upward trend of money supply M2 is basically the same as the evolution trend of the real estate prices.
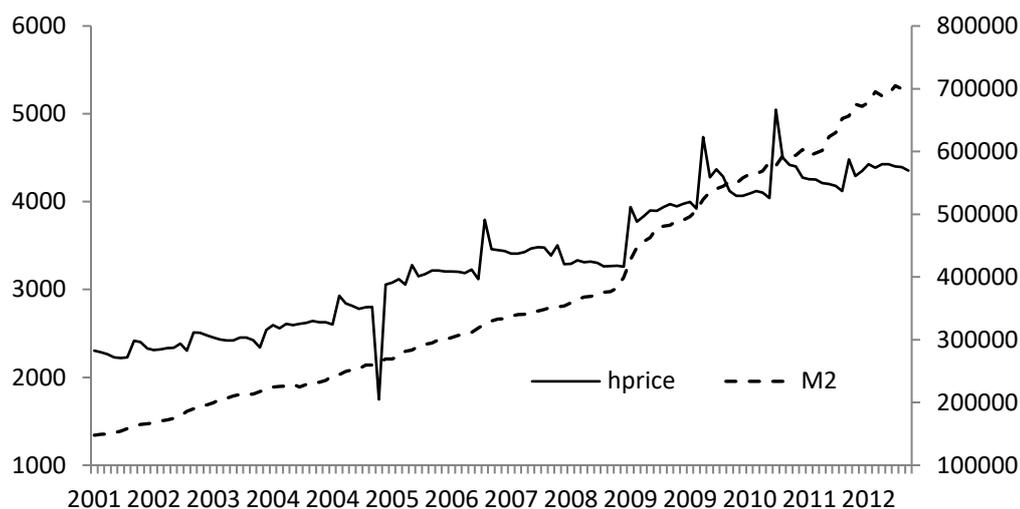
Figure 2.7: Evolution trend of consumer expectations and M2

The Johansen cointegration test shows that there is only one linearly independent cointegration vector between the real estate prices, Consumer Expectation Index and M2, and the maximum eigenvalue test also shows that the original hypothesis of "cointegration rank is 0" is rejected at a significance level of 5%, but the original hypothesis of "cointegration rank is 1" cannot be rejected, that is, there is a cointegration relationship between real estate prices and consumer expectations. In addition, the lag order is determined to be 2 according to AIC, HQIO, SBIC statistics which are -12.957, -12.843 and -12.678, respectively.

Table 2.5 Cointegration regression test on real estate prices, consumer expectations and M2

Original hypothesis H_0	trace test		max test	
	Statistic	5% critical value	statistic	5% critical value
0 cointegration relationship	36.767*	34.55	32.386*	23.78
At least 1 cointegration relationship	14.381	18.17	16.443	16.87
At least 2 cointegration relationships	1.939	3.74	1.939	3.74

Note: * means that the original hypothesis is rejected at the significance level of 5%.

The cointegration equation between real estate prices and Consumer Expectation Index and M2 is shown below:

$$\hat{lnprice} = 0.875 \times lnexp + 0.276 \times lnm2 \qquad (2.5)$$

The standard deviation of consumer expectation and M2 estimation coefficient in the

error correction model is 0.332 and 0.029, respectively, which is positively correlated with the real estate prices at the significance level of 1%.The above equation shows that the increase in Consumer Expectation Index by one percent will increase the real estate prices by 0.88%, money supply M2 by 1% and real estate prices by 0.28%, while the consumer expectations are estimated to be decreased as compared to Equation (2.4) after the addition of M2. In addition, the addition of money supply M2 does not affect the significance of consumer expectations for real estate prices, it has also proved the robustness of the cointegration relationship between Consumer Expectation Index and real estate prices.

2.5.2 Cointegration relationship between real estate prices, Consumer Expectation Index and GDP

Here we use quarterly GDP data as an additional variable to verify the robustness of the conclusion in this chapter. Since there is only quarterly data available GDP, real estate prices and consumer expectations are averaged at the quarterly level to fit the analysis. The Johansen cointegration test shows that there is only one linearly independent cointegration vector between the real estate prices, Consumer Expectation Index and quarterly GDP, and the maximum eigenvalue test statistics is 13.659, as a result of which the original hypothesis of "cointegration rank is 0" is rejected at a significance level of 5%, but the original hypothesis of "cointegration rank is1" cannot be rejected.

Table 2.6 Stationarity test of quarterly GDP

Variable	Test type	ADF statistics	P-value	PP statistics	P-value	Conclusion
lnqgdp	constant	-1.298	0.630	-2.512	0.113	Non-stationary
	constant and trend	-6.332***	0.000	-6.334***	0.000	Stationary
	1st order difference	-6.585***	0.000	-6.585***	0.000	Stationary

Note: "constant" means that there is no trend term in the unit root test, and "constant and trend" indicates that trend items are included in the unit root test. All variables are logarithm based. *, **, and ***, respectively indicate significance levels of 10%, 5% and 1%.

The cointegration equation between real estate prices and Consumer Expectation Index and GDP is shown below:

$$\hat{lnprice} = 0.675 \times lnexp + 0.489 \times lnqgdp$$
（2.6）

The standard deviation of consumer expectations and the estimation coefficient of GDP in the error correction model is 0.282 and 0.037, respectively, which is positively correlated with the real estate prices at the significance level of 5% and 1%, respectively. In addition, the above equation shows the robustness in the cointegration relationship between consumer expectations and real estate prices after addition of the variable of quarterly GDP.

It is worth pointing out that the estimation coefficient of consumer expectations with the addition of M2 and quarterly GDP (2.5) and (2.6) is significantly decreased as compared to Model (2.4) of the single variable, which is because there is a high correlation between consumer expectations and M2 and the quarterly GDP, and the correlation coefficient of the two reaches 0.82 and 0.71, respectively. That is, the impact of M2 and GDP on real estate prices has been included in consumer expectations, and M2 and GDP have been the important factors affecting the consumer expectations. However, the high correlation coefficient between M2, GDP and expectations cannot be used to judge the impact degree of subjective psychology on expectations.

2.6 Conclusions

Participants in the financial market usually pay more attention to the monthly announcements of consumer and investor sentiment, especially during the economic crisis, mainly because: first, the confidence (or sentiment) index is neither just the noisy of the macroeconomic variable, nor the simple feedback of the information contained in these related economic variables, but has an impact on the economic system as independent exogenous variable (Barsky and Sim, 2012); second, the confidence (or sentiment) has a certain predictive effect on consumption and GDP, and its ability to predict the economic recession far surpasses the classic recession forecast indices and other fundamental macroeconomic variables. In addition, the best way to forecast the future economic recession is to combine sentiment variables with classic recession forecast factors or fundamental economic variables (Christiansen et al., 2014).

Further research is still needed to understand why consumer confidence can well predict economic fluctuation. At present, the predictive power of confidence is usually attributed to animal spirits (Keynes, 1936; Akerlof and Shiller, 2009) or agents rationally and intelligently processing fundamental news (Barsky and Sims, 2012). The author believes that the animal

spirits view has more explanatory power. On the one hand, all current or future fundamental information (or news) must be interpreted and accepted before it can be used to guide economic behavior, that is, confidence is subjective; on the other hand, the impact of sentiment may not be confined to a short term. News angle does not exclude animal spirits, and news is only one of the sources of animal spirits.

Although Consumer Confidence Index is deemed as a regular index which is published immediately, it has an important advantage of being available in real time subject to no subsequent revisions as compared to other leading indices (Koenig, 2002), while it has rarely been introduced to the real estate market to test the relationship between variables and to explain the prices. This chapter analyzes the impact mechanism of real estate prices, portrays market expectations on economic situation with Consumer Confidence Index, and analyzes the long-term equilibrium relationship between consumer expectations and real estate prices through cointegration. The empirical results show that: Consumer Expectation Index has positive correlation with real estate prices at the 1% significance level. If Consumer Expectation Index increases by one percentage point, the real estate prices will increase 4.346%. Afterwards, M2 and quarterly GDP are separately added into the test, and it can be seen from the test results that the cointegration relationship is robust between consumer expectations and real estate prices. Moreover, it can be seen from the conclusions of the three-variable cointegration test separately with the addition of M2 and quarterly GDP that although there is a higher correlation coefficient between M2, quarterly GDP and the real estate prices, there is only one cointegration relationship between the consumer expectations and real estate prices in the test system, which also partially proves the viewpoint that news is only one of the sources of confidence.

Conclusion is of an obvious significance for the policy. For the purposes of regulatory policies, take China for example, although the regulatory policies for the purpose of curbing excessive increase of house prices (including means of administrative orders that prohibited housing purchase) accompanied the whole process of excessive increase of house prices, the effect is not ideal (Hui and Wang, 2014), because the land supply, interest rates, taxes and other means have not been able to change the expectations that house prices will continue to grow, and the expectations come from the historical long-term increase of real estate prices. And apparently, the expectations about sustainable increase of real estate prices have not been reversed by

objective factors such as rent prices ratio as low as 1 percent or ratio of house price to per capita annual income as high as 40, just because people believe the existence of such "superstar city" and sustained high economic increase expectations. In order to manage the market investment expectations, it is necessary to introduce a new channel and method to affect the public psychology besides traditional economic variables. What channel and method to be introduced is worth studying.

Because this study focuses on macro level, it points out the correlation between real estate prices and expectations at macro-level. On one hand, one can further analyze the correlation between the sentimental factors at the provincial level in the follow-up study. As the provincial-level data are richer, there are more choices of price variables and expectations proxy variables, and one may verify the correlation between the two from more aspects; on the other hand, one can study the relationship between home tenure rate and social psychological change at the urban level, and study the psychosocial determinant of home tenure rate by way of qualitative and quantitative study.

Chapter 3

Entrepreneurs' Confidence and House prices

3.1 Introduction

China's house prices, especially those in large cities, have experienced a sharp rise in the last ten years. The data from *China Statistical Yearbook* shows that China's overall average house price rose by 160% from 1998 to 2012, with an average annual rise of 7%. The house prices in big cities rose faster. Wu et al. (2012) estimated the house prices in Chengdu, Hangzhou, Shanghai and Shenzhen rose at least 10% per year from 2003 to 2010, while the house prices in Beijing rose by nearly 20% annually in the same period. The sharp rise of the house prices has not only led to enormous social pressures and conflicts, but also aroused extensive discussions on the ups and downs of house prices. Worrying about the serious harm to the macro-economy caused by the burst of potential house price bubble, and the intense social conflicts caused by the speculation induced income disparity, the Chinese government has taken a number of policy measures with the attempt to stabilize house prices, including tax policies, financial regulations and controversial purchase and resale restrictions.

The development of China's housing market is a gradual process, and is still in the process of change. Since the reform and opening-up in 1979, China's housing market has experienced a change process from the welfare housing distribution system to the double track system of planned economy and market economy, and then to the market-oriented system (Ye et al., 2006). An important milestone is the *23rd Decree* promulgated by the State Council in 1998. The document regulates that enterprises are prohibited to build new houses for their employees, thus making the house consumption subject to market-oriented demand. And then, the government changed the original inter-enterprise agreement based transfer system of state-owned land use right into the Bid, Auction and Listing system on the basis that the government is the only transferor of land use rights, and divided all the land into the residential land, commercial land and other land, having standardized the land transfer process, greatly enhanced the

transparency of governmental financial resources and the market, and laid a common foundation for the residential housing market, the commercial property market, and other property right based real estate market. Then, after 15 years' general rapid rise, China's house prices has been showing a trend of differentiation since 2013, along with the slowdown in China's overall economic growth. The house prices in China's central cities such as Shanghai, Beijing and Guangzhou are growing continuously and steadily, while the same in medium and small cities are downward as the backlog of new housing appears.

This chapter is the extension of Chapter 2. Chapter 2 adopted China's Consumer Expectation Index as the proxy variables of subjective expectations for macro-economy, and studies the relationship between it and China's house prices, thereby clarifying the interaction between such expectation and overall house prices, from the perspective of the behavioral economics. According to the conclusion described above, a long-term cointegration relationship is found between China's consumer expectations and real estate prices, namely, there is a long-term trend of common changes between China's Consumer Expectation Index and real estate prices, and they are also mutually corrected in the process of changes. Thus, the study verifies the correctness of bidirectional-influence mechanism of aggregated mass sentiment and real estate prices by taking China's macroeconomic data as the example.

By controlling the news-forged influences (Barsky and Sims, 2012) based on the literatures，this chapter taking Entrepreneur Confidence Index as an explanatory variable by using the provincial-level panel data, presents the empirical study about the variable's influence on house prices. First, it tested the overall influence of Entrepreneur Confidence Index on the house prices, and then tested the influence by dividing China's provinces into east, middle and west regions according to the level of development and geographical location. The empirical study results show that Entrepreneur Confidence Index has a significant influence on the house prices. According to the tests, the influence of Entrepreneur Confidence Index is of significance in the eastern and middle regions, but not in the western region.

Akerlof and Shiller (2009) extended Keynes' "animal spirits" (1936) to include spontaneous behavior as well as optimistic and pessimistic beliefs. And by the definition, Entrepreneur Confidence Index is the entrepreneurs' views (i.e. optimistic, so-so and pessimistic) on the prosperity situation of their own enterprises in the current and next periods. The data is

closely related to theory.

In addition, the entrepreneurs' confidence has a broad and far-reaching impact on the psychology of public investment. Shiller (2005) has summarized the effect of group psychology on market fluctuations and listed causes including the influence of authority, herd behavior, information cascade and tale spreading surpasses theoretical analysis. Entrepreneurs tend to be recognized as opinion leaders by the public, so their comments or buying-or selling-leading behaviors have exact influences on the social need psychology. The circle marketing (marketing by virtue of chamber of commerce and other social organizations) strategy which is more important in China's housing sales and marketing, is a typical embodiment of this effect.

The result of this chapter indicates that Entrepreneur Confidence Index has a significant influence on the house prices, and the degree of such influence is related to the degree of economic development. The higher the level of economic development is, the more influence will be. On the one hand, the confidence of entrepreneurs influences their own investment behavior on housing; on the other hand, what is more important is that influences the house prices by shaping the mass purchase expectations.

The positive correlation between the influence of Entrepreneur Confidence Index on the house prices and the degree of economic development provides the possible way to explain why the explanatory capability of fundamental factors on China's provincial (or city) house prices drops along with the rise of economic development level (Li and Chand, 2013; Wang et al., 2014), namely: freer market environment and more developed economy may be accompanied by a broader sentiment impact.

To our knowledge, this is one of the first attempts to study the relationship between the entrepreneurs' confidence and house prices in the current academic field. The conclusion in this chapter can provide reference and help for further research.

3.2 Literature review

3.2.1   Market fundamentals

In the extant literature, there are several variables applied to proxy economic fundamentals in modeling house prices. The most widely used factors include construction costs, population and income (Jud and Winkler, 2002; Potepan, 1996; Poterba. 1991; Shen and Liu,

2004; Meen, 2012). Construction cost and income are commonly found to be the most important determinants of house prices in these studies. The role of population is ambiguous. For example, Levin et al. (2009) concluded that population decline and aging put downward pressure on house prices, and the prices rose in the past wouldn't continue into the future. However, some studies have also found insignificant or negative effects of population growth on house prices (e.g., Hort, 1998 for Sweden, and Engelhardt and Poterba, 1991 for Canada). Other factors such as interest rates (Abranham and Hendershott, 1994; Englund and Ioannide, 1997; Jud and Winkler, 2002; Giulindori 2005; Adam and Fuss, 2010), land prices (Du et al., 2011; Yu, 2010) are also deemed as determinants in some studies, but the effects vary between regions and on the context.

In his wrap-up work, Meen (2012) sorted the determinants of house prices into cyclical and trend factors. Hereinto, cyclical determinants include income, interest rates (real and nominal), credit availability, wealth, expected capital gains, construction costs and employment/unemployment; trend factors are population size and structure, headship rates, migration, housing stock, planning regulations and housing taxation. However, Meen (2012) admits that, despite of considerable agreement on the theoretical framework, controversial empirical findings had been made regarding different markets. The differences mainly due to the different empirical tools and economic variables they employed in explaining the prices.

For China, Yu (2010) use panel data to reach the conclusion that the increase of land supply, area of housing sold and vacancy levels each has a negative impact on house prices while the decrease of mortgage rate has a positive effect. Liang and Gao (2007) conclude that the price of housing in eastern and western regions of urban china is mainly affected by the credit policy and income. But the independent factors were limited to the demand side such as GDP and housing sales areas, the factors from supply side were ignored. Both Deng et al. (2009) and Du et al. (2011) highlight the role of land prices in determining house price. Wang and Zhang (2014) adopt Hukou population, wage income, urban land supply and construction in explaining the rising house price in major Chinese cities between 2002 and 2008. The result indicates, for most cities, changes in fundamentals account for major proportion of price appreciation. However, for some coastal cities, explanatory ability of fundamentals seems non-significant. Li and Chand (2013) use annual provincial data to test the housing market fundamentals such as income, construction cost, land price, user cost and impending marriage. The finding shows that the house

price in more developed regions are determined by supply factors including construction cost and land price, while prices in other provinces are determined by both demand and supply.

In this chapter, the modeling of determinants of house prices in China takes into account the contribution of most major variables noted in these studies.

3.2.2 Psychological influences on real estate market

As the author pointed out in the literature review of Chapter 2, the subjective psychology of social mass had a broad and profound impact on the economy. For example, Christiansen et al. (2014) found that the predicting ability of sentiment variables on the US recession was far beyond that of classic recession predictors and macro variables by applying monthly data from consumer and business surveys, and the combination of the data with classical recession predictors or macro variables. After examined both the predictive power of consumer and business confidence, the paper highlighted that the latter is a substantially stronger recession predictor than the former.

For the real estate market, Shiller (2005) argued that the US asset price surge after 1992 was a speculative bubble based on psychological factors, which was the "Ponzi process" from enlarging investments due to the feedback loop. The basic way was price-price feedback: The rise or fall in price triggered investor enthusiasm or indifference, which in turn leaded to the further rise or fall of future price. This market feedback process was a natural phenomenon, and indirect evidence came from the high autocorrelation of house price (Case and Shiller, 1990; Abraham and Hendershott, 1994; Englund and Ioannides, 1997; Tu, 2004).

Behavioral evidence could also be observed in traditional economics, proving that the volatility of the house price cycle was caused by the supply stickiness of housing products and the unreasonable expectations on market rents. For example, short-sighted expectations might lead to overestimation of asset prices. By computing a Good-time-to-buy (GTTB) index to measure households' expectations, Huang (2014) found those households' expectations and house price shifted synchronously with the housing boom-bust cycle.

By studying the deviation of the market price from the intrinsic value, some special psychological effects on the price were revealed. For example, Edelstein and Paul (2000) pointed out that because of the continued success of the Japanese economy in the 1980s, people were too confident in their business management before the real estate bubble burst, which was considered

arrogance effect. This effect influenced many decision-making processes during that time, and these decisions appear to be very stupid today. For another example, Capozza and Seguin (1996) provided evidence of euphoria in the market: housing market participants seemed to have overreactions to income growth; similarly, Anundsen and Jansen (2013) pointed out that investors' expectations on their future revenue growth and economic growth had a significant impact on the development of house prices; by testing data of 18 OECD countries, Engsted and Pedersen (2015) found money illusion in the housing market, namely the rent-price forecast pattern was highly dependent on the return of the house and the rent was measured in nominal or real rent; and Lambertini et al. (2013) proved the importance of the news impacts and the consumer confidence to house prices. Shocks to news and expectations accounted for more than 50% of the forecast error variance of house prices.

As for China, Wei et al. (2007) argued that there was a sheep-flock effect in China's housing market. When the sheep-flock effect existed, the relationship between macroeconomic fundamentals and house prices was distorted, and the house price elasticity increased, leading to the real estate bubble.

3.2.3   Sentiment and market fundamentals on asset pricing

The early behavioral finance literature showed that the erroneous pricing of assets is the trade result of sentimental, irrational traders and non-sentimental rational arbitrageurs (De Long et al., 1990). However, as the arbitrage of irrational investors was both expensive and risky (Shleifer and Vishny, 1997), the behavior of rational arbitrage could not return the erroneous pricing of assets to the intrinsic value. Both for the securities market and the real estate market, investor sentiment was the result of the combined effects of various market psychological factors, but since it was difficult to measure psychological factors (Shiller, 2005; Baker et al., 2012), empirical research on investor sentiment was still in the process of development and improvement.

In his classic paper, Baker and Wurgler (2006) constructed the investor sentiment index based on six related agency variables of US stock market, and based on this index, investigated the impact of investor sentiment on the forecasted stock returns. Their findings suggested that the stock market returns also fell as investors rallied. Baker and Wurgler (2007) investigated the type of stock most affected by investor sentiment in subsequent studies. With the "top-down" (or

macroeconomic) method, they found that the stocks, which were speculative and difficult to arbitrage, were more likely to be affected by investor sentiment. Later, Baker et al. (2012) studied 6 major stock markets and the study results showed that the global and local market sentiment was negatively correlated with country-level returns, and global sentiment was formed by the spread of investment sentiment around the local markets through private capital flows.

In the field of behavioral finance, the real estate market did not receive as much academic attention as the capital market. In contrast, there were few studies that focused on the real estate market or the securitized real estate market. In the case of the real estate market, the literature found that the market fundamentals could not explain the change in house prices comprehensively (Case, Quigley and Shiller, 2003; Wong et al., 2005; Jin et al., 2014). The unexplained change in house prices was driven by a "noise trader" activity (Barkham and Ward, 2009), which had nothing to do with market fundamentals or rational factors.

Unlike the stock market, the real estate market is with less liquidity and higher transaction costs, and the house prices cannot respond quickly to changes in information as stock prices do. As pointed out by Baker and Wurgler (2006), assets with limit arbitrage were more susceptible to sentiment. Some studies tried to build an index to measure the impact of investor sentiment on the real estate market. Clayton et al. (2009) used a direct survey and established a sentiment index to explore the impact of market fundamentals and investor sentiment on the valuation of commercial real estate in the US market. By using error correction models, they concluded that investors' sentiment would affect pricing even after controlling long-term equilibrium of other variables (expected rent growth, stock risk premium, bond yield and lagging adjustment). Lin et al. (2009) examined the impact of investor sentiment on the return of REIT, which was considered to be a direct proxy variable for the US real estate asset. They found that investor sentiment had a positive impact on REIT monthly returns. Using the data of the real estate market in Hong Kong, Hui and Wang (2014) designed a sentiment index to elucidate the overall trading behavior of investors based on the expected waiting time (delay effect) from "buy" to "sell" in the transaction record, and found that the housing market investors were likely to be affected by the mood. In addition, the conclusion also showed that the sentiment index was an effective estimate indicator of price level, return rate and trading volume. In subsequent essays, Wang and Hui (2016) found that sentiment was not only related to short-term rents and house prices, but

also had long-term effects on house prices. Later, Lam and Hui (2018) confirmed that sentiment is negatively related to future returns of Hong Kong residential properties, with a lagged effect from 3 to 12 months, and has stronger effects on "hard to value" assets.

In the case of China, the researchers found that house prices were too high to be proved based on market fundamentals. For example, Hui and Yue (2006) investigated the relationship between house prices and economic factors based on data from Beijing, Shanghai and Hong Kong. They concluded that there was an anomalous interaction between house prices and market fundamentals, which was defined as the real estate bubble. Gao et al. (2014) used data from 30 Chinese metropolitans to estimate the extent of house prices deviating from market fundamentals. They found that most cities experienced a period of the real estate bubble. The real estate bubbles in eastern cities were bigger than those of western and central cities. The studies directly aimed to investigate the influence of sentiment in housing market is limited in mainland China. A recent study is, maybe due to the difficulty to obtain data, Hui et al. (2017) constructed buyer-seller index and developer index based on real estate transaction volume and land transaction volume in Shanghai to proxy market sentiment, and studied their effects on returns. Although the conclusion showed that there was an impact, the overall impact was not obvious.

3.2.4 Hypothesis and empirical strategy

Existing literature attributes the influence of consumer confidence on macroeconomy to either "nonfundamental-based sentiments" or "news" (Abildgren et al., 2018). The "nonfundamental-based sentiments" strand of view holds the understanding that consumption shock at least to some extent was caused by psychologically based animal spirits (Blanchard, 1993). In contrast, "news" view deems that the predictive power of consumer confidents origins from agents rationally and intelligently processing current or future fundamental news (Barsky and Sims, 2012).

This chapter attempts to achieve two possible contributions regarding sentiment through investigating the influence of entrepreneur confidence on house prices. First, since Akerlof and Shiller (2009) extended the definition of animal spirits to include spontaneous behavior as well as optimistic and pessimistic beliefs, and Entrepreneur Confidence Index is defined as the entrepreneurs' views (i.e. optimistic, so-so and pessimistic) on the prosperity situation of their own enterprises in the current and next periods, the Entrepreneur Confidence Index can be

adopted as an excellent proxy for sentiment to probe the impact of sentiment on house prices.

second, since the cointegration analysis based on time series data was selected in Chapter 2, it became difficult to set control variables to simulate the influence of news on sentiment, when investigating the impact by consumer expectations on house prices. Yet, given the attributes of panel data model selected for the research in this chapter, diverse control variables can be set to better control for the influences by objective information (news) on expectations. Therefore, if control variables are set, the sentimental index is still able to generate significant influence, and thus the view is held that influence primarily derive from the psychological factors in subjective expectations.

Entrepreneurs' confidence has broad and far-reaching influence on the investment psychology of the public. By referring to the research classics, Shiller (2005) summarized the effects of group psychology on market fluctuations into the influence of authority, herd behavior, information cascade and tale spreading surpassed theoretical analysis, etc. Although *"Sentiment is intrinsically difficult to measure precisely" (Baker et al., 2012, P272)*, above-mentioned psychological factors could be reflected in Entrepreneur Confidence Index in China's real estate market. For example, as investment specialists (whether in the real estate or other areas of investment), entrepreneurs' buying advices and market analysis could reflect the influence of authority, and their buying behaviors would bring the sheep-flock effect and produce herding; Because of the information cascade, the entrepreneurs' buying advices or their own buying and selling real estate behaviors would first affect real estate investment behaviors of their relatives and friends, and then affect other investors; finally, entrepreneurs or other real estate investment cases (especially the successful investment cases) would have a wide impact on the real estate investment sentiment of the whole society through the tale spreading. Circle marketing (marketing by virtue of chamber of commerce and other social organizations), which is prevalent in China's real estate developers and intermediaries, is a typical case of taking advantage of entrepreneurial influence. Therefore, this chapter attempts to study the impact of market sentiment on the real estate market by analyzing the impact of China's provincial level Entrepreneur Confidence Index on house prices and provide new evidence for behavioral finance.

The empirical analysis of this chapter includes the following process: First, the provincial panel data model is used to analyze the overall impact of entrepreneurs' confidence on house

prices. Secondly, the instrumental variable of Entrepreneur Confidence Index is constructed to examine the endogenous problems caused by missing variables and test whether the entrepreneurs' confidence affects the house prices by influencing the potential and unobservable variables; then, all provinces are divided into the eastern, middle and western regions, and the impact of the regional Entrepreneur Confidence Index on house prices is estimated; finally, the impact of the lagged Entrepreneur Confidence Index on house prices is analyzed.

3.3 Data and statistical analysis

3.3.1   Entrepreneur Confidence Index

Entrepreneur Confidence Index is an indicator comprehensively reflecting entrepreneurs' optimistic level on the current macroeconomic situation and the development trend according to their judgment on the industrial situation in the enterprise prosperity survey. Entrepreneur Confidence Index is a prosperity index determined based on the entrepreneurs' views (i.e. optimistic, so-so and pessimistic) on the prosperity situation of their own enterprises in the current and next periods. The value range of Entrepreneur Confidence Index is between 0 and 200, with 100 as the threshold. When the index is greater than 100, it indicates that the entrepreneurs' confidence is positive and optimistic. The closer the value is to 200, and the higher the degree of optimism will be; and when the index is less than 100, it indicates that the entrepreneurs' confidence is negative and pessimistic. The closer the value is to 0, the deeper the degree of pessimism will be (Li, 2002; Gao, 2010).

The enterprise prosperity survey was carried out in the form of questionnaire, and the prosperity index was obtained by measuring and processing the entrepreneurs' judgment on current macroeconomic environment and micro operation situation, to reflect the development of macroeconomic status, the enterprises' production and operation prosperity as well as the future development trend. The enterprise prosperity survey is a systematized quarterly survey. The survey involved industry, construction, transportation, storage and posts, wholesale and retail trade, housing, social services, information transmission, computer services and software, accommodation and catering industries. The survey was conducted via focus survey and sampling survey methods, and a total of nearly 20,000 sample enterprises in different industries, with different sizes and registration types were taken. The survey objects were the legal

enterprises and the enterprise principals who are in charge of industrial business corresponding to such enterprises. Entrepreneur Confidence Index typically includes Spot Confidence Index and Expected Confidence Index. Specific description is as follows:

$$\text{Entrepreneur Confidence Index} = 0.4 \times \text{Spot Confidence Index} + 0.6 \times \text{Expected Confidence Index} \quad (3.1)$$

Where, Spot Confidence Index = the proportion of the enterprise principals' optimistic answers on the current general operation status of the industry which their enterprises belong to －the proportion of pessimistic answers,+100; Expected Confidence Index = the proportion of the enterprise principals' optimistic answers on the next quarterly general operation status of the industry which their enterprises belong to－the proportion of pessimistic answers,+100. This chapter adopts the provincial and municipal Entrepreneur Confidence Index between 2003 and 2011, and the data is from *DataStream[3]*.

3.3.2   Measurement of provincial house prices

Since no statistical indicators readily available on house prices of China's provinces, this chapter calculated the house prices of provinces according to the relevant statistical indicators in *China Statistical Yearbook* (2003-2011). Specifically speaking, for each year and every province, unit price of residential commodity houses is calculated by the total sales of residential commodity houses divided by the sales area. The residential commodity houses refer to those exclusively for residence, including villas, apartments, family dormitories and common dormitories of employees (including bachelor employees and student dormitories), etc. But, the basement for people's air defense and non-residential basement are excluded. The houses can be divided into ordinary residential houses, affordable houses and villas, luxury apartments according to the purpose; and the houses with the area of below 90m^2 and the houses with the area of more than 140m^2 according to the house type.

The sale area of residential commodity houses refers to the total area of the sold residential commodity houses in the reporting period (i.e. the construction area indicated in the contract between the buyer and the seller), consisting of the area of sold existing houses and the area of sold forward houses.   First, the area of sold existing homes refer to the construction area of the residential houses that have been completed and meet the entry conditions, and for which the contract has been signed, including the construction area of existing houses that are sold in

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[3] sourced from the enterprise prosperity survey by China's National Bureau of Statistics.

the form of one-time payment and installment. Second, the area of sold forward houses refer to the construction area of the residential houses that are still under construction and not delivered for residence, and for which the contract has been signed, including the construction area of existing houses that are sold in the form of one-time payment and installment. The construction area of sold forward houses will not be carried over the construction area of sold existing house.

From the above calculation method, it is known that the price used in this chapter is the average price, instead of hedonic house price, which may result in the difference in price structure and quality of the houses cannot be captured. Considering that the high-price houses and affordable houses only account for a low proportion in China's house prices structure in the sample period, the deviation caused by the price structure may be ignored (Li and Chand, 2013). For example, in 2009, the high-price houses accounted for 5% of total sales, affordable houses accounted for 4%, and the remaining 91% were sold at conventional prices. In view of that the housing sales involve new houses, the difference in quality of sample houses may result in overestimation of the overall house prices.

3.3.3　Control variables data sources

The data of control variable sets in this chapter is mainly from *China Statistical Yearbook* (hereinafter referred to as the Yearbook), which is co-edited by the National Bureau of Statistics and the China Index Research Institute. China Index Research Institute is a research institution fully serving China's commercial economy, and integrating China's Housing Index System and China Housing TOP 10 Research Groups, etc., co-founded by dozens of domestic and foreign experts and several academic institutions, having five branches, i.e. North China, East China, Central China, South China and Southwest institutes, and it is the largest industrial institute. The China Housing Index System (referred to as CREIS), is an indicator system and analysis method reflecting the status of main cities' housing markets across China via the price index. As a house price index system with the largest coverage and most cities involved, China Housing Index System publishes a series of indices, like price indices (residential houses), office building indices, retail building indices, villa indices, second-hand housing sales and rental price indices of 100 cities on a monthly basis.

3.3.4　Statistical analysis

Based on *China Housing Statistical Yearbook* (2003~2011) data, this chapter estimates the

unit price of residential commodity houses in 30 provinces (excluding Tibet) of China, in order to measure the house prices of all the provinces of China, as shown in figure 3.1[4]. Between 2003 and 2011, the distribution of average house prices of China's provinces showed the trend of differentiation between the coastal region and the inland region. The average house price in the former was 4,646 yuan/m^2, while that of the inland region was 2,000 yuan/m^2. In the coastal region, the areas with the highest average price was Beijing, where it was10,065 yuan/m^2, followed by 7,115 yuan/m^2 of Shanghai; more than 4,800yuan/m^2 in Tianjin, Guangdong and Zhejiang; more than 3,000 yuan/m^2 in Liaoning, Jiangsu, Fujia and Hainan. In the west provinces, the house prices are basically lower than 2,000 yuan/m^2. The areas with the lowest house prices are Gansu and Guizhou, 1600 yuan/ m^2.
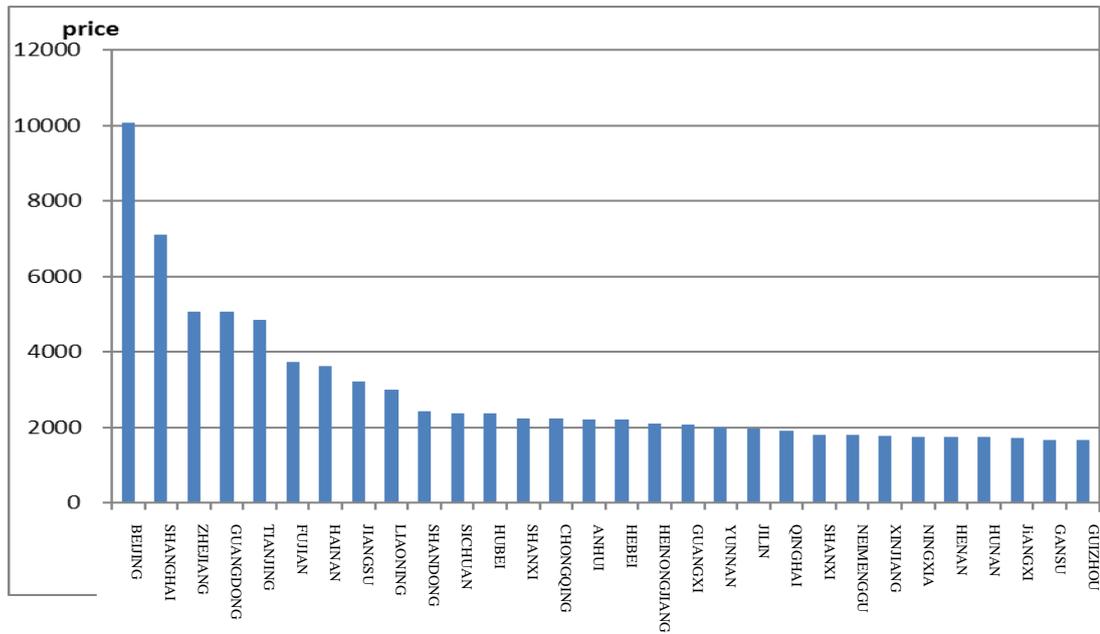
Figure 3.1: Distribution of provincial house prices of 2003~2011

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[4] This house price was adjusted according to the Consumer Price Index (CPI) of all areas by taking 2003 as the basic year.
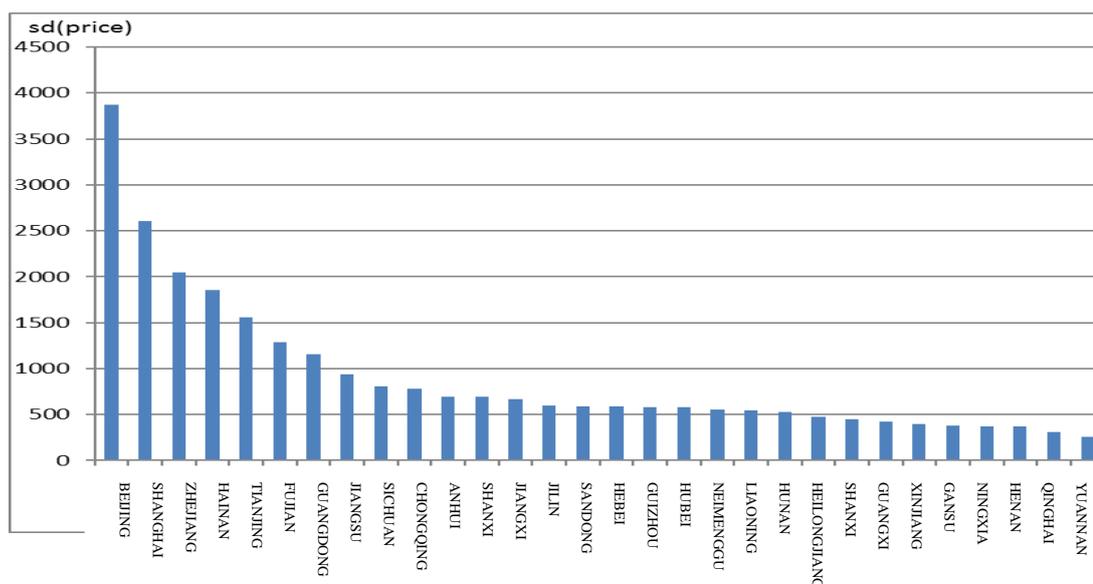
Figure 3.2: Fluctuation of provincial house prices of 2003~2011(standard deviation)

Secondly, in view of the evolution trend of provincial house prices, the average price of residential commodity houses in Beijing was 4,456yuan/m^2 in 2003 and 13,087yuan/m^2 in 2011. Since 2007, the house price of Beijing has exceeded 10,000yuan/m^2; following Beijing, the house price of Shanghai, was 4,989 yuan / m^2 in 2003 and 11,010 yuan / m^2 in 2011. And since 2009, the house price of Shanghai has exceeded 10,000yuan/ m^2. According to the fluctuation of the house prices (as shown in Figure 3.2), the value of Beijing, Shanghai and Zhejiang was the maximum, while that of Yunnan, Qinghai and Henan was the minimum[5].

Finally, let's analyze the evolution trend of the house prices and Entrepreneur Confidence Index (as shown in Figure 3.3). The left vertical axis represents the provincial average house price (expressed in the median of the annual house prices of all provinces), and the right vertical axis represents the average value of Entrepreneur Confidence Index. From the evolution trend of the house prices of all provinces, the house prices of all provinces were 1,470 yuan / m^2 in 2003, and 3,178 yuan / m^2 in 2011. Since 2007, the national house price has exceeded 2,000 yuan/m^2 and from 2008, the house price began to rise sharply. Entrepreneur Confidence Index experienced the rise - drop- rise trend. It started to rise from 2003 and reached the peak of 138 in 2007. Due to

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[5] In this chapter, the standard deviation of the house price among different provinces is adopted to measure the fluctuations in house price.

the impact of the financial crisis, Entrepreneur Confidence Index bottomed out to 116 in 2009.
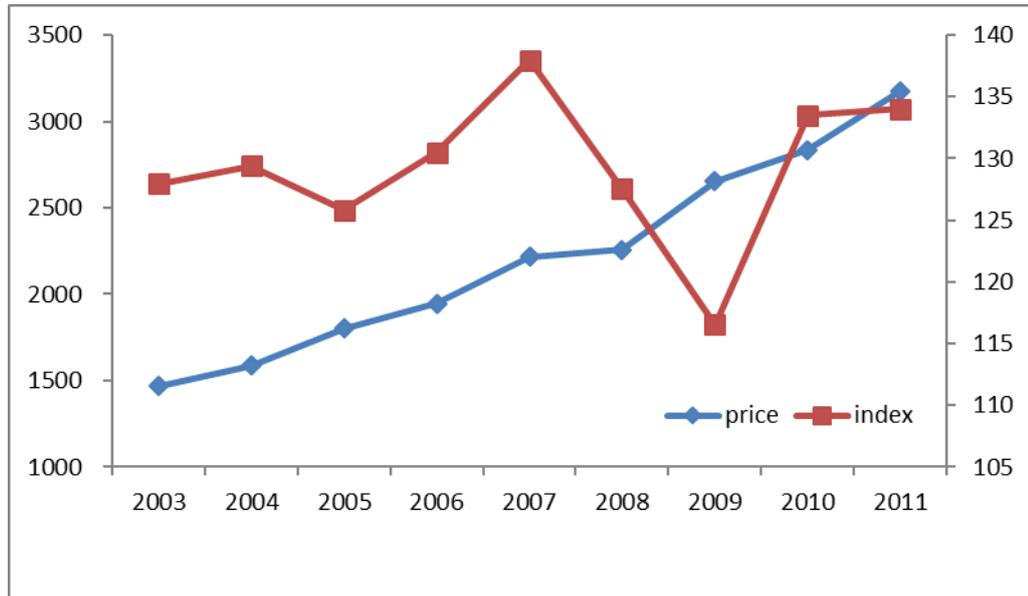
Figure 3.3: Evolution trend of Entrepreneur Confidence Index and house prices

3.4 Model specification and empirical results

3.4.1 Estimation of panel data model

(1) Basic concept of panel data

Panel data or longitudinal data refers to the data tracing the individuals of the same group within a period of time, which consists of N, i.e. the cross-section dimension (N individuals) and the time dimension (T stages). Generally, the panel data featuring smaller T and larger N is called short panel. If individuals in the samples of the panel data keep unchanged in different stages, the panel data is called balanced panel data. The provincial-level house price on which the paper is based is called the balanced panel data, including the data of the 30 provinces other than Tibet Autonomous Region during 2003 to 2011. Additionally, the major advantages of panel data are given as follows:

On the one hand, the issue related to missing variable could be resolved. Missing of variables is a common problem during empirical analysis. Though it could be resolved by dint of instrumental variables, it is often hard to find out the effective ones. Generally, missing of variables is caused by unobservable difference or heterogeneity between individuals; if such an

individual difference doesn't change with time, then, the estimation via panel data could be used to resolve the endogenous issue arising from missing variables (Wooldridge, 2009).

On the other hand, information about more individuals' dynamic behavior is provided. Thanks to its two dimensions i.e. cross section and time, the panel data sometimes is capable of resolving the issues that cannot be resolved by single cross section data or time series data. For example, when we consider how to distinguish the effect of scale economy upon enterprises' productivity from that of technical progress, the cross-section data fails to observe the technical progress because it does not have the dimension of time while the time series data of single enterprise cannot figure out why the productivity has been enhanced, because of enlarged scale or technical progress. However, the panel data can resolve the foresaid problems.

(2) Estimation method of panel data model

The following panel data model is considered:

$$y_{it} = \beta_0 + X_{it}\beta + \alpha_i + \varepsilon_{it} \qquad (3.2)$$

Where, i denotes observed individual, t refers to time dimension, and it is assumed that the time dimension of each individual is T, that is to say, $t=1, 2,..., T$; the number of individuals is K, that is to say, $i=1, 2,..., K$. Therefore, the number of samples is N*K. A brief introduction of the estimation method for the fixed effect and random effect of panel data model will be made as follows.

a. Fixed effect model

For the XXth individual in the fixed effect model, the following equation is obtained after Equation (3.2) is averaged over the time zone on both sides:

$$\overline{y_i} = \beta_0 + \overline{X_i}\beta + \alpha_i + \overline{\varepsilon_i} \qquad (3.3)$$

The interest margin of original model is obtained after Equation (3.2) minus Equation (3.3):

$$y_{it} - \overline{y_i} = (X_{it} - \overline{X_i})\beta + (\varepsilon_{it} - \overline{\varepsilon_i}) \qquad (3.4)$$

Define $y_{it} = y_{it} - \overline{y_i}$, $X_{it} = X_{it} - \overline{X_i}$, $\varepsilon_{it} = \varepsilon_{it} - \overline{\varepsilon_i}$, then there is

$$y_{it} = X_{it}\beta + \varepsilon_{it} \qquad (3.5)$$

α_i has been deleted from the above equation, so β, the consistent estimated parameter of OLS could be adopted as long as X_{it} is not correlated with ε_{it}, and the estimator is called fixed

effect estimator of panel data model $\hat{\beta}_{FE}$. Since $\hat{\beta}_{FE}$ has made use of the within groups dispersion of each individual, it is also called within estimator. Though individual characteristics are correlated with explanatory variable, a consistent estimation could be obtained as long as the within estimator is used. This is the advantage of panel data model. Additionally, in order to guarantee $X_{it} - \overline{X}_i$ is not correlated with $\varepsilon_{it} - \overline{\varepsilon}_i$, since $\overline{X}_{it}$ contains the information of all $x_{i1}, x_{i2}, \ldots, x_{iT}$, it is required that the i observed value meets the strict exogeneity assumption, i.e. $E[\varepsilon_{it}|x_{i1}, x_{i2}, \ldots, x_{iT}] = 0$. That is to say, the disturbance terms are not correlated with the explanatory variable of each stage.

b. Random effect model

It is assumed that in the random effect model individual effect is not correlated with explanatory variable, therefore the OLS estimation is consistent. However, the disturbance term is composed of $\alpha_i + \varepsilon_{it}$ but not spherical disturbance, so OLS estimation is not among the most efficient ones. It is further assumed that the disturbance terms of different individuals don't correlate with each other and the correlation among the disturbance terms of the same individual over different stages won't change with time-space. Therefore, the estimated results of OLS or fixed effect are consistent but not the most effective. The common method is to estimate the residual error of random effect model through OLS and then to estimate the original model with FGLS so as to obtain $\hat{\beta}_{RE}$, the random effect estimator of panel data model.

c. Hausman test: FE vs. RE

Which to select, fixed effect model or random effect model, when processing the panel data, is a fundamental problem. Therefore, it is required to test the original hypothesis "H_0: α_i is not correlated with X_{it}" (the random effect model is the correct one). Of course, no matter whether the original hypothesis is tenable or not, the fixed effect model is always consistent. If the original hypothesis is tenable, the random effect will be more effective than fixed effect; but if the original hypothesis is not tenable, the random effect will be inconsistent. Hausman (1978) has proposed the classical Hausman test estimator to test the fixed effect and random effect:

$$\left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right)' \left[Var(\hat{\beta}_{FE}) - Var(\hat{\beta}_{RE})\right]\left(\hat{\beta}_{FE} - \hat{\beta}_{RE}\right) \to \chi^2(K) \tag{3.6}$$

The critical value for the distribution could be worked out based on $\chi^2(K)$. If Hausman test estimator is higher than the critical value, the original hypothesis H_0 will be refutable, that is

to say, the random effect mode is not correct. If Hausman test estimator is lower than the critical value, the original hypothesis H$_0$ is acceptable, that is to say, $\hat{\beta}_{RE}$, the random effect estimator is the most effective of all. However, if heteroscedasticity exists in disturbance terms, $\hat{\beta}_{RE}$ won't be the most effective estimator. Therefore, the regression results of the article are mainly based on the fixed effect.

In addition, there are two dimensions in a panel, N and T. This chapter and Chapter 4 adopt the panel including the data of 30 provinces other than Tibet Autonomous Region during 2003 to 2011 for econometric analysis. Where, N is 30, and T is 9. When T is greater than N, the heterogeneous regression model is adopted for the macro panel data, that is, one individual corresponds to one regression coefficient. Therefore, the fixed effect and random effect estimation of the panel data model are not suitable. Given the time series correlation in the explanatory variable, it is necessary to study the panel data model using the time series method. On the other hand, for the panel data model where N is greater than T, Baltagi (2005) held that there is no time series problem in variables, and the fixed effect of panel data can be used to obtain consistency of parameter estimation. Consistent with the measurement method of N greater than T, Li and Chand (2013) used the panel data of 29 provinces in China from 1998 to 2009 to study the impact of market fundamentals on house prices, and directly estimated the fixed effect model and random effect model of panel data without studying characteristics of time series. This method is also adopted in the measurement of this chapter and Chapter 4.

3.4.2 Model specification

This chapter makes an empirical analysis of the effect of entrepreneurs' confidence upon house prices by making use of the provincial-level panel data model and tries to prevent the endogenous issue arising from missing variables by bringing unobservable heterogeneity among the individuals of different provinces under control. The detailed measurement model is given as follows:

$$lnprice_{it} = \beta_0 + \beta_1 lnindex_{it} + \gamma X_{it} + year2008 + \alpha_i + \varepsilon_{it} \qquad (3.7)$$

Where, the subscripts i and t denote province and year respectively and explained variable *lnprice* refers to the logarithm of provincial house price; *lnindex* denotes the logarithm of Entrepreneur Confidence Index of each province and it is also the core explanatory variable of

this chapter. Since Entrepreneur Confidence Index is released quarterly, the median of four quarters' Entrepreneur Confidence Indices are used to measure the entrepreneurs' confidence of the year. X represents the control variable set. The papers of Li and Chand (2013) and Wang et al. (2014) about the fundamentals of China's house price are main references for the setting. It includes GDP per capita, house construction cost, land price, urbanization level, FDI proportion, interest rate of more than five-year loan and proportion of unmarried population. The detailed definition of the variables is shown in Table 3.1. *Year2008* refers to the dummy variable of the year. The years earlier than 2008 are set to 0 while the years later than 2008 are set to 1 with the aim to bring the effect of government bailout during the financial crisis of 2008 under control. α_i refers to the unobservable individual effect of province and ε_{it} denotes the disturbance term.

3.4.3   Definition of variables

This chapter selects house price as the explained variable and Entrepreneur Confidence Index as the explanatory variable. Section 3.3 of this chapter has explained the construction methods for the core explaining variables and the explained variables. In order to prevent the endogenous problem arising from missing variables, this chapter selects the following variables as the control variables. The detailed definition is given as follows:

(1) **Land price** (*land cost*): Land acquisition cost refers to the expenses that housing development enterprises have to pay in order to obtain the use right of land by different means. The land acquisition cost falls into three types. Firstly, it is composed of the compensation for the land, the compensation for the attachments to or green crops on the land, settlement allowances, the management fee for land acquisition and many others that shall be paid if the land use right is obtained by way of land allocation; secondly, it is composed of the fees for assignment that are paid in case that the land use right is obtained through land transfer; thirdly, it consists of the funds that are paid in order to get the land use right through "land auction". The funds paid in order to get the land use right by way of land allocation and land auction will be included into the newly increased fixed assets while the transfer fees that are paid in order to get the use right of land by way of land transfer won't be included into the newly increased fixed assets. The land acquisition cost will be included into the investments on the basis of the actual amount of the period. In case of payment by installment, the land acquisition cost shall be included into the investments for housing development by stages. The land acquisition area of the year refers to the

land area of which the use right is obtained by different means (excluding land appropriation) in the current year. The variable will be adjusted according to Consumer Price Index (CPI) of different regions and converted into the value of the year 2003. (2) **House construction cost** (*construct*): The construction cost is measured by the construction cost of commercial building upon completion. The variable is also adjusted according to CPI of different regions and the year of 2003 is taken as the benchmark. (3) **GDP per capita** (*gdp_pop*): This chapter will use GDP per capital of each province to control the economic development level of the region. The GDP per capita will be deflated according to GNP index of each province and converted to the value of the year 2003. (4) **Foreign investment proportion** (*fi*): It refers to the proportion of the foreign investments in capital source of the housing enterprises in each province for the current year. The capital source of the year refers to the monetary funds that real estate enterprises (units) have actually invested for the purpose of housing development, including domestic loans, foreign investment, self-raised funds and other funds. Foreign investment refers to the offshore funds (including foreign countries and Hong Kong, Macao and Taiwan regions) that are obtained within the reporting period for the purpose of housing development and operation, including foreign direct investment, foreign loans (loans from foreign government, loans from international financial organizations, export credit, commercial loans from foreign banks, bonds and shares issued to foreign countries) and other foreign investments (including foreign businessmen's payment for equipment during compensation trade and processing assembly, international lease). It excludes the own foreign exchange funds (including state foreign exchange, local foreign exchange, retained foreign exchange, swap exchange, the foreign exchange loans issued by Chinese banks based on their own funds and many others) of China. (5) **Loan rate** (*interest*): The more-than five-year loan rate released by the People's Bank of China will be adopted as the loan rate for the housing market in this chapter. (6) **Urbanization level** (*urban*): the urbanization level of a region is measured by the proportion of urban population in the total population of the region and this indicator could reflect the change of urban-rural dual economic structure (Gong, 2012). (7) **Proportion of unmarried population** (*unmarried*): It refers to Ratio of unmarried female to unmarried male. The definition of major variables is shown in Table 3.1.

Table 3.1: Definition of variables

Variables	denote	Definition
House price	*Price*	House price (Yuan per square meter) on the basis of the year 2003
Entrepreneur Confidence Index	*Index*	Entrepreneur Confidence Index (totaled up based on quarterly data)
Land price	*land_cost*	Land acquisition cost of the year/Land acquisition area of the year (Yuan per square meter)
House construction cost	*construct*	Construction cost of residential commodity house upon completion (Yuan per square meter)
GDP per capita	*gdp_pop*	On the basis of the year 2003 (Yuan per capita)
Foreign investment proportion	*Fi*	Proportion of foreign investment in housing funds (%)
Loan rate	*interest*	More than five-year loan interest rate (%)
Urbanization level	*Urban*	Proportion of urban population in total population (%)
Proportion of unmarried population	*unmarried*	Ratio of unmarried female to unmarried male

Note: the data of the article comes from "*China Housing Statistics Yearbook 2003-2011*", "*China Statistics Yearbook 2004-2012*" and the website of the People's Bank of China. The samples contain the data of 30 provinces other than Tibet Autonomous Region during 2003 to 2011.

The descriptive statistics of all variables are shown in Table 3.2.

Table 3.2: Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
price	270	2970.70	2139.87	964.00	15274.68
land_cost	270	1330.51	2107.39	163.58	21643.43
construct	270	1441.54	515.41	740.10	3892.49
index	270	129.84	8.80	103.65	156.90
gdp_pop	270	13589.6	8494.75	3603	48429.95
fi（%）	270	0.83	1.43	0.00	18.45
interest（%）	270	6.14	0.62	5.40	7.26
urban（%）	270	47.75	14.86	20.48	89.30
unmarried	270	0.72	0.09	0.53	1.20
first difference					
price_fd	240	298.51	504.27	-2187.25	3768.90
land_cost_fd	240	198.16	1161.73	-9450.59	8237.23
construct_fd	240	85.87	175.69	-845.34	882.41
index_fd	240	0.67	9.99	-30.70	23.00
gdp_pop_fd	240	406.76	914.50	-7968.95	6792.66
fi_fd	240	-0.03	1.83	-17.95	17.20
interest_fd	240	0.18	0.64	-1.32	0.90
urban_fd	240	1.53	2.58	-15.80	16.85
unmarried_fd	240	0.0036	0.09	-0.35	0.49

Note: the data of the article comes from "*China Housing Statistics Yearbook 2003-2011*", "*China Statistics Yearbook 2004-2012*" and the website of the People's Bank of China. The samples contain the data of 30 provinces other than Tibet Autonomous Region during 2003 to 2011.

3.4.4   Analysis of correlation among variables

This chapter adopts Spearman correlation coefficient to identify the correlation among variables. The method has no special requirements on distribution of primitive variables and it is a non-parametric statistics method. Spearman rank correlation coefficient is also called rank correlation coefficient. The estimation coefficient is between -1 and 1. As shown in Table 3.3, the house price is positively correlated with Entrepreneur Confidence Index. Land price, construction cost, and urbanization level are also the major factors affecting house prices. Additionally, the coefficient of correlation between Entrepreneur Confidence Index and other control variables is lower than 0.3, indicating that no multicollinearity exists between Entrepreneur Confidence Index and other control variables.

Table 3.3: Spearman correlation coefficient matrix of variables

	lnprice	*lnland*	*Lnconst-ruct*	*lnindex*	*lngdp_pop*	*lnfi*	*lninterest*	*lnurban*	*Lnun-married*
lnprice	1								
lnland_cost	0.8075*	1							
lnconstruct	0.8687*	0.7150*	1						
lnindex	0.1908*	0.1109	0.1855*	1					
lngdp_pop	0.7345*	0.5714*	0.6658*	0.2922*	1				
lnfi	0.1553*	0.0716	0.1091	0.0208	0.1760*	1			
lninterest	0.4093*	0.4241*	0.3385*	0.1710*	0.2163*	0.0898	1		
lnurban	0.7478*	0.5807*	0.6777*	0.2722*	0.8735*	0.1594*	0.2457*	1	
lnunmarried	0.3476*	0.2726*	0.3399*	0.1753*	0.6002*	0.0748	0.0847	0.5101*	1

Note: (ln) refers to the logarithm of the variable, * means significance level is 5%;

However, it may lead to multicollinearity due to the higher correlation coefficients among multiple variables in the Table 3.3. In section 3.4.5 of this chapter, the estimated results of the core explanatory variable are reported first. As shown in Columns (1) and (2) of Table 3.4, the main variables are significant at least at the level of 5%. Then, other control variables are added, as shown in Columns (3) and (4) of Table 3.4. In order to investigate the possible existence of multicollinearity, Table 3.4 further reports the Variance Inflation Factor (VIF) of fixed effect estimation. VIF in Column (1) of Table 3.4 is 5.42, and that is 9.87 in Column (3) of Table 3.4. Usually, VIF less than 10 indicates that there is no multicollinearity in the measurement model.

3.4.5　General regression results

Usually, in the Ordinary Least Squares regression (OLS), and α_i are ε_{it} regarded as the disturbing terms of the model. We cannot control all the variables that influence Entrepreneur Confidence Index and the house price due to the limitation of data. However, there are differences in geographic features and institutional environment in various provinces of China, the missing variables that do not change with time may exist. Therefore, the regression results of OLS may be inconsistent. The measurement model using panel data can control individual heterogeneity of different provinces. In this way, the endogenous problems led by the missing variables can be solved. According to the relation between α_i and explanatory variables, the fixed effect model (fixed effect, FE) and the random effect model (random effect, RE) can be used respectively. If α_i is not related to the other explanatory variables in the model, the random effect model is more effective than the fixed effect model relatively; whether α_i is related to the other explanatory variables in the model or not, the estimated result of the fixed effect model is always consistent.

As shown in Table 3.4, we report the estimate results of the fixed and random effects of the panel data model respectively. The house prices are positively correlated with Entrepreneur Confidence Index, and when Entrepreneur Confidence Index is increased by one percentage point, the house prices are in the change range of 0.27% to 0.38%, indicating that the entrepreneur's current and expected confidence in the economic situation will affect the house prices.   The land acquisition prices and the housing construction costs are the major cost factors affecting the house prices, in accordance with the conclusion of Li and Chand (2013) and Wang et al. (2014), and their elasticity coefficients affecting the house prices are 0.12% and 0.46% respectively. The improvement of the urbanization also pushes up the house prices through increasing housing demands. When the proportion of the urban population increases by one percentage point, the house prices is correspondingly up 0.3%, which is in accordance with the conclusion of Chen et al. (2011). The influence of foreign investment and interest rate of five years is not significant on the demand of housing. The influence of the GDP per capita on the house price is significant when the control variables are fewer, and detailed analysis will be made in the follow-up by regions. Besides, adding the dummy variables in 2008 indicates that the house price was significantly raised after the financial crisis, which may be related to the investment of RMB 4

trillion Yuan from the government, and a large amount of money flowed into the housing market.

It is notable that the unmarried population and estimated coefficient of house price are positive but not significant, and the conclusion is highly different from the conclusion of Li and Chand (2013). In the paper, Li and Chand takes impending marriage rate as the main variables to put in the panel data to estimate the influence on the house price, and the conclusion is significant. The differences of the conclusion of this chapter and the conclusion of Li and Chand are caused by the different parameters of the measurement impending marriage. In this chapter, the parameter is defined as the ratio of unmarried female to unmarried male, where Li and Chand define impending marriage as the population between 24 and 29 years old divided by total urban population, and with the situation that the average age at marriage all across the country is 25 years old mentioned in the paper, the population between 24 and 29 years old must contain a large number of married persons.

We report the test statistics of whether there is individual heterogeneity or not at the same time. The F test of the fixed effect model and the Breusch and Pagan LM test (Breusch and Pagan, 1979) of the random effect model refutes the original assumption of inexistence of individual effect in the 1% significance level, which also indicates that the estimated results of OLS is inconsistent. The test result of Hausman is 17.73, which refutes the original assumption of "α_i is not related to the other explanatory variables of the model" in the 5% significance level. As for the inaccurate of random effect model, the fixed effect model should be adopted.

Table 3.4: Entrepreneur Confidence Index and house prices (explained variable: *lnprice*)

Variables	(1) FE	(2) RE	(3) FE	(4) RE
lnindex	0.3766**	0.2263	0.2684*	0.0484
	(0.1809)	(0.1682)	(0.1589)	(0.1508)
lngdp_pop	0.3047**	0.4203***	-0.0283	0.1888***
	(0.1293)	(0.0673)	(0.1104)	(0.0668)
lnconstruct	0.7167***	0.7352***	0.4613***	0.4779***
	(0.0827)	(0.0763)	(0.0710)	(0.0663)
lnland_cost			0.1243***	0.1524***
			(0.0215)	(0.0201)
lnfi			-0.0054	-0.0042
			(0.0068)	(0.0069)
lnurban			0.2954***	0.3298***
			(0.0969)	(0.0897)
lnunmarried			0.1208	0.0791
			(0.0884)	(0.0885)
lninterest			-0.0438	-0.0170
			(0.0984)	(0.1001)
year2008	0.1876***	0.1590***	0.1171***	0.0563**
	(0.0323)	(0.0270)	(0.0304)	(0.0261)
constant	-2.1106**	-2.5838***	0.8768	-0.3350
	(1.0638)	(0.8484)	(0.9571)	(0.7543)
Province Fixed Effecy	Yes	Yes	Yes	Yes
F-test	13.03***		14.08***	
Breusch and Pagan LM test		308.85***		285.27***
Observations	270	270	270	270
R-squared	0.7598		0.8569	
Variance inflation factor	5.42		9.87	

Note：*significance level is 10%；**significance level is 5%；***significance level is 1%. FE: fixed effect panel data model; RE: random effect panel data model.

3.5 Robustness check and additional analysis

3.5.1 Endogenous test of missing variables

In this chapter, the panel data model is used to avoid the endogenous problems caused by missing variables through controlling the individual heterogeneity of different provinces and the fixed effect of year. The panel data model cannot control some of the unobservable variables that change over time, and these variables may be related to Entrepreneur Confidence Index and also

affect the house prices. In view of this, we build the instrumental variable of Entrepreneur Confidence Index to test endogeneity.

For panel data model, the lagged variable of the endogenous explanatory variable is often adopted as an instrumental variable. However, Entrepreneur Confidence Index is the prosperity index prepared based on entrepreneurs' views (specifically divided into optimistic, pessimistic and so-so) on the current and future prosperity of the industry in which the enterprise is located. Given the differences in the samples of entrepreneurs in each interview or indexes compiled, it may not be appropriate to use the first lag of Entrepreneur Confidence Index as the instrumental variable. This paper uses Lewbel's (1997) method for reference to construct the instrumental variable of Entrepreneur Confidence Index to test endogeneity. If no suitable IV can be found or the first lag of the explanatory variable is not suitable for IV, Lewbel (1997) provided a method to construct instrumental variable, which takes the third power of the differences between the sample observations and their mean values as the instrumental variable. Although such instrumental variable is not obvious in the economic sense, it has good adaptability to the endogenous test of the explanatory variable and the measurement errors that may exist in the explanatory variable. Besides, another advantage of this method is that it can build an effective tool variable without using external factors. The details are as follows:

$$index\_iv_{it} = (index_{it} - \overline{index_i})^3 \tag{3.8}$$

$\overline{index_i}$ represents the average of i provincial Entrepreneur Confidence Index.

The regression results for the instrumental variables of Entrepreneur Confidence Index are as shown in the table 3.5, and we report the estimate results of the first and second phases of the Two-stage Least Squares regression (2SLS) respectively. In the regression results of the first stage, the F statistic is 43.87. Determining the correlation between the instrumental variable and the endogenous variable can guarantee the reasonable progress of the two-stage least squares estimation. The statistical value should usually be greater than 10, indicating the selected instrumental variable is reasonable. In the regression results of the second phase, the Durbin-Wu-Hausman test statistic is 0.9093, with a corresponding p-value of 0.3425, which could not reject the original hypothesis of exogenous explanatory variables. The estimated 2SLS results of the instrumental variable show that Entrepreneur Confidence Index is positively but not significantly correlated with the house prices, because although the 2SLS estimates are always

consistent, they are not the most effective, i.e. 2SLS estimates lead to significant horizontal distortions, that is, in the absence of endogenous explanatory variables, the fixed effect of the panel data model is most effective. The regression and endogeneity test results of Entrepreneur Confidence Index show that the impact of entrepreneurs' confidence on the house prices does not have the endogeneity of missing variables, that is, Entrepreneur Confidence Index independently affects the house prices.

Table 3.5: 2SLS estimation of instrumental variable of Entrepreneur Confidence Index

Variables	(1) 2SLS-1st Lnindex	(2) 2SLS-2nd lnprice
lnindex		0.2450
		(0.5332)
lnindex_iv	0.0070***	
	(0.0004)	
lnrgdp_pop	-0.0067	-0.0017
	(0.0165)	(0.1411)
lnconstruct	0.0091	0.5282***
	(0.0102)	(0.0880)
lnland_cost	-0.0006	0.1268***
	(0.0030)	(0.0261)
lnfi	0.0011	-0.0154*
	(0.0011)	(0.0093)
lnurban	-0.0006	0.6349***
	(0.0136)	(0.1168)
lnunmarried	-0.0065	0.2254**
	(0.0132)	(0.1146)
lninterest	0.0502***	0.3913***
	(0.0132)	(0.1211)
year2008	-0.0066	0.0549
	(0.0041)	(0.0364)
constant	4.8410***	0.6929
	(0.1552)	(2.6283)
Province Fixed Effecy	Yes	Yes
Durbin-Wu-Hausman test		0.9093
F test	43.87	
R-squared	0.9402	0.9513

Note: *significance level is 10%; **significance level is 5%; ***significance level is 1%. 2SLS: two-stage least squares of instrumental variables regression, 2SLS-1st is to regress the endogenous variable of Entrepreneur Confidence Index, while 2SLS-2nd is to use the estimated Entrepreneur Confidence Index (with endogeneity having been removed) as an explanatory variable for regression with house prices.

3.5.2 Analysis by regions

Liang and Gao (2007) have divided China's 29 provinces into three regions by per capita GDP, among which the region with per capita GDP of more than RMB 20,000 is the eastern region, between RMB 12,000 to 20,000 is the middle region, and below RMB 12,000 is the western region. Based on this division method and geographic distribution, we made some slight adjustments of the regions that several provinces belong to. The dividing regions of each province are as follows (see map of China[6] below). Eastern region contains 11 provinces and cities. They are Beijing, Fujian, Guangdong, Hebei, Hainan, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin and Zhejiang. Western region includes 11 provinces which consist of Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang. Anhui, Hubei, Heilongjiang, Henan, Hunan, Jilin, Jiangxi and Shanxi provinces constitute the middle region. Generally speaking, the house price distribution of Chinese provinces presents great differences: the eastern region's is higher than the middle and western regions'. Therefore, this chapter will further analyze the influences that entrepreneurs' confidence on house prices based on divided regions.

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[6] Sourced from www.59edu.com.

We make estimation with fixed effect model in the regression analysis of divided regions. As shown in Table 3.6, Entrepreneur Confidence Index significantly influences house prices in the eastern and middle regions, When Entrepreneur Confidence Index increases by one percentage point in both eastern and middle regions of China, the corresponding house price increases by 0.65 and 0.68 percentage points respectively, while the influence is not so significant in the western region. This indicates that influences of entrepreneurs' confidence on house prices will be constrained by local economic development levels. Entrepreneurs' confidence will have a more significant influence on house prices with a higher economic development level and faster market process.

Besides, per capita GDP is the main factor that influences the house prices of the middle and western regions, but its impact on the eastern region is not remarkable, conforming to the conclusion of Li and Chand (2013). Li and Chand (2013) deemed the possible reason for this was that eastern region's developed economy, large numbers of population migration and the relatively deficient land resources made supply factors like lands and construction costs play a more important role in the formation of house prices, whereas the influence of demand factors like per capita incomes was relatively weakened. This analysis is markedly different in comparison with the mentioned reason when Wang et al. (2014) explained why the explanatory ability of fundamentals for house prices is weaker in eastern cities, which (with a non-empirical analysis) held that inelastic urban housing supply would lead to the increase of the influence on housing premiums caused by the growth of population and income. This chapter holds that costs influence house prices significantly in the eastern region, and meanwhile, investment expectation also plays a part that cannot be neglected in developed regions. The high return expectation of asset investments will hasten more investment demands or produce more potential risks. For example, Wu et al. (2012) estimated that after experiencing the boom from 2007 to 2010, *"even modest declines in expected appreciation would lead to large price decline of over 40% in market such as Beijing, absent offsetting rent increase or other countervailing factors" (p531)*.

There are two channels may provide further evidence for the judgment that the more developed market may be accompanied by a more intensive psychological impact. One piece of evidence is from stock market. By studied six stock markets: Canada, France, Germany, Japan, the United Kingdom, and the United States, Baker et al. (2012) noted that United States' total

sentiment index *"receives the highest loading in the global index"* because it is *"widely considered the world's bellwether market" (p278)*. Another piece of evidence comes from the volatility of China's market house prices, which are important indicators of market sentiment. As shown in Figure 3.2, volatile degree is basically in accordance with the level of development, namely more developed province endured more severe fluctuation. There is only one exception province, Hainan, which is a relatively low developed eastern province but suffered number 4 volatility in the Figure. That is because Hainan is a famous tourist destination, and there are lots of property purchases for investment purposes. Investments are more likely to be affected by sentiment.

Table 3.6: Regression results of divided regions (explained variable: *lnprice*)

Variables	Eastern FE	Western FE	Middle FE
lnindex	0.6497**	-0.0577	0.6834***
	(0.2918)	(0.2408)	(0.2164)
lnrgdp_pop	0.2262	0.4464**	0.5002**
	(0.2100)	(0.1862)	(0.1981)
lnconstruct	0.3297***	0.4243***	0.6103***
	(0.1226)	(0.1100)	(0.1070)
lnland_cost	0.1082***	0.0524*	0.0513
	(0.0380)	(0.0294)	(0.0501)
lnfi	-0.0326*	0.0028	-0.0066
	(0.0182)	(0.0082)	(0.0083)
lnurban	-0.1777	0.6923***	0.0022
	(0.1641)	(0.1661)	(0.1688)
lnunmarried	0.1478	0.1068	-0.0689
	(0.1445)	(0.1293)	(0.1378)
lninterest	-0.1638	0.0007	-0.1499
	(0.1853)	(0.1435)	(0.1217)
year2008	0.2355***	-0.0224	0.0923**
	(0.0575)	(0.0450)	(0.0389)
constant	-0.3811	-2.4994*	-4.5945**
	(2.1273)	(1.4209)	(1.7568)
Province Fixed Effecy	Yes	Yes	Yes
F-test	11.80***	8.78***	6.41***
Observations	99	99	72
R-squared	0.8822	0.8838	0.9426

Note：*significance level is 10%；**significance level is 5%；***significance level is 1%. FE: fixed effect panel data model.

The dummy variable of 2008 was also a factor that had significantly affected house prices of the eastern and middle regions, while the influence on the western region was not that striking, the reason for which might be that the eastern and middle regions were most affected by financial crisis and the government bailout was focused on the eastern and middle regions.

3.5.3 The lagged effects of entrepreneurs' confidence

In this chapter, the impact of the lagged Entrepreneur Confidence Index on the house prices is considered in the empirical analysis. According to the definition of Entrepreneur Confidence Index, it is a prosperity index determined based on the entrepreneurs' views (i.e. optimistic, so-so and pessimistic) on the prosperity situation of their own enterprises and macro-economy in the current and next periods. The volatility of house prices or the rapid development of the real estate industry also affects Entrepreneur Confidence Index, that is, there may be a mutually-causal simultaneity bias, and the addition of the lagged item of entrepreneurs' confidence can avoid the problem of inconsistencies in the estimation results caused by the simultaneity bias. In addition, the structure of Entrepreneur Confidence Index includes Spot Confidence Index and Expected Confidence Index. The addition of the lagged item can capture the impact of the entrepreneurs' expectations on the house prices.

We regard the lag phase of Entrepreneur Confidence Index as explanatory variable to add into regression model. The first lag means the effects of t-1th Entrepreneur Confidence Index on the *t*th house price of every province. The second lag means the effects of *t-2*th Entrepreneur Confidence Index on the *t*th house price of every province and by parity of reasoning. Table 3.7 indicates the effects of lagged Entrepreneur Confidence Index on house prices, adopting estimating method of Fixed Effect.

The first column of Table 3.7 means the effects of the first lag of Entrepreneur Confidence Index on house prices. Their regression coefficients are positive correlation at a 1% significance level, that is, if Entrepreneur Confidence Index of the first lag increases by 1%, current house price will increase by 0.51%, and the effect of Entrepreneur Confidence Index for the second lag on house price is 0.56%. From the estimation results, the confidence indices of the first and second lag have the greatest influence on the house prices in their respective explanatory variable setting. The effects of Entrepreneur Confidence Index of the third and fourth lag on

house price are not significant. Maybe entrepreneurs make future economy anticipation according to current economy situation, so their investment decision will alter with the change of economic situation and the entrepreneurs' evaluation for future economic situation is not accurate.

Table 3.7: the lagged effect of entrepreneurs' confidence（explained variable：*lnprice*）

	（1）	（2）	（3）	（4）
Variables	The first lag	The second lag	The third lag	The fourth lag
L1.lnindex	0.5111***			
	(0.1639)			
L2.lnindex		0.5618***		
		(0.1600)		
L3.lnindex			-0.1814	
			(0.1890)	
L4.lnindex				0.0436
				(0.2323)
lnrgdp_pop	-0.0351	-0.0871	0.0655	0.2431
	(0.1200)	(0.1741)	(0.1891)	(0.2155)
lnconstruct	0.4604***	0.4817***	0.4524***	0.3919***
	(0.0709)	(0.0749)	(0.0849)	(0.0904)
lnland_cost	0.1508***	0.1301***	0.1209***	0.0543*
	(0.0240)	(0.0233)	(0.0242)	(0.0319)
lnfi	-0.0111*	-0.0159**	-0.0192***	-0.0129*
	(0.0066)	(0.0064)	(0.0065)	(0.0074)
lnurban	0.1491	0.4798	0.9110***	1.0211**
	(0.1167)	(0.2971)	(0.3361)	(0.3906)
lnunmarried	0.0727	0.0094	-0.0169	0.0283
	(0.0850)	(0.0819)	(0.0814)	(0.0792)
lninterest	-0.0933	-0.0948	-0.1114	-0.2977***
	(0.0934)	(0.0860)	(0.0967)	(0.1085)
year2008	0.1273***	0.1130***	0.0277	-0.0093
	(0.0312)	(0.0308)	(0.0232)	(0.0240)
constant	0.4407	-0.1837	0.8051	-1.3178
	(0.9817)	(1.0500)	(1.3882)	(1.2743)
Province Fixed Effecy	Yes	Yes	Yes	Yes
Observations	240	210	180	150
R-squared	0.8484	0.8273	0.7973	0.7666
Number of pid	30	30	30	30

Note：*significance level is 10%；**significance level is 5%；***significance level is 1%. FE: fixed effect panel data model. "Number of pid" refers number of provinces.

3.6 Conclusion

This chapter analyzes the effects of sentiment on house price from entrepreneurs' confidence, made use of house price data of every province in China during 2003-2011. It brings Entrepreneur Confidence Index as explanatory variable on the basis of controlling variable set, and makes an empirical analysis of their influencing mechanism. The ordinal house price of every province in China is that the eastern region is at the highest price, then the middle region and the western region at its lowest, which is consistent with economic development and marketization degree of every region, in which Beijing, Shanghai, Guangdong are the three cities at the highest increasing rate of house prices. Utilizing panel data fixed effect model of 30 provinces in China, we find out that there is a remarkable positive correlation between Entrepreneur Confidence Index and provincial house prices. The regression results of regions indicate there is a positive correlation between Entrepreneur Confidence Index of the eastern and middle regions and house prices, but the effect of Entrepreneur Confidence Index on the western region is not remarkable. Additionally, Entrepreneur Confidence Index has lag effect on house prices.

From the results of empirical estimation by adopting panel data, we find out the effects of the land price at the level of the whole nation, construction costs, and urbanization on house prices are significant in control variables. And the dummy variable in 2008 indicates the house price has a remarkable increase after financial crisis, which may be related to 4 trillion investment of the government, plenty of funds of which flow into the housing market, significantly increasing the prices of land and housing properties. At the level of regions, per capita GDP affects much on house price in the middle and western regions. But it is not remarkable in the eastern region. In general, empirical results of control variables are consistent with the conclusion of Li and Chand (2013) and Wang et al. (2014) on fundamentals concerning China house prices.

After controlling the news-forged influences (Barsky and Sims, 2012) based on the literatures, we infer that the rest direct effect from Entrepreneur Confidence Index, by and large, is to influence house prices by influencing the psychology of social investments. Shiller (2005) has summarized the effect of group psychology on market fluctuations and listed causes including the influence of authority, herd behavior, information cascade and tale spreading

surpasses theoretical analysis, etc. As the social and economic elites, entrepreneurs are identified as the opinion leaders by the public in most cases. As a result, their comments or behaviors to purchase or undersell houses will make a great difference to the public's demand psychology through the effects above. Circle marketing (marketing by using social organizations such as the chamber of commerce) which is the comparatively important strategy in Chinese marketing of housing is one of the typical embodiments of these effects. According to Akerlof and Shiller (2009), there are optimistic or pessimistic expectations in the public, and these psychological expectations lead to investor's behavior bias. The empirical results of this chapter show that the accuracy of prediction or regulation of house prices will undoubtedly improve if we give weighs to such sentiment (confidence) indices.

In addition, Li and Chand (2013) indicate that *"the level of house prices is likely to be associated with the local economic status… surprisingly, the positive relationship between local economic status and house price remains after we control for local GDP (income) in our model suggesting that there is a location premium over and above the simple income variation" (p152)*, similarly, Wang et al. (2014) also found *"in several coastal cities, the actual increase in house prices deviates largely from what can be predicted from fundamental changes" (p53)*. But all of their interpretations are not convincing. The conclusion demonstrated according to different regions in this chapter may provide one feasible interpretation. Through the conclusion demonstrated according to different regions, a positive correlation is found between the influence of Entrepreneur Confidence Index on house prices and local economic status as well as marketization degree: a freer market environment and a more developed economy may accompany with more extensive psychological impacts. The possible reasons are: first, a freer market environment means less government control, thus investors and customers are able to make decisions more freely according to market information, and their decision-making process is thus easier to be affected by psychological factors; second, a more developed economy means that the motivation to make money by investment occupies a larger proportion in the purpose of market transaction, as a consequence, purchasing houses for making money is easier to be influenced by psychological factors than the rigid demand for purchasing houses; third, a more developed and freer market mean richer market information and more complicated trade products, the cognition mechanism of human to make the complicated simple and direct thereby make the

decision-making process (Shiller, 2005) more susceptible to psychological factors.

The follow-up study of this chapter includes at least the following two directions. First, it is useful to extend the work by investigating the impact of entrepreneurs' confidence on the housing market fluctuation as well as its price dynamics. Second, based on the study of this chapter, the relationship and mechanism between the degree of marketization and the degree of psychological impact should be further studied to build a more accurate housing market sentiment index, so as to provide a theoretical basis for the macroeconomic regulation and control policies for the real estate markets of different marketization degrees.

Chapter 4

Impact of Promotion Expectations of Local Officials on Housing Market under Fiscal Decentralization

4.1 Introduction

Zhuravskaya (2000) considers that the rapid economic growth of China in 1980s and 1990s comes from strong motivation generated from local fiscal decentralization on the promotion of local officials. This chapter discusses the impact of promotion expectations of local officials under the fiscal decentralization mechanism on the land price as well as house prices from the perspective of behavioral science by adopting empirical methods.

China's fiscal decentralization is an important constituent of the marketization mechanism reform; however, it is significantly different from the fiscal decentralization of other countries. Firstly, China's fiscal system is decentralized, while China's administrative system is top-down authorization system. It can be described as a multidivisional-form hierarchy structure in which the central government exerts great influence on the local administration (Maskin, Qian and Xu, 2000). For example, the power of the provincial government is not based on election (although it is so in form), but based on the appointment of the central government. Secondly, the existence of the *Hukou* System (although the system is weakened in recent years) limits the movement of population between different provinces (in this case, the movement refers to the transfer of work and its related tax and social security relations). In fiscal federalism theory (Besley and Case, 1995), decentralization is supposed to increase the efficiency of public spending by inducing competition between local officials, especially through a "vote for feet" or a "yardstick competition" created by voters.

Notwithstanding the above differences, Caldeira (2012) considers that the traditional yardstick competition theory remains valid: Chinese central government has created yardstick competition system based on performance appraisal amongst local government officials through reward or punishment, similar to which the voters do in a democratic system, so to achieve the

objective of integral development. Such "top-down" yardstick competition may even alleviate the problems generated from traditional yardstick competition, such as market segmentation.

Then, how does the central government reward and punish the local officials? What is the yardstick of competition?

Just like politicians of other countries, China's local officials, especially provincial governor-level officials in this study (officials of other levels are also similar), care about their political future very much. On the one hand, the desire for promotion comes from the great expansion of powers brought by the promotion as well as the changes associated with the prestige and welfare; on the other hand, there is "lock- in effect" existed among Chinese senior officials because of the control on senior officials by the Communist Party of China (CPC) and the central government; that is to say, unlike company managers or western politicians, it is virtually no chance for a Chinese provincial official to find an equivalent job in other places if such official breaks away from the bureaucratic system (Li and Zhou, 2005). The desire for promotion is greatly enhanced because of the superposition of these two factors.

Performance-based promotion provides a powerful motivating force for individuals to exert efforts (Milgrom and Roberts, 1992). Performance-based promotion assessment has built up a championship-type system in the organization and the reward for the winner is promotion. Moreover, it can be considered theoretically that the ex-ante probability of a promotion will induce effort, thereby leading to improved performance (Demeré et al., 2015). Therefore, the main contents of the first part of empirical tests in this chapter concerns application of promotion expectations theory to public sector which has already been used in private sector by an empirical study, which is intended to lay a solid foundation for the behavioral perspective of this chapter.

As for the yardstick of competition amongst local officials, there are two kinds of viewpoints in the traditional academia. One viewpoint is that local officials take GDP as the main subject of the competition, and take the average GDP growth rate during the tenure as the main yardstick based on which the central government assesses and promotes the cadres (Chen et al., 2005; Li and Zhou, 2005); or along with the adjustment of economic growth policies of the central government, energy productivity that can better reflect the intensive growth is taken as a basis for the assessment of local officials (Chen, Qin and Wei, 2016). Another viewpoint is that local officials competes surrounding the "image" of local economic growth, which is mainly

reflected as urban infrastructure and amenity (Han and Kung, 2015; Ding, Niu and Lichtenberg, 2014; Wu and Heerink, 2016). That is to say, local officials care more about the subject that can improve economic development "image" in short term compared with improving people's livelihood, sustainable development and other long-term economic development objectives, because such short-term projects can better accumulate capital for their promotion.

Since officials want to start "image" projects, they must care about the sources of funding. Under China's fiscal decentralization system, the investment fund in construction must be raised by the local government itself. After fiscal reform in 1994, the central government increased the revenue sharing ratio significantly in consideration of concentration of state power, thereby reducing the local fiscal revenue. Under such circumstance, Land Finance emerged at the right moment （Han and Kung, 2015; Ding, Niu and Lichtenberg, 2014;Wu and Heerink, 2016）。That is land can be leased out in the urban land market to the real estate sector and other tertiary-sector businesses for prices that far exceed those paid to farmers for expropriated land; this so-called Land Finance serves as a crucial source of local government revenue (Cao et al., 2008; Tan et al., 2011; Tao et al., 2010).

Based on the above analysis, we presume the following mechanisms: under the influences of Chinese-style fiscal decentralization system (administrative centralization and fiscal decentralization developed synchronously) and yardstick competition, higher (lower) promotion expectations of local officials make them adopt more aggressive (moderate) Land Finance method during their tenure; meanwhile, Land Finance may in turn affect the promotion expectation of local officials. In the end, the increased land prices induce the increment of house prices.

Here follows by a chart of above mechanism:
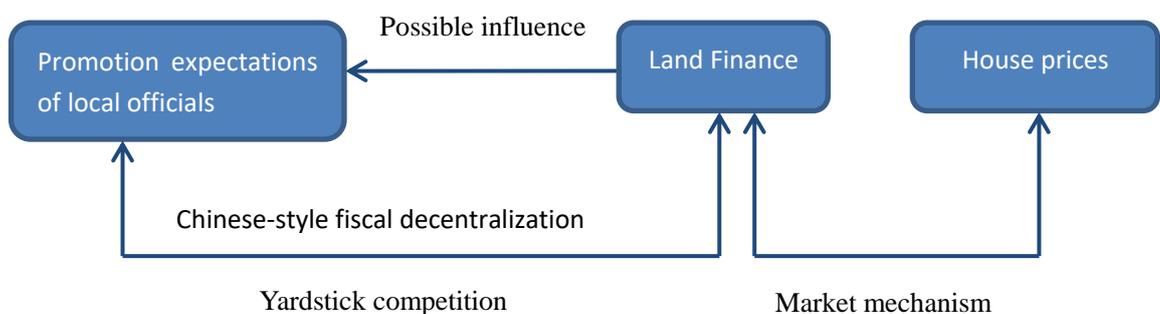
The empirical findings of this chapter confirm the influence of local officials' promotion

expectations on land prices as well as the influence of land prices on house prices; however the endogenous test applied in this chapter rejects the converse impact of land prices on local officials' promotion expectations, probably caused by the price-control policy distorted performance appraisal criteria for local officials. The reason of not significant has been discussed in the section of endogenous test.

Normally, aggressive Land Finance increases the land prices through following approaches: first, as discretionary funds of local governments, the money from land selling will be greatly spent on projects that benefit local officials' political advancements; that is to say, instead of long-term public goods like sewers, buses and libraries etc., the growth-oriented projects such as urban infrastructures and amenities attract a great mass of local public funds; second, the developments of infrastructures and amenities improve the utilizability of lands; therefore, the land prices are increased; third, in order to generate land-sale revenue equal to the investment in construction, local government officials have the motivation to push up the land prices through controlling the land supply and even manipulating the land auction process.

The main contributions of this chapter are: firstly, to the best of knowledge of the author, the literature on the promotion expectation is limited, while this chapter is one of the first attempts to introduce promotion expectations estimation into government departments, enriches the variables affecting the estimation of promotion expectations and enhances the estimation theory about promotion expectations; secondly, this chapter discusses from the special angle of the impact of promotion expectations of local officials on house prices, enriches the theory of house prices, and expands the boundary of study of impacts of subjective behavior on the housing market; thirdly, the yardstick competition model of local officials under Chinese-style fiscal decentralization system has general reference significance for countries to achieve certain economic and social development goals (such as improving environmental protection and promoting social equality, etc.).

4.2 Literature review

4.2.1 Yardstick competition

Yardstick competition is a relative performance evaluation method between local governments as a discipline device for rent-seeking politicians in the context of a developed and

democratic country (Besley and Case, 1995), which is the stimulation methods of assessing of agent performance relative to a peer group.

The original yardstick competition concept is developed by Shleifer (1985), which is a top-down process aim to address the problem of efficient cost reduction in a franchised monopoly. The idea that the performance of local governments can be evaluated by making comparisons between them was previously proposed by Salmon (1987) and formally developed by Besley and Case (1995). However, the premise that Besley and Case established for theory application is somewhat different from China's reality (Caldeira, 2012). First, Besley and Case set the premise that local government is elected or discharged by voters, whereas China's current fiscal system is largely decentralized while its governance ruling is rather a centralized system with strong top-down mandate. It means central government exerts great influence on local officials' action. In particular, the powers of provincial governors, who are the observations in this study, is not based on a system of electoral representation, but are appointed by Beijing. Second, population mobility between provinces is still limited (from the point of job-seeking and social welfare) even with the relaxation of the *Hukou* system.

Despite above-mentioned differences, Caldeira (2012) proposes a yardstick competition "from the top", that is the central government (rather than local voters) creates competition among local officials by rewarding or punishing them on the basis of relative performance in providing public service. By estimating panel data from China's 29 provinces, the author further argue that, in this context, the central government stimulates strategic interaction among local governments with similar results as voters do in a democratic regime.

4.2.2 Promotion expectation

Yardstick competition is a method of relative performance evaluation (Potter et al, 2004), and an important benefit of relative performance evaluation is that it can be used in promotion decisions within the organizational labor market (Milgrom and Roberts, 1992). Performance-based promotion provides a powerful motivating force for individuals to exert effort (Milgrom and Roberts, 1992). From a theoretical standpoint, performance-based promotion systems create a tournament-like system within the organization, in which promotion is the prize awarded to the tournament winner. Promotions provide increased monetary rewards arising from advancement within the organization, as well as recognition, prestige, and increased power

(Demeré et al., 2015).

There are theoretical reasons to expect that the ex-ante probability of a promotion will induce effort, thereby leading to improved performance (Demeré et al., 2015). A promotion provides a substantial, discontinuous, and persistent increase in compensation. While the increase in compensation may or may not reflect the marginal productivity of the employee who has been promoted, it still serves as a motivator for employees lower in the hierarchy seeking a future promotion (Lazear and Shaw, 2007).

The two primary drivers of effort in tournament models are the size of the prize and the probability of winning the prize. If the prize is not sufficiently large, individuals are not likely to choose to supply higher effort because the value of the prize is not sufficient to offset the disutility from working harder (Rosen, 1986). Similarly, to motivate performance, it is critical that the probability of winning the prize increases with increased effort (Pinder, 1998). The key issue here is that the motivational effect of a promotion tournament is a function, not only of the size of the prize (i.e., the increase in salary, along with prestige and power), but also of the agent's ex-ante assessment of the probability of winning the prize (i.e., being promoted) (Demeré et al., 2015).

Empirical study on promotion-based incentive is limited, even in the private sector; and there is no such study in the public sector to the author's knowledge. A field study by Campbell (2008) shows a positive association between individual absolute performance and market area characteristics (use as a proxy for the probability of promotion). Further on, by adopting proprietary archival and survey data from the internal audit department of a large organization, a latest research by Demeré et al. (2015) shows that while relative performance evaluation may benefit employees by reducing uncertainty in incentive compensation as predicted by theory, the incremental performance benefits derived from the use of relative performance evaluation as a promotion mechanism depend on the employee's promotion expectations. Specifically, the greater (lower) performance benefits associated with the use of relative performance evaluation when an employee's probability of promotion is greater (lower). These two empirical studies provide evidence on the effect of promotion incentives on performance as theorized in the earlier research (i.e., Lazear and Rosen 1981).

It is worth noting that the variable setting of promotion expectations of the research is not

perfect although the research of Demeré et al. (2015) is frontier. Demeré et al. (2015) pointed out that the main variables affecting the promotion are from two aspects: one aspect is the historical performance of employees; the other aspect is the hierarchical level within an organization. Better historical performance improves promotion expectations, while a higher rank reduces promotion expectations; the reason is that jobs available for promotion for an official are fewer when the official's rank is higher. We can foresee many other factors that will affect the subjective promotion expectations actually, for example: firstly. age and education level of individual officials, the older an official is, the less the promotion desire of the official is; the higher the level of education is, the easier the official is promoted; secondly, the age and service period of one's superior, the reason is that there is no post available for promotion if one's superior cannot be promoted or transferred; thirdly, the importance of one's own post and post adaptive capacity, if one's own post capacity is too simple or post adaptive capacity is too narrow, then the promotion possibility is reduced. In addition to these dominant factors, there are also more subtle factors, such as interpersonal relationships. The definition of historical performance of employee is also worth further exploration, Demeré et al. (2015) only used performance evaluation of the previous year as the historical performance variable; however, we usually consider the performance evaluation of more years.

From what discussed above, it is obvious that even with the early emergence, the empirical study concerning the influences of promotion expectations on performance induced is still under development. The mechanism of promotion expectations on governing performance has not been applied to explaining the behavior of local officials, not mention its influence on housing market.

4.2.3   Political-incentive-triggered economic development

(1) Political incentive

Based on Riker's (1964) seminal book *Federalism, Origins, Operation, Significance*, Enikolopov and Zhuravskaya (2007) pointed out that *"strong national political parties influence policies of local politicians by affecting their career expectations. The careers of politicians in local governments depend on their parties' political and financial support at the time of their reelection and on the possibility of their promotion to the national government" (p2262)*. Further on, by comparing China with Russia, they argue that china's economic miracle in 1980s and

1990s is forged by fiscal decentralization accompanied with tight control of the communist party, which means career concerns for advancement within CPC play an vital role in disciplining provincial governors in China. The communist party standing committee evaluates performance of provincial leaders and makes promotion (and dismissal) decisions on the basis of whether each of them followed growth-promoting policies (Huang, 2002; Blanchard and Shleifer, 2001).

It is worth noting a particular career status among Chinese provincial leaders (Li and Zhou, 2005). Unlike corporate managers or politicians in western country, Chinese high rank government officials have few job options outside the administrative system. If a provincial leader leaves government, it is virtually no chance to find an equivalent job. It is called by Li and Zhou "lock-in effect". The lock-in effect accompanied by the great differences in term of personal power, prestige and welfare, political advancement provides the provincial leaders with a strong incentive.

(2) Political-incentive-triggered economic development

A popular approach which emphasizes the political incentive of local officials behind China's economic miracle, namely, the central government spurs local officials to maximize a well-specified target such as GDP growth or revenue remitted to the central government by creating or inducing what is known as "yardstick competition" among local officials (Xu 2011, Han and Kung 2015).

With regard to the political turnover and economic performance, more explanation emphasizes the role of political incentives or career concerns on the part of local officials in China. According to the review, the readiness of the Chinese central government to reward and punish local officials on the basis of their economic performance motivates them to promote the local economy (Blanchard and Shleifer, 2001). The reward and punishment mechanisms are made possible within the multidivisional-form (M-form) structure of Chinese economic system, which allows yardstick competition among local officials (Qian and Xu, 1993; Maskin et al., 2000). By employing the turnover data of top provincial leaders in China between 1979 (the start year of the open policy) and 1995, Li and Zhou (2005) find that the likelihood of promotion of provincial leaders increases with as well as likelihood of termination decreases with their economic performance rise. And the study also revealed that the turnover of provincial government leaders is more sensitive to the average GDP growth rate over their tenure than to

their annual performance. One step further, using a more recent dataset, Chen, Li and Zhou (2005) reveal that the turnover of Chinese top provincial leaders is not only related to their own economic performance, but also related tightly with the performance of their immediate predecessors.

Li and Zhou's argument is modified by Chen et al. (2016), who use a longer data period from 1978-2012. There are several findings in the study. Firstly, the regression covers entire sample period suggests that average GDP growth rates have a significant impact on political promotions of provincial governors, which echoes Li and Zhou's result; Secondly, after the author chose 1990 (roughly the year that the central government determined to shift the economic development mode from resource-driven to energy efficient) as the cut-off point and divided the entire research period into two study samples, the impact of average GDP growth rate on promotion of provincial governors is significant in the first half period, but not in the second half period; thirdly, by contrast to the segmented effect of the average GDP growth rate, the effect of energy productivity on promotions of provincial governors getting stronger in the second phase. The findings, on the one hand, demonstrate that, with the shift of economic aim, the traditional yardstick—GDP has weakened its weight on the local official evaluation system; on the other hand, this change illuminates that China's top-down yardstick competition on local government officials is flexible to achieve different governing goals.

4.2.4   Fiscal decentralization and Land Finance

From behavioral perspective, some recent studies have extended the influences of political incentive on fiscal decentralization to China's land market, and then housing market.

China has become a highly decentralized economy since its fiscal reform in 1980s and 1990s (Chen et al., 2016). Many studies focus on the relation of China's fiscal decentralization and economic growth (for a review, see Xu, 2011).The major finding is that the fiscal decentralization provides local government with the power to invest in public infrastructure to cultivate their tax bases, thereby promoting economic growth (Jin, Qian and Weingast, 2005; lin and Liu, 2000; Qiao, Martinez-Vazquez and Xu, 2008).

China's fiscal decentralization system, or named as the fiscal revenue-sharing system works in the way that for each and every source of the fiscal revenue the central government stipulates a sharing rule with the provincial government (Han and Kung, 2015). After the fiscal

reform in 1994, the central government raised its tax sharing for strengthening centralization. Specially, it reassigned to itself 75% of the transaction or value-added tax, which is generated mainly from Township and Village Enterprises (TVEs) and other industrial enterprises. The tax reassignment is deemed had greatly weakened the incentive of local government in fostering of enterprises ever since (Kung and Lin, 2007; Li and Rozelle, 2003, 2004).

For the purpose of not stifle the incentive of local governments to continue with their economic development, a major statutory legislation enacted in 1998, whereby the local governments were assigned the exclusive rights over revenue generated from selling the usufruct rights of formerly arable land, also known as land conveyance (Han and Kung, 2015). Therefore, Land Finance came into being.

A standard Land Finance operating is that land can be leased out (40, 50 or 70 years based on land uses) by local government in the urban land market to the real estate sector and other tertiary-sector business for price that far exceed those paid to farmer for expropriated land (Wu and Heerink, 2016). Land Finance serve as a vital source of revenue for local governments since it has been brought into the fiscal system. Because there is normally no rigorous fiscal scrutiny on the spending of land conveyance fees as budgetary revenue are subject to (Ding, Niu and Lichtenberg, 2014), the revenues from land transfer are routinely defined as off-budget revenue.

Perhaps there is no other country like China that has such an extreme size of off-budget revenues (Ding, 2007; Eckaus, 2003). Although accurate data on off-budget incomes are not available in China, as it is true in many other countries too, anecdotal evidence suggests that the size of off-budget revenues is outstanding (Ding, 2007; Eckaus, 2003). Land revenues, which are predominately land conveyance fees generated from public land leasing in China, are the most important source for off-budget incomes in sub-national governments in China. They were equivalent to 38.9% of total fiscal revenues in sub-national governments in 2006. As intergovernmental transfers contribute 45% to total fiscal revenue on average, the ratio of land revenues to tax revenues in sub-national governments can be as high as 0.7. There are no other types of off-budget revenues that can match land revenues in terms of magnitude and significance to local governments (Ding, Niu and Lichtenberg, 2014).

Because China's land revenue is actually deemed as discretionary funds of local governments, the money will be spent on projects that benefit local officials' political

advancements. It is been argued that Chinese local officials intend to channel land revenues more toward growth-oriented infrastructure such as urban roads, more toward "image projects" such as public squares and open space, and more toward projects that help to boost public impression of local economic success on which cadre evaluation weighs heavily, instead of sewers, buses and library books which have more subtle impact on local economy (Ding, Niu and Lichtenberg, 2014). The preference of fiscal share will influence the land and house prices. The similar outcome is erected by Han and Kung (2015), who argue that through shifting bulk of the budgetary tax revenue from the local to central government, the local governments maneuver their efforts in fostering industrial growth to "urbanizing" their localities. Therefore, the authors concluded that the rocketing house prices and rapid real estate development can be partly explained by the craze for urbanization of the revenue-hungry local governments.

4.2.5   Hypothesis and empirical strategy

Under the premise of Chinese-style fiscal decentralization and the yardstick competition stimulated motivation, it is hypothesized that higher (lower) promotion expectations will induce local officials to adopt aggressive (moderate) Land Finance strategy. The aggressive Land Finance will increase the land prices, and then increase the house prices. The following parts are the demonstrations of empirical tests.

The empirical tests of this chapter includes the following main sections: firstly, modify the estimated variables based on the estimation of the promotion expectations in the private sector, and estimate the promotion expectations of governors in China by using probit model; secondly, estimate the relationship between promotion expectations, land selling prices and the prices of houses property through panel data model; finally, carry out an endogenous test based on the possible existence of common factors affecting the promotion expectations and land prices.

This chapter selects 2003-2011 annual provincial panel data of China as main focus of this research for two reasons. Firstly, in general, the economic growth policies of China to this day can be divided into three stages: the first stage is the period of 1978-1990, when the economic growth target is the pursuit of quantitative growth (Chen et al., 2016); the second stage is the period of 1991-2011, when the central government shifted its economic growth target from pursuing quantitative growth to pursuing economic efficiency, mainly manifested in energy use

efficiency and environmental protection (Chen et al., 2016); the third stage is the period from 2012 to the present, since the stimulus policy introduced in response to the international financial crisis in 2008 resulted in obvious consequences, such as severe overcapacity, asset bubbles and weak sustained economic growth, the central government expressed clearly in the economic work conference at the end of 2011 that economic growth promotion was shifted to autonomous growth orderly from policy stimulus. Secondly, the economic growth orientation is closely correlated with the governing idea of the main officials in power; for example, during their time in office (March 2003 - March 2013), General Secretary Hu Jintao and Premier Wen Jiabao emphasized the development of the central and western areas, and the eastern area should give away resources to support the development of the central and western areas, which is obviously different from the governing idea of the leading development of the eastern coastal areas put forward by Deng Xiaoping. The selection of panel data for 2003 - 2011 is the result of the combined effects of these two factors. In other words, the panel data were for the later period influenced by China's second-stage economic policy and in the continued term of office of Hu Jintao and Wen Jiabao, during which, the economic and political environment is relatively stable.

4.3 Estimation of promotion expectations of provincial governors

4.3.1 Bureaucratic system of China

China is a state with centralization of authority, and its political system roughly consists of five administration levels: the center, provinces, prefectures, counties and townships. As the center of the national politics, the Central Committee of the Communist Party of China ultimately controls the flow of government officials within the system. This highly centralized personnel control structure remains intact till today.

Provinces are the second level of the political system of China. As of today, China consists of 31 provincial administrative units including Taiwan, Hong Kong and Macao: 4 municipalities (Beijing, Shanghai, Tianjin and Chongqing), 22 provinces and 5 autonomous regions. Provincial level equals to central ministerial administrative level. Provincial party secretary is the highest provincial post, followed by the post of governors. This phenomenon of party and government dual setting exists in the political structure of every political level in China without exception. Governor, as the second commander in the party and government dual setting,

can be promoted to the post of provincial party secretary of the original province or other province or take office in the central or central ministries. The promotion referred to in this chapter means one of these positions transferred to from the post of governor.

China began its far-reaching economic reforms in 1978. Compared with the key role of the central ministries in the development planning and coordination before the reform, the role of the provinces in economic administration had been improved significantly after the reform, which had also led to a significant increase in the strategic importance of provincial leaders in the political structure (Qian and Xu, 1993; Huang, 1996). In addition, reform also vested provincial leaders with the ultimate power to allocate economic resources in each province. Their political and economic decisions influenced the economic performance of these provinces greatly. For this reason, they were also responsible for the corresponding consequences generated by their decisions. To a certain extent, provincial leaders equal to middle level management personnel of a multidivisional corporation, who are responsible for the performance of their own division.

The reform of China's personnel management system was synchronized with its economic reform in general. A key shift in personnel management was the general change in the assessment criteria of government officials. Political conformity, being the only important promotion criteria before the reform, gave its way to economic development achievements and other competence-related indicators during the term of office of an official. While political loyalty remained important, three new factors had also been introduced into the assessment process. Officials must be comparatively young, well educated, and have specialized knowledge in public administration. Besides, local economic performance had become the most important criterion for higher-level officials to assess subordinate officials (Li and Zhou, 2005). For local officials, a clear sign of the importance of economic growth indicators was their "obsession" of economic rankings of the same level of administrative regions. Government reports or provincial yearbooks usually contain detailed information on the relative ranking of the economic growth of each province about GDP growth, steel yield, newly increased miles of highways and so on.

In 1980, the Communist Party of China formally put forward the abolition of the lifelong tenure system of the party and government officials for the first time in the history, and set up the mandatory retirement system. Under this new system, a provincial leader must retire at the age of 65 if he is not promoted to a senior position in the central government. According to the new

policy, many senior provincial leaders were requested to leave their office and gave way to young people. The implementation of this reform in 1982 gave rise to two major retirement waves in 1983 and 1985.

The economic and political reforms have made the governors (including other leaders at all levels) have clear career advancement expectations and have a clear understanding of the conditions under which the expectations can be realized. However, in addition to promotion, termination, including retirement and demotions, also affects the behaviors of officials as an incentive mechanism.

Under normal conditions, provincial leaders (including other leaders at all levels) will not leave the power system completely after their retirement except for special circumstances, such as poor health. Before the formal retirement, they are often transferred to the provincial People's Congress or the provincial People's Political Consultative Conference as a transition, holding a post with honor but without actual administrative power. Although the loss of power is a sign of the end of the political career (regardless of what kind of honorary positions he holds), senior officials who resign from leading posts still have extensive social influence and a large number of welfare benefits related to their positions; therefore, local officials have a tendency of conservative administration.

For officials who pursue promotion, radical development policies and tough administrative tools must be adopted to realize relatively excellent economic growth in China's gradual model reform environment; however, these policies and tools may bring risks to executors in two aspects: on the one hand, radical local development policies require policy innovation, while new policy is likely to be in the policy grey zone, which may bring about unpredictable political risks; on the other hand, tough administrative tools may lead to fierce fighting of subordinates, and executors shall shoulder responsibility for potential failures. Therefore, it is foreseeable that the avidity of local officials' pursuit of promotion is closely related to the possibility of promotion in advance. The higher estimated promotion possibility is, the more radically the local officials will pursue the promotion and the more radical economic development means will be adopted consequently.

In a word, the following organizational characteristics of China's administrative personnel management system have great significance to this research. Firstly, the personnel power over the

governors (including other officials at all levels) is firmly held by their superiors, and the economic performance (or the "impression" of economic success) during their term of office is a key indicator of the personnel assessment of them. Secondly, the relative official assessment system based on the yardstick competition and a clear target allow for a sensible link between performance and turnover. Thirdly, the lock-in effect (Li and Zhou, 2005) accompanied by the great differences in terms of personal power, prestige and welfare, political benefits provide the provincial leaders (including other leaders at all levels) with a strong incentive to pursuit promotion. Fourthly, because of potential risks brought by the pursuit of promotion, the intensity of local officials' pursuit of promotion is closely positively correlated with the estimated possibility of promotion in advance, and the intensity of the pursuit of promotion is closely positively correlated with the degree of radicalization of economic development means adopted by these officials.

4.3.2   Data about the turnover of the provincial governors

This chapter aims to structure the promotion incentives of the responsible persons, the governors of each province of which the officials are assessed. The promotion of governors has a strong regularity to follow, part of which is even manifested in the form of regulations and laws. For example, Decision of the CPC Central Committee on *the Establishment of the Retirement System of Veteran Cadres* promulgated in 1982 explicitly stipulates that the retirement age of provincial officials (secretary of a provincial party committee and provincial governor) is 65 years old. After a governor is promoted, the governor would become: (1) the secretary of the party committee of the province, (2) the secretary of the party committee of another province, (3) or be promoted to a higher rank in a higher level central government department, such as deputy leader of the National People's Congress (NPC) or the Chinese People's Political Consultative Conference (CPPCC), or member of political bureau. During the period between 2003 and 2011, 60 governors' positions were changed, of which a total of 29 were promoted (20 were promoted to the secretary of the party committee of the province, 7 were promoted to the secretary of the party committee of the other provinces, and 2 were promoted to a higher rank in a central government department); 15 were transferred to a position of same level, 1 was removed from office, and 15 came to the age of retirement. This shows that more than two thirds of the governors were promoted after job transfer, and most of them were promoted to the secretary of

the party committee of the province.

By sorting the data from the database of important members of the government and China's leading cadres of *people.cn*[7], Figure 4.1 shows the promotion distribution diagram of governors of various regions; during year 2003-2011, the promotion frequency of officials of Hainan provinces is the highest, a total of 3 officials were promoted from the governor to the provincial party secretary; Anhui, Hebei, Heilongjiang, Hubei, Jiangsu, Qinghai, Xinjiang and other provinces are in the second place, a total of 2 governors were promoted during 9 years; Guizhou, Henan, Jiangxi, Ningxia, Shandong, Sichuan, Tianjin, Tibet, Zhejiang, Chongqing totaling 10 provinces are in the last place, and no governor is promoted to the provincial party secretary. In addition, from the perspective of annual official promotion distribution shown in Figure 4.2, the times of promotion of officials in 2003 and 2007 are the highest with 6 officials promoted every year; moreover, the promotion of officials shows strong political periodic characteristics, year 2003 is the first year that the new leaders took their office, and the 17th National Congress of the Communist Party of China was held in 2007. Comparatively speaking, the promotion of officials in 2004 and 2008 is more moderate.
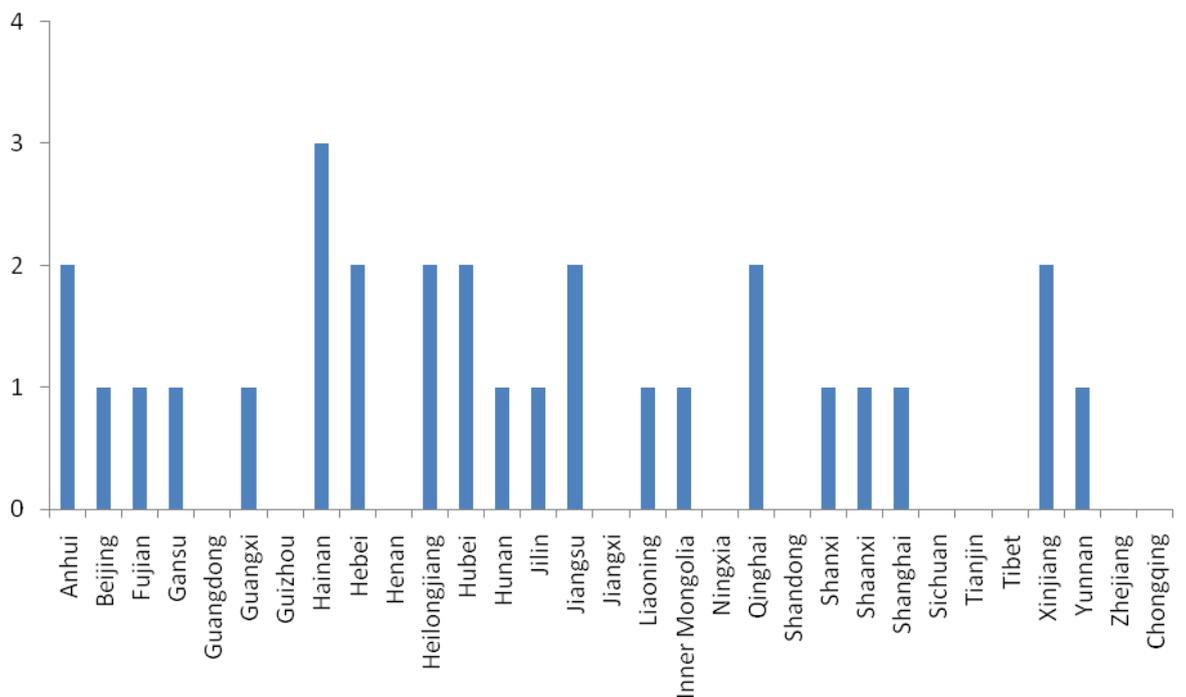
Figure 4.1: Official promotion distribution diagram by region
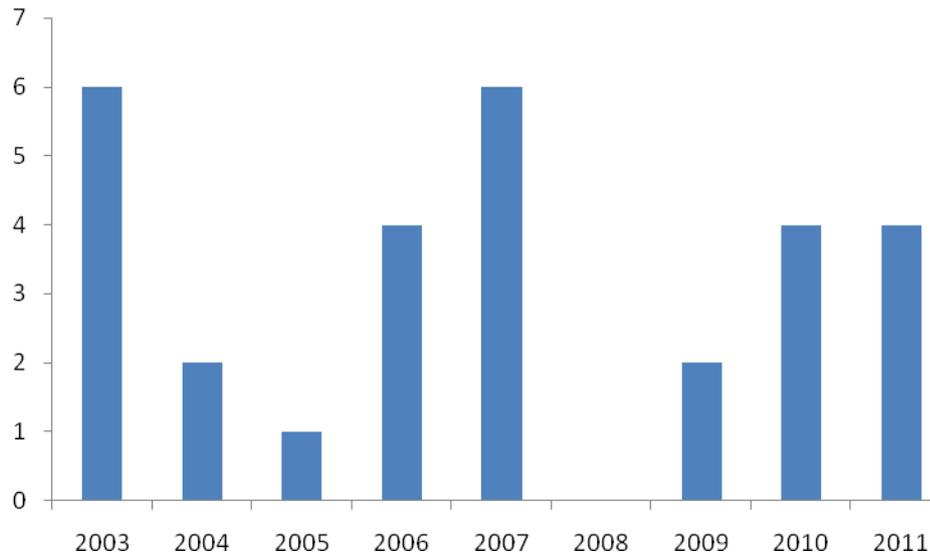
Figure 4.2: Official promotion distribution diagram by year

4.3.3　Variable set

In accordance with the findings relating to the promotion and the research of Li and Zhou (2005), Chen et al. (2005), Demeré et al. (2015) and Chen et al. (2016), this chapter holds that the factors influencing the promotion expectations of governors are as follows: (1) the age of governors. As mentioned above, the retirement age of provincial officials is 65 years old, so the age of a governor is an important condition to determine whether he will be promoted, so the closer to the retirement age, the more difficult the promotion is; (2) the length of tenure of governor. The longer a governor has served in his office, the more likely he will leave the post. Even if the governor wishes to serve for another term of office consecutively, he has to leave the post in accordance with the *Interim Provisions on the Tenure of Party and Government Leading Cadres*. Therefore, the longer the tenure is, the greater the possibility of redeployment is, and the greater the possibility of promotion is; (3) the age and tenure of the secretary of the party committee of the province. The older the secretary is, the greater the possibility of the secretary to leave the office is, and the job vacancy is likely to be filled by the governor of the province; in addition, the province of which the secretary of a provincial party committee is a member of the Political Bureau is usually a comparatively important province, and the governor of such province may also obtain the opportunity of promotion easily; (4) Provincial historical average growth rate of GDP during tenure. Demeré et al. (2015) pointed out that in the private sector, the

historical performance of employees and hierarchical level within an organization affect their promotion expectations. Taking into account the actual performance appraisal of government departments as well as the conclusion of literature, the chapter uses historical average growth rate of GDP during tenure as a proxy variable to replace historical performance. As for the post level within the organization, since this chapter examines only one level of governor, no variable is set in this chapter.

There are some other variables that may affect the promotion expectations of provincial governors. These variable are, whether the province where an official works is a national autonomous region (national policy and ethnic policy may affect promotion expectations); whether the year in which an official takes his office is the year for holding the National Party Congress or the new National People's Congress(the year of personnel change may increase the probability of promotion); population size of a province (the complexity of governance may affect the promotion expectations); change in GDP ranking nationwide (the result of relative economic development competition amongst provinces may affect the promotion expectations).

Part of variables has been verified to have non-significant correlation with promotion of provincial officials in other literatures; therefore, they are not included in the estimates of this chapter, including level of education (Li and Zhou, 2005; Chen, Li and Zhou, 2005) and relationship with the central government (Chen, Li and Zhou, 2005).

4.3.4 Estimation method of the promotion expectations of governors: probit model

It assumes that individuals have only two options, namely y=1 (promotion) or y=0 (no promotion); promotion depends on the age, tenure, economic performance and other factors of officials; it is supposed that all these explanatory variables are included in the vector x.

The simplest model is linear probability model as follows:

$$y_i = x_i'\beta + \varepsilon_i \tag{4.1}$$

Since $\varepsilon_i = y_i - x_i'$, so $\varepsilon_i = 1 - x_i'\beta$ or $\varepsilon_i = -x_i'\beta$; therefore, the disturbance term$\varepsilon_i$complies with two-point distribution rather than normal distribution. Another difficulty is that although we know the value of the explained variable y is either 0 or 1, the estimated value of $\hat{y}$ made according to the linear probability model may be greater than 1 or less than 0, which is impractical.

To make the predicted value of y always fall into the range of [0,1], under the condition

that x is given, the two-point distribution probability of y is considered:

$$\begin{cases} P(y = 1|x) = F(x, \beta) \\ P(y = 0|x) = 1 - F(x, \beta) \end{cases}$$ (4.2)

It can be assured that the predictive value $0 \leq \hat{y} \leq 1$ by selecting appropriate functional form $F(x, \beta)$; it is understood as probability generated when "y=1", namely $E(y|x) = 1 * P(y = 1|x) + 0 * P(y = 0|x) = P(y = 1|x)$. If $F(x, \beta)$ is the cumulative distribution function of the standard normal distribution, then $P(y = 1|x) = F(x, \beta) = \Phi(x'\beta) = \int_{-\infty}^{x'\beta} \varphi(t) \, dt$, the model is called Probit model. If $F(x, \beta)$ is the cumulative distribution function of Logit distribution, then $P(y = 1|x) = F(x, \beta) = \Lambda(x'\beta) = \frac{\exp(x'\beta)}{1+\exp(x'\beta)}$, the model is called Logit model. The image of cumulative distribution function of Logit distribution is similar to that of the standard normal distribution, and its density function is symmetric to the origin.

As for binary choice behavior, a "latent variable" can usually be used to summarize the net income of the behavior; if the net income is greater than 0, then "do" is selected, otherwise, "not do" is selected. It is assumed that the net income is

$$y^* = x'\beta + \varepsilon$$ (4.3)

Wherein, the net income y^* is unobservable latent variable, the above formula is also usually referred to as "index function". The selection rule of individuals is as follows

$$y = \begin{cases} 1, \text{if } y^* > 0 \\ 0, \text{if } y^* \leq 0 \end{cases}$$ (4.4)

Therefore, the following can be obtained:

$$P(y = 1|x) = P(y^* > 0|x) = P(x'\beta + \varepsilon > 0|x) = P(\varepsilon > -x'\beta|x)$$ (4.5)

Assume $\varepsilon \sim N(0, \sigma^2)$ is a normal distribution, there is $P(y = 1|x) = P(\varepsilon > -x'\beta|x) = P(\varepsilon < x'\beta) = F_\varepsilon(x'\beta)$. Wherein, $F_\varepsilon(.)$ is the cumulative distribution function of ε. The second equal sign of the above equation uses the nature of density function that it is symmetric to the origin. If ε follows normal distribution, then it is called probit; if ε follows logit distribution, then it is called logit. It should be noted that for any constant k>0, $P(x'\beta + \varepsilon > 0) = P(kx'\beta + k\varepsilon > 0)$. If disturbance term variance $\sigma^2 = var(\varepsilon)$, then $var(k\varepsilon) = k^2\sigma^2$, the fitting of model for ($k\beta, k^2\sigma^2$) is exactly the same as (β, σ^2), β and σ^2 cannot be simultaneously recognized at the same time. Therefore, for the probit model, make the variance σ^2 of the disturbance term 1, namely $\varepsilon \sim N(0,1)$, while for the logit model, make the variance of the

disturbance term $\pi^2/3$.

4.3.5   Model specification and estimation results

This chapter takes the promotion expectation of a governor as the proxy variable for his promotion incentives, and probit model is constructed as follows based on 2003 - 2011 data about the turnover of governors:

$$promote_{it} = 1\{\Gamma W_{it} + D_i + \varepsilon_{it}\} \tag{4.6}$$

Wherein, promote is the dummy variable denoting whether a governor of i province is promoted in the t-th year; if the governor is promoted, the value of promote is 1; otherwise, it is 0; W is a control variable, including the age and tenure of the governor, the age of the secretary of a provincial party committee and whether he is a member of Political Bureau, whether the National Party Congress or the new National People's Congress will be held in the current year, whether it is a national autonomous area, the proportion of GDP of the province where the governor works to the GDP of the country, etc. D is the provincial fixed effect used to control other unobservable heterogeneity of provinces. As for the value of the number of years in governor's office, if the governor takes up his post in the first half of the year, the number of years in governor's office will include the current year; if the governor takes up his post in the second half of the year, the number of years in governor's office will be calculated from the next year; as for the value of the age of provincial secretary, if replacement has occurred to the secretary of a provincial party committee, the value will be the age of the provincial secretary who have served for a longer period; if changes have occurred to both the provincial governor and the secretary of the party committee, the age of the provincial secretary in the observation value of original governors will be the age of the original provincial party secretary, the age of the provincial secretary in the observation value of new provincial governors will be the age of the new provincial party secretary. Historical average growth rate of GDP during the tenure is the moving average growth rate of GDP during the tenure. The age, tenure, promotion, and other variable data of the governors and provincial party secretaries are from the database of important members of the government and China's leading cadres of *people.cn*[8]; population size, GDP average growth rate and other control variables are calculated according to the data of 2003-2011 *China Statistical Yearbook*, and descriptive statistics of each variable are shown in the following table.

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[8] http://renshi.people.com.cn/

Table 4.1: Descriptive statistics of variable

Variable	definition	Mean	Std. Dev.	Min	Max
Promotion dummy variable	Governor promoted as 1; otherwise 0	0.11	0.31	0	1
Age of provincial governors	Calculated based on the date of birth	57.35	3.95	45	65
Tenure of provincial governors	Tenure of provincial governors from the year on board to the year promoted, dismissed or retired	2.76	1.93	0	10
Age of provincial party secretaries	Calculated based on the date of birth	58.77	4.29	45	68
Tenure of provincial party secretaries	Tenure of provincial party secretaries from the year on board to the year promoted, dismissed or retired	3.51	2.52	0	15
Whether the provincial party secretary is a member of Political Bureau	Being a member of Political Bureau as 1; otherwise 0	0.19	0.40	0	1
Whether the National Congress of the CPC will be held in the year	The year of the National Congress will be held as 1; otherwise 0	0.33	0.47	0	1
Whether it is a minority area	Minority area as 1; otherwise 0	0.13	0.34	0	1
Population size (logarithm)	Logarithm of provincial population	8.14	0.76	6.28	9.26
Historical average growth rate of GDP during the tenure	The moving average growth rate of GDP during the tenure	-0.14	4.06	-16.87	19.62
Change in GDP Ranking	Position difference in GDP ranking between year t and t-1	-0.09	6.93	-25	20

Note: the sample quantity is 270.

The estimated results of Table 4.2 show that: first, the younger the governor is, the longer the tenure is, the greater the probability of promotion is; while if the provincial secretary is a member of Political Bureau, the probability of promotion of provincial governor becomes greater; comparatively speaking, the probability of promotion of responsible person in the government of national autonomous region is lower. These conclusions are consistent with that of Li and Zhou (2005), Chen et al. (2005) and Chen et al. (2016). According to the dprobit[9] estimation result, under the condition that the sample mean of all the variables is taken, one additional year is added to the age of governors, the probability of promotion is reduced by 0.012; the term of office is extended by one year, the probability of promotion is increased by 0.03; the probability of promotion of governors in minority areas is 0.091 lower than that of governors in

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[9] Dprobit denotes the estimated marginal effect of probit model.

non-minority ethnic areas.

Table 4.2: Probit estimate of promotion expectations of governors

Equation	Variables	(1) Probit estimation	(2) Dprobit estimation
Promote	Age of provincial governors	-0.1078***	-0.0124***
		(0.0366)	(0.0043)
	Tenure of provincial governors	0.2586***	0.0298***
		(0.0847)	(0.0098)
	Age of provincial party secretaries	-0.0186	-0.0021
		(0.0333)	(0.0039)
	Tenure of provincial party secretaries	-0.5599	-0.0498*
		(0.3744)	(0.0262)
	Whether the provincial party secretary is a member of Political Bureau	0.2247***	0.0259***
		(0.0635)	(0.0071)
	Whether the National Congress of the CPC will be held in the year	0.1986	0.0248
		(0.2880)	(0.0383)
	Whether it is a minority area	-1.8242***	-0.0906***
		(0.6542)	(0.0224)
	Population size	-0.0002	-0.0000
		(0.1730)	(0.0199)
	Historical average growth rate of GDP during the tenure	0.0401	0.0046
		(0.0317)	(0.0037)
	Change in GDP Ranking	-0.0070	-0.0008
		(0.0187)	(0.0022)
	Constant	4.4819*	
		(2.7059)	
	Observations	270	270

Note: *significance level is 10%; **significance level is 5%; ***significance level is 1%; take the logarithm of all the variables in the estimation; model (1) denotes the estimated coefficient of probit model, and model (2) denotes the estimated marginal effect of probit model. Standard errors are displayed in the parenthesis.

Second, during the tenure, the estimated coefficient of the historical average growth rate of GDP is positive, but not significant, such conclusion is inconsistent with that of Li and Zhou (2005); however, it can be explained by using the research results of Chen et al. (2016). Chen et al. (2016) divided the data of 1978-2012 of China into two stages, namely 1978-1990,1990-2012 (1990 can be regarded as a year of transition during which China's economic policy shifted from

extensive to intensive mode of economic development), and the influence of GDP and energy productivity on the promotion of provincial officials is estimated respectively. The results show that the average growth rate of GDP can significantly affect the promotion of governors before 1990, while the impact is not significant after 1990; however, the impact of energy productivity on the promotion of a governor is just the reverse. Our sample stage falls right in the second stage defined by Chen et al. (2016). The estimation result of changes in the GDP ranking is negative, which is because the distribution mean value of changes in the GDP ranking during this sample stage is -0.089.

Third, the impact of other variables (such as the age and tenure of provincial party secretaries, whether to convene a meeting of the National Congress of Chinese Communist Party and population size) on the promotion of governors is not significant.

Furthermore, the fitted value of the probability of promotion of a governor can be obtained based on the probit model, and such fitted value is the promotion expectation of a governor. In addition to the above-mentioned age and tenure of governors, factors affecting the probability of promotion are also public information, which governors can easily obtain and understand clearly; therefore, they can form their own promotion expectations.

4.4 Interaction mechanism between provincial governors' promotion expectations, Land Finance and house prices

4.4.1   Model Specification

This chapter adopts the panel data model to analyze the mechanism of interaction between provincial governors' promotion expectations, Land Finance and house prices. Based on the argument above, this section adopts the fitted value of probit estimation as the promotion expectations of Chinese provincial governors. The specification of model is as follows:

$$land\_cost_{it} = \beta_0 + \beta_1 promote_{it} + \beta_2 X_{it} + year2008 + \varepsilon_{it} \qquad (4.7)$$
$$hprice_{it} = \lambda_0 + \lambda_1 land\_cost_{it} + \lambda_2 Z_{it} + year2008 + u_{it} \qquad (4.8)$$

Wherein, i and t denote the province and year, *land_cost* denotes Land Finance indicator measured by the land price, calculated by the ratio of land acquisition cost to area of acquired land, promote denotes the probability of promotion of governors, *hprice* denotes house prices, X denotes the control variables affecting land prices, such as the level of urbanization, GDP per

capita, population density; Z denotes the control variables affecting the house prices, including construction costs, proportion of unmarried population, foreign investment proportion and loan rate, meanwhile, dummy variables of year 2008 are added in the model, controlling 2008 financial crisis and the policy effect of government policies.

4.4.2   Variable set

Based on above model specification, the dependent variable, independent variable and control variables are defined as follow.

Land price (*land cost*): Land acquisition cost per square meter, as a proxy for Land Finance, refers to the expenses that housing development enterprises have to pay in order to obtain the use right of land by different means. The land acquisition cost falls into three types. Firstly, it is composed of the compensation for the land, the compensation for the attachments to or green crops on the land, settlement allowances, the management fee for land acquisition and many others that shall be paid if the land use right is obtained by way of land allocation; secondly, it is composed of the fees for assignment that are paid in case that the land use right is obtained through land transfer; thirdly, it consists of the funds that are paid in order to get the land use right through "land auction". The land acquisition area of the year refers to the land area of which the use right is obtained by different means (excluding land appropriation) in the current year. The variable will be adjusted according to Consumer Price Index (CPI) of different regions and converted into the value of the year 2003.

House prices (*hprice*): Since no statistical indicators about house prices of China's provinces, this chapter estimated the house prices of provinces according to the relevant statistical indicators in *China Statistical Yearbook* (2003-2011). Specifically speaking, the prices of residential commodity houses of the current year equals to the sales of residential commodity houses divided by the sale area. The residential commodity houses refer to those exclusively for residence, including villas, apartments, family dormitories and common dormitories of employees (including bachelor employees and students dormitories), etc.

From the above method of house prices calculation, it is known that the price used in this chapter is the average price, instead of hedonic house price, which may result in the difference in price structure and quality of the houses cannot be captured. Considering that the high-price houses and affordable houses only account for a low proportion in China's house prices structure

in the sample period, the deviation caused by the price structure may be ignored (Li and Chand, 2013). For example, in 2009, the high-price houses accounted for 5% of total sales, affordable houses accounted for 4%, and the remaining 91% were sold at conventional prices. In view of that the housing sales involve new houses, the difference in quality of sample houses may result in overestimation of the overall house prices.

Other control variables are: (1) **House construction cost** (*construct*): The construction cost is measured by the construction cost of commercial building upon completion. The variable is also adjusted according to CPI of different regions and the year of 2003 is taken as the benchmark. (2) **GDP per capita** (*gdp_pop*): This chapter will use GDP per capital of each province to control the economic development level of the region. The GDP per capita will be deflated according to GNP index of each province and converted to the value of the year 2003. (3) **Foreign investment proportion** (*fi*): It refers to the proportion of the foreign investments in capital source of the housing enterprises in each province for the current year. Chen et al. (2016) implied that because of eager for foreign investments, local government may attract investors via reducing land transfer price. (4) **Loan rate** (*interest*): The more-than five-year loan rate released by the People's Bank of China will be adopted as the loan rate for the housing market in this chapter. (5) **Urbanization level** (*urban*): the urbanization level of a region is measured by the proportion of urban population in the total population of the region and this indicator could reflect the change of urban-rural dual economic structure (Gong, 2010). (6) **Proportion of unmarried population** (*unmarried*): It refers to Ratio of unmarried female to unmarried male. (7) **Population density** (*pop_area*): it is measured by provincial population divided by built urban area.

The data of this chapter comes from *China Housing Statistics Yearbook* 2003-2011, *China Statistics Yearbook* 2004-2012 and the website of the People's Bank of China. The samples contain the data of 30 provinces other than Tibet Autonomous Region during 2003 to 2011 and the descriptive statistics of all variables are shown in Table 4.3.

Table 4.3: Descriptive statistics of variables

Variables	Definition	Mean value	Standard Deviation	Minimum	Maximum
promote	promotion expectations	0.11	0.11	0.01	0.65
price	logarithm of housing sales price (yuan/m^2)	2970.70	2139.87	964.00	15274.68
land_cost	logarithm of land price (yuan/m^2)	1330.51	2107.39	163.58	21643.43
construct	logarithm of house construction cost (yuan/m^2)	1441.54	515.41	740.10	3892.49
gdp_pop	logarithm of GDP per capita (yuan/person)	13589.6	8494.75	3603	48429.95
fi （%）	proportion of foreign investment	0.83	1.43	0.00	18.45
interest （%）	loan interest rate	6.14	0.62	5.40	7.26
urban （%）	urbanization level	47.75	14.86	20.48	89.30
unmarried	Ratio of unmarried female to unmarried male	0.72	0.09	0.53	1.20
pop_area	population density	415.34	563.85	7.39	3778.46
first difference					
promote_fd		0.006	0.107	-0.572	0.310
price_fd		298.51	504.27	-2187.25	3768.90
land_cost_fd		198.16	1161.73	-9450.59	8237.23
construct_fd		85.87	175.69	-845.34	882.41
gdp_pop_fd		406.76	914.50	-7968.95	6792.66
fi_fd （%）		-0.03	1.83	-17.95	17.20
interest_fd （%）		0.18	0.64	-1.32	0.90
urban_fd （%）		1.53	2.58	-15.80	16.85
unmarried_fd		0.0036	0.09	-0.35	0.49
pop_area_fd		8.81	46.96	-39.37	676.92

Note: the sample quantity is 270.

4.4.3　Estimation results

This chapter carries out empirical analysis of the mechanism of action between promotion incentive, Land Finance and house price based on econometric model formula (4.7) and (4.8). Under normal circumstances, ordinary OLS will take α_i are ε_{it} as disturbance term together; we cannot control all the variables influencing the land price and house price because of the limitations of data; there are differences in the geographic features, institutional environment and other aspects of various provinces in China, there may exist omitted variables which are not time-varying; therefore, the regression results of OLS may be inconsistent. The econometric model adopting panel data can control individual heterogeneity between different provinces,

which can solve the endogenous problems caused by omitted variables. Based on whether α_i is associated with explanatory variables, the estimation methods of fixed effect model (FE) and random effect model (RE) can be adopted respectively. If α_i is not associated with other explanatory variables, random effect model is more efficient compared with fixed effect model; no matter α_i is not associated with other explanatory variables or not, the estimation results of fixed effect model are always consistent.

Firstly, the fitted value in promotion expectation estimated in section 4.3 of this chapter is used as the proxy variable for promotion expectation, and is used as key explanatory variables of Land Finance equation (Equation 4.7) so as to verify its impact on land prices. Secondly, Land Finance equation is regressed and then added to housing equation (Equation 4.8) as an explanatory variable so as to analyze the influencing mechanism between the land prices and house prices.

As shown in Table 4.4, the Land Finance equation shows the regression results of the governor promotion expectations on land prices, the governor promotion expectations and land prices are significantly positively correlated, namely the greater a governor considers his promotion probability is, the higher the land price of the region is. The estimation coefficient indicates that one percentage point increase of the promotion expectations of the governors will increase the land prices by 0.043%. The house price equation indicates the regression results of land prices and house prices, which have significant positive correlation (Table 4.5); for China's housing market, the same conclusion had been reached by Zhang, Cheng and Ng (2013), Li and Chand (2013), Wu, Gyourko and Deng (2012), Du, Ma and An (2011), and in Chapter 3. The estimation coefficient of land cost indicates that one percentage point increase of the land prices will increase the house prices by 0.124%. The mechanism about promotion expectations of governors and fluctuations of house prices lies in that, under the condition of fiscal decentralization, governors indirectly affect the house prices by intervening the Land Finance of the region, the underlying cause is the official appraisal mechanism with local economic development as target. The greater a governor considers his promotion probability is, the greater his motivation is to achieve economic growth targets through Land Finance, while land prices are the main factor influencing house prices.

Results about control variables are discussed below. Except for the population density as

a newly added control variable in the land finance regression equation, Chapter 3 adopts control variables and data periods consistent with that used in this chapter. The difference lies in the estimation method, where Chapter 3 adopts overall panel estimate, while this chapter adopts two-stage equation estimate. In general, the two chapters are basically the same in aspects of the estimated results of control variables: per capita GDP, urbanization rate, construction costs and economic stimulus in 2008 significantly affected the house prices, while the effect of the proportion of unmarried female to male and the proportion of foreign investment on the house prices is not significant, the reason for which has been explained in Chapter 3. The main difference between the estimate results of control variables of the two chapters lies in the effect of the five-year interest rate on house prices. The effect is not significant in Chapter 3, but significant in this chapter, but the signs of estimated coefficients are consistent. The conclusion of non-consistency of interest rate on China's house prices can be manifested by other documents; for example, when Li and Chand (2013) used provincial panel data to estimate the market fundamentals of China's house prices, they pointed out that the significance of the influence of interest rates on the house price is slightly lower than 10% (0.0998), and the estimated coefficient is very small (-0.001).

In the regression results of promotion expectations and land finance of this chapter, the per capita GDP, population density and urbanization rate are positively correlated with land prices at least at a significance level of 10%. The per capita GDP controls the economic scale of the region, while population density controls the demand for land; with the development of the industrialization and urbanization, large population gather in cities, and land has gradually become the main source of revenue of local governments. The increase in per capita GDP, population density and urbanization rate have led to the scarcity of land, which has led to the rise of land prices and encouraged local officials to implement Land Finance so as to create personal political capital. In the regression results of Land Finance and house prices, the construction cost is the main factor affecting the real house prices, where one percentage point increase in construction cost will make house prices increase by about 0.5%.

We also reported on the test statistics to find out whether there exists multicollinearity or individual heterogeneity. The figure of variance inflation factor (VIF) in table 4.4 and 4.5 is clearly below 10, indicates there is no multicollinearity between explanatory variables. As for

individual heterogeneity, no matter F test of fixed effect model or the Breusch-Pagan LM test of random effect model (Breusch and Pagan, 1979) all rejected the original hypothesis without individual effects at the significance level of 1%, which also indicates that the usual OLS estimation results are inconsistent. The results of Hausman test of Land Finance equation and house price equation are 12.42 and 17.23 respectively, rejecting the original hypothesis of "α_i is not associated with other explanatory variables of the model" at the significance level of 5%, the estimation results of random effect model are inconsistent, so the fixed effect model should be adopted.

Table 4.4: Promotion expectations and Land Finance (explained variable: *land_cost*)

Variables	(1) FE	(2) RE
promote	0.0433*	0.0486*
	(0.0254)	(0.0253)
gdp_pop	1.1676***	0.5056**
	(0.3292)	(0.2084)
urban	0.4897*	0.4734*
	(0.2840)	(0.2693)
pop_area	0.0015***	0.0005***
	(0.0003)	(0.0002)
year2008	0.4415***	0.5939***
	(0.0741)	(0.0560)
constant	-6.9853**	-0.3930
	(2.8101)	(1.5245)
F test	13.44***	
Breusch and Pagan LM test		317.62***
Hausman test	12.42**	
Observations	270	270
R-squared	0.5757	
Variance inflation factor	2.3	

Note：*significance level is 10%；**significance level is 5%；***significance level is 1%；FE: fixed effect panel data model, RE: random effect panel data model.

Table 4.5: Land Finance and house price (explained variable：*hprice*)

Variables	(1) FE	(2) RE
land_cost	0.1244***	0.1612***
	(0.0213)	(0.0212)
construct	0.4992***	0.6453***
	(0.0645)	(0.0620)
fi	-0.0049	0.0001
	(0.0067)	(0.0071)
unmarried	0.0964	0.1261
	(0.0899)	(0.0934)
interest	-0.2959**	-0.2080
	(0.1202)	(0.1273)
year2008	0.1545***	0.0865***
	(0.0299)	(0.0298)
constant	3.2811***	1.7568***
	(0.6414)	(0.6227)
F test	13.29***	
Breusch and Pagan LM test		262.08***
Hausman test	17.23***	
Observations	270	270
R-squared	0.8523	
Variance inflation factor	1.26	

Note：*significance level is 10%；**significance level is 5%；***significance level is 1%；FE: fixed effect panel data model, RE: random effect panel data model.

4.5 Endogenous test

Endogenous problem usually comes from three aspects: the omitted variable, measurement error and simultaneity bias. We adopted fixed effect estimation and random effect estimation in the above panel ordinary least square regression. Fixed effect estimation and random effect estimation may effectively eliminate unobservable province difference effect; therefore, the endogenous problem of omitted variables generated by the correlation between province difference effect and disturbance term of the models is solved.   Promotion expectations variable estimated by using a binary choice model can solve endogenous problems generated by measurement error. However, there may exist endogenous problem of simultaneity bias between the promotion expectations of the officials and the explained variable Land Finance, the higher the promotion expectations of officials is, the greater the impetus to drive Land

Finance is, which in turn increase the level of economic growth and further increase the promotion expectations of officials. Serious endogenous problems can cause inconsistency of model coefficient estimate. The panel two-stage least square regression method (2SLS) is adopted in the ensuing paragraphs to carry out endogenous test of promotion expectations and econometric model of Land Finance.

The premise of using instrumental variable estimation is the existence of valid instrumental variable; therefore, how to find instrumental variables is very important. However, the main aspects to be considered for selecting instrumental variables are: On the one hand, the instrumental variable is strictly exogenous, and the instrumental variable is correlated with endogenous variable. The two requirements of the instrumental variables (correlation and exogeneity) are often contradictory, that is to say, variables correlated with the endogenous explanatory variables are often associated with the disturbance term of the explanatory variables. For panel data models, the lagged variable of endogenous explanatory variable is often used as instrumental variable. It is obvious that the endogenous explanatory variable is associated with its lagged variable, meeting the requirement of correlation. On the other hand, since the lagged variable has already occurred, its value has been fixed from the current perspective, and it may possibly be uncorrelated with the current disturbance term. Therefore, for the endogenous test of promotion expectations of officials, this chapter takes the lagged term of promotion expectations (promote) as instrumental variables, carries out Durbin-Wu-Hausman endogenous test, and adopts two-stage least square estimation (2sls).

The estimation results of instrumental variables are shown in Table 4.6. We should first verify the reasonableness of instrumental variables selected, and this chapter takes the lagged term of promotion expectations (promote) as instrumental variable. Staiger and Stock (1997) pointed out that F statistical value of the first stage should be reported when applying two-stage least square method. Judging the correlation between instrumental variables and endogenous variables may guarantee the reasonable performance of two-stage least square method, and the statistical value should be greater than 10 usually. Therefore, before reporting the results of the two-stage least square regression results, we first report the regression results of the first stage, as shown in column (1) of Table 4.6; the F statistical value of the first stage regression of 2SLS is 22.58, indicating that the selection of instrumental variable is reasonable. The column (2) of

Table 4.6 shows the estimation results of the second stage regression of 2SLS, the robust F-statistical value of Durbin-Wu-Hausman endogenous test is 0.7892, which corresponds to the p-value of 0.375, and the original hypothesis of exogenous explanatory variables cannot be rejected. In addition, the estimation results of 2SLS instrumental variable show positive but not significant correlation between promotion expectations and land prices, the reason is that although 2SLS estimation is always consistent, it is not the most effective; using 2SLS estimate can lead to a significance level of twist, that is to say, in the case of absence of endogenous explanatory variables, the fixed effect estimation of panel data model is the most effective. In other words, the estimated results of the effect of promotion expectations on land prices should be subject to the FE estimate in Table 4.4, and the 2SLS estimate is only used to verify the endogeneity of the core explanatory variables.

In fact, for Chinese governors, under the background of long-term regulation of the housing market (from the day on which the first housing macro control policy *State Eight* is promulgated in 2005), the excessive growth of land prices is not entirely favorable for the promotions. The objective of the regulations and controls of the central government on the land market has always been maintaining moderate and steady growth. If local governments have not taken measures which are expected to cool down the housing market under the circumstance that the house price increases rapidly in the short term, then it will be considered politically incorrect to some extent. However, compared with economic growth, maintaining house price at a reasonable level is not the core pursuit of local officials. Except price fall caused by market reasons, maintaining the stable house price periodically during the rapid growth is already bottom line that the local officials can accept in their mind.

Table 4.6: 2SLS estimation of promotion expectations and Land Finance

Variables	(1) promote 2SLS_1st	(2) land_cost 2SLS_2nd
promote_iv	0.4854***	
	(0.0603)	
promote		0.0360
		(0.0672)
gdp_pop	0.1421	0.6972***
	(0.2548)	(0.1651)
urban	-0.4269	0.1039
	(0.4049)	(0.2847)
pop_area	0.0002**	0.0004***
	(0.0001)	(0.0001)
year2008	-0.0713	0.5763***
	(0.1251)	(0.0720)
constant	1.2630	-0.5346
	（1.4944）	(0.9059)
Durbin-Wu-Hausman test		0.7892
F statistical magnitude	22.58	
Observations	240	240
R-squared	0.2643	0.5864

Note: *** p<0.01, ** p<0.05, * p<0.1, take the logarithm of all the variables in the estimation; 2SLS: two-stage least squares of instrumental-variables regression, 2SLS-1st is to regress the endogenous variable of promote expectations, while 2SLS-2nd is to use the estimated promote expectations (with endogeneity having been removed) as an explanatory variable for regression with land price.

4.6 Conclusion

This chapter places the promotion expectations, Land Finance and house prices in the same frame so as to analyze the mechanism between the three based on the fact of continuous rising of the house prices in China. Firstly, this chapter collects data related to the relocation of provincial governors, selects probit model to describe the promotion expectations of governors by using the championship mode of promotion of Chinese local officials and evaluation mechanism with economic development as the target. Secondly, this chapter separately sets up measurement model between the promotion expectations and Land Finance, Land Finance and house prices, and recognizes the influencing mechanism between the three through panel data model. Finally, the regression results of 2003 - 2011 provincial level data show that for samples in general, the higher the promotion expectations probability of the governor is, the larger the

impact on the local Land Finance is, and the higher land price of the region is, meanwhile, the land price level and house price are significantly positive correlated.

The conclusions of this chapter show that the underlying cause that local officials prefer the Land Finance of land transfer is the official assessment and promotion mechanism with economic development as the target. The fiscal revenue of the area is assured by Land Finance; the targets of economic growth and employment and others are further realized through the continuous rising of house prices and the development of housing market driven by land price. Under the Chinese-style fiscal decentralization system (administrative centralization and fiscal decentralization develop simultaneously), higher (lower) promotion expectations of local officials (it refers to governors in this chapter) make them adopt more aggressive (moderate) Land Finance method during their tenure, and aggressive Land Finance will increase the house prices through two approaches: 1. The development of infrastructure and amenity improve the utilizability of land; therefore, the house price is increased; 2.To generate land-sale revenue equal to the investment in construction, local government officials have the motivation to maintain house prices that they consider reasonable and they even adopt administrative means.

In order to increase their promotion probability, the local officials continue to strengthen the demand for "image" projects, which leads to high dependence on Land Finance, while sustained high-intensity Land Finance generates broad and in-depth influences on the economy, politics and livelihood of China. Large scale land acquisition from farmers has been found to contribute to regional protectionism, inflation, jurisdictional disparity and other problem (Feltenstein and Iwata, 2005; Zhang, 2006; Wu and Heerink, 2016). There are also some examples of confronting land acquisition by adopting extreme means (such as self-burning, killing government workers, etc.) released in the newspapers. We can say that the development of China from the late 1990s till today is at the cost of sacrificing the interests of farmers to a large extent.

The contributions of this chapter mainly are: firstly. as far as the author knows, the literature on the promotion expectation is not much, while this chapter may be the first attempt to introduces the promotion expectation estimation into public administration study, this chapter also greatly enriches the variables that can affect the estimation of promotion expectations and enhances estimation theories on promotion expectations; secondly, this chapter discusses from

the special angle of the impact of promotion expectations of local officials on house prices, enriches the theory of house prices, and expands the boundary of study of impacts of subjective behavior on the housing market; thirdly, the yardstick competition model of local officials under Chinese-style fiscal decentralization system has general reference significance for countries to achieve certain economic and social development goals (such as improving environmental protection and promoting social equality, etc.).

Subsequent studies may include: firstly, further define the economic development assessment factors affecting the promotion expectations of local officials. This chapter adopts the historical average growth rate of GDP during the term of office, which is not the best explanatory variable; secondly, extend the impact of promotion expectations on economy to the prefectures (*diqu*) level; such impact may be enhanced on this level; thirdly, Investigate the impact of promotion expectations of local officials on other industries, such as the impact on the industries causing environmental pollution.

Chapter 5

Conclusion

5.1 Overview of the thesis

Including the conclusion chapter, this thesis consists of five chapters. Chapter 1 is an introduction which firstly presented the theoretical backgrounds of and debates on psychological factors, expectation, and sentimental variables. What come next was the development and current status of China's real estate industry to be studied in this thesis, as well as its key features. The three main research subjects to be investigated in this thesis were presented at the end, together with a brief discussion.

As the first subject, the investigation on the bidirectional interaction between Consumer Expectation Index in China (as the selected proxy variable for general consumer sentiment) and real estate prices has been conducted in Chapter 2. The analysis began with a cointegration analysis of macro-variables based on time series data to evaluate the cointegration relationship between Consumer Expectation Index and real estate prices at the national level. After a positive result was obtained, M2 and quarterly GDP had been added into the time series, so as to test the robustness of the cointegration relationship between Consumer Expectation Index and real estate prices respectively.

Based on findings of Chapter 2, the study on the influence of Entrepreneur Confidence Index (as the selected proxy variable for investor sentiment) on the house prices across provinces has been conducted in Chapter 3, to further clarify the influence of psychological factors on real estate prices based on data at a more specific level. The analysis began with the evaluation on the overall influence of Entrepreneur Confidence Index on house prices via the panel data model. Subsequently, a test of endogeneity on the evaluation model was conducted to avoid omitting relevant variables. In light of the level of economic development and geographical location, provinces were then divided into three groups: eastern, middle and western regions. The influences of the entrepreneurs' confidence on house prices were estimated via the panel data

model respectively. Finally, given the lagged impact exerted by sentimental factors on economy, an additional analysis of the influence of lagged entrepreneurs' confidence on house prices was provided.

China's distinct promotion system for local officials based on quasi-yardstick competition has a far-reaching and profound impact on the real estate market. An examination on the influence of local officials' promotion expectations on land prices in China, and further on house prices, was carried out in Chapter 4. After a systematic introduction on China's bureaucracy system, variables were selected out to estimate the local officials' promotion expectations via the probit model. Then, the estimated promotion expectations were applied to the panel data model to evaluate its influence on land prices and house prices. At last, a test of endogeneity was added on the evaluation system about the influence of promotion expectations on land prices, in consideration of the concerns on possibly simultaneity bias.

The thesis has the following characteristics: firstly, discussions all focus on psychological factors, expectations, and sentimental variables which are closely interrelated theoretically; secondly, all three research topics are concerned with the formation mechanism and influential factors of real estate prices at the macro level; thirdly, the research methods and models selected in this thesis become increasingly sophisticated as the research proceeds, and comprehensive and multiple perspectives have been adopted to perform this research.

5.2 Summary of the empirical findings

(1) Consumer Expectation Index and real estate prices

Customer expectations significantly affect assets prices. Recent literatures have indicated that the agents' subjective expectations on investment returns are formed varyingly. In other words, individual investment decision making is heterogeneous. Some people develop their expectations rationally, while other follows a completely irrational path (such as rule of thumbs) (Drerup et al., 2017). Consequently, subjective beliefs and stockholding decisions tend to be statistically significant, but usually rather small in magnitude (Hurd, 2009; Ameriks et al., 2016). Meanwhile, these two mechanisms of investment decision making also reflect two different interpretations by current theorists on influence of sentiment (confidence) index on macro economy. The former supposes that the influence result from agents' rational and intelligent

processing of current or future fundamental news (Barsky and Sims, 2012). The latter holds that the influence originates from the psychologically based animal spirits (Keynes, 1936; Akerlof and Shiller, 2009). Therefore, compared with other variables for economic analysis, Consumer Expectation Index, as a direct measurement of consumers' subjective expectations, is straightforward to facilitate analysis of variation in asset prices. In addition, Consumer Expectation Index, as a sub-index of Consumer Confidence Index, is a common index published timely and without the needs for following revision, it is more suitable compared with other important economic indicators (Koenig, 2002). However, this index has rarely been adopted in the real estate sector to study price variations.

This academic gap is filled by the study in Chapter 2. The study started with literature view on the impact of psychological factors and sentimental variables on real estate prices. Then, Consumer Expectation Index was used to indicate the agent's subjective expectation on macro-economic climate, and the cointegration analysis based on time series data was deployed to evaluate the long-term equilibrium relationship between consumer expectations and real estate prices. The empirical result confirmed the relationship at the 1% significance level. If Consumer Expectation Index rises by 1%, the real estate price will increase by 4.345%. Then, in order to verify the robustness of the empirical conclusions, M2 and the quarterly GDP data were applied to the cointegration test one by one. The test result confirmed the robustness of this cointegration relationship between consumer expectations and real estate prices. Moreover, the test results with the two added factors -- M2 and the quarterly GDP data, indicated an exclusive cointegration relationship between real estate prices and Consumer Expectation Index, which suggests consumer expectations are more effective to explain and more closely related to the real estate prices than the conventional economic fundamentals.

(2) The entrepreneurs' confidence and house prices

Based on the positive findings from the empirical study in Chapter 2, the analysis on the influence of the entrepreneurs' confidence on house prices was conducted in Chapter 3. Entrepreneurs are usually regarded as opinion leaders. An opinion leader is an individual having prominent influence on the decision-making of other individuals in the opinion communication process (Valente and Pumpuang, 2007). Entrepreneur Confidence Index is a component of China's economic climate indices, which comprehensively reflects entrepreneurs' optimistic level

on the current macroeconomic situation and the development trend, according to their judgment on the industrial situation in the enterprise prosperity survey.

Data on house price and Entrepreneur Confidence Index for different provinces between 2003 and 2011 were adopted in Chapter 3. After all control variables identified in the literature had been input into the estimate model, Entrepreneur Confidence Index was treated as the explanatory variable to fulfill the empirical analysis of its overall influence on house prices via a fixed effect panel data model. The result indicated that house prices were positively influenced by Entrepreneur Confidence Index. When Entrepreneur Confidence Index is increased by one percentage point, the house prices rise by 0.27% to 0.38%. The following test of endogeneity verified the independent influence of the entrepreneurs' confidence on house prices. The inclusion of this variable into the panel model tends to improve the model's explanatory power. Then, the test via the fixed effect panel data model was conducted after dividing the provinces into three groups: eastern, middle and western regions, in light of the level of economic development and geographical location. The results showed that the intensity of the influence imposed by the entrepreneurs' confidence was positively related to the level of economic development. House prices in economically developed provinces were more susceptible to the influence of the entrepreneurs' confidence. Given the lagged effect of the confidence index, an empirical test was added on the influence of Entrepreneur Confidence Index at different lag phases on house prices. The results showed that the entrepreneurs' confidence at the first and second lag had the greatest influence on the house prices.

The empirical results from the panel data also confirmed the significant influence of control variables including land prices, construction costs, and the urbanization level, on house prices. House prices have risen sharply since the 2008 financial crisis, which may be attributed to the state government's four trillion investment program. Tremendous government investment flew into the real estate market, which had greatly pushed up the price of land and properties. In general, the empirical findings on control variables are consistent with that from the literature (e.g., Li and Chand, 2013; Wang et al., 2014).

It is worth noting that the interpretation on whether the influencing potential of market sentiment (confidence) on the economy derives from the debate on rational expectations or animal spirits. Since the cointegration analysis based on time series data was selected in Chapter

2, it became difficult to set control variables to simulate the influence of news on sentiment, when investigating the impact by consumer expectations on house prices. Yet, given the attributes of panel data model selected for the research in Chapter 3, diverse control variables can be set to better control for the influence by objective information (news) on expectations. Therefore, if control variables are set, the sentimental index is still able to generate significant influence, and thus the view may held that influence primarily derive from the psychological factors in subjective expectations.

(3) The local officials' promotion expectations and house prices

Based on the following facts: firstly, the promotion and selection system based on relative performance appraisal is effective to stimulate individuals' hard work (Milgrom and Roberts, 1992); secondly, the ex-ante probability of a promotion will induce effort, thereby leading to improved performance (Demeré et al., 2015); thirdly, China's distinct regime which combines fiscal decentralization and administrative centralization gives birth to Land Finance (Han and Kung, 2015; Ding, Niu and Lichtenberg, 2014; Wu and Heerink, 2016). It is inferred that there is a competition between China's local officials on "images" (mainly in the form of urban infrastructure and amenity) which reflect economic growth rate or local economic achievements and are used in performance assessment. It is likely to greatly affect China's land market and real estate market. Then, local officials' ex-ante promotion expectation determines their commitment to this competition. The empirical test in Chapter 4 was conducted in three steps: firstly, variables that affect the promotion expectations of these provincial governors were revised in accordance with the literatures, and the probit model was developed to estimate the governors' promotion expectations. The results showed that age, the serving years at that post, membership of the Politburo, and the status of the jurisdiction area (where or not it is a minority area) all significantly shaped the promotion expectations. The independent influence by GDP was not significant during the sample period. Secondly, the fixed effect panel model was used to work out the measurement models on the correlation between the promotion expectation and Land Finance, and that between Land Finance and the house prices respectively. The results showed that the promotion expectations had a significant impact on land prices, and land prices had a significant impact on house prices. At last, a test of endogeneity was conducted, showing that although the promotion expectations of governors significantly affected the land prices, but land prices had no

significant effect on the promotion expectations.

5.3 Implications

(1) Consumer Expectation Index and real estate prices

The conclusion in the thesis on the influence of consumer expectations on real estate prices is saliently important to design real estate policies. The research conclusions, on either the national or the urban level, are able to guide the control over property-market. The continuous rapid growth of real estate prices goes along with the consistent tightening measures, especially in first-tier cities like Beijing and Shanghai. The tightening measures range from the escalating land, credit and loan, taxation, foreign exchange and security housing policies since 2004, through property-purchase restrictions since 2010, to the recent transfer restrictions and pricing regulation. Measures become increasingly severe, gradually shifting away from market instruments to administrative control. However, the various tightening measures failed to generate the effect as expected by the government (Hui and Wang, 2014). The main reason lies in the lack of focus on regulating market expectations. Administrative instruments in particular, such as purchase restrictions and price control, are easy to stimulate expectations among investors that tremendous needs cannot be satisfied, so the price would inevitably rise fiercely after the removal of restrictions. As a result, buyers without actual housing demand flock into the market, creating extra demand. Besides, regarding market instruments, enough attention should be paid to their influence on group psychology and subjective expectations as well.

Shiller (2005) believed that waves of optimistic, pessimistic or neutral investment sentiment and overconfidence prevail in the assets market, which gives rise to spiraling positive feedback loops in prices. This is obviously applicable to China's real estate market as well. For example, investors in Shanghai, Beijing, Shenzhen, etc. are inclined to overlook market information which evidently goes against investment common sense, such as a price-to-rent ratio lower than 1%, or a house price-to-household income ratio above 40. Instead, they believe in "super cities" and maintain an expectation of continuous rapid increase in house prices. Therefore, in order to manage consumers' expectations on investment returns, new channels and methods should be introduced to influence public psychology, in addition to the traditional economic variables. What kinds of channels and methods are worth studying.

(2) The entrepreneurs' confidence and house prices

It has become a common sense to leverage the influence of opinion leaders to implement marketing strategies in the marketing world. The real estate sector is of no exception in this regard. Although results from recent economic experiments unveil that *"players fail to predict the fundamental value and that agents have adaptive expectations rather than rational ones" (Colasante et al., 2017, p1001)*, but collective rationality emerges when they have to make decisions independently (Colasante et al., 2017). Yet, the preconditions for such independent decision making are destroyed by opinion leaders. Shiller (2005) summarized the effects of group psychology on market fluctuations into the influence of authority (Asch, 1952, Milgram, 1974), herd behavior, information cascade (Bikhchandani et al., 1992) and tale spreading surpassed theoretical analysis, etc. All of them can be founded in the influence by entrepreneurs on market sentiment related to property investment.

Deviant behaviors may emerge due to the influence of investment psychology and subjective expectations. Consequently, research with mere focus on the influence of traditional macroeconomic variables on house prices always end with a finding that economic fundamentals cannot sufficiently explain the change of house prices. For instance, Wang et al. (2014) pointed out that the actual rise in house prices in China's several coastal cities differs greatly from the expected value based on economic fundamentals. Yet, a reliable explanation can be derived from the conclusion on the eastern, middle and western regions in Chapter 3. The results from comparative empirical study in Chapter 3 unveil a positive correlation between the intensity of the influence by the entrepreneurs' confidence on house prices and the degree of marketization in a given region. The entrepreneurs' confidence may generate greater far-reaching influence in a freer market with a higher level of economic development. Possible reasons are: firstly, a more liberal market environment means less government control, so investors and customers can make decision more freely based on the market information, and thus are more susceptible to the influence of psychological factors. Secondly, a more developed property market means that making money through investment (compare to rigid needs) weighs more in terms of the purpose to perform a transaction. A real estate market where investment transactions accounted for a large proportion is more easily influenced by psychological factors. Thirdly, a more developed and more liberal market means richer market information and more complex trade products, so the

effects incurred by imperfect foresight and human inability to solve complex problems with a host of variables will come into force (Alchian, 1950).

(3) The local officials' promotion expectations and house prices

Zhuravskaya (2000) maintained that China's rapid economic growth in 1980s and 1990s resulted from fiscal decentralization and the great incentives for local officials via promotion. Findings from Chapter 4 suggest the root cause behind local officials' preference to Land Finance lies in the promotion system based on relative performance appraisal under this fiscal decentralization system. The superior's power of appointment and removal of his subordinates directly and an appraisal system which emphasizes economic development implemented by the state government after the reform and opening-up foster local officials' pursuit for short-term economic development. Compared with long-term measures for economic development to improve comprehensive economic efficiency, the construction of amenity and infrastructure mainly driven by government investment is undoubtedly easier to yield visible outcome within the tenure. Land Finance secures local fiscal revenues, and boosts regional economic growth. However, it also results in local governments' high reliance upon Land Finance. The continuous, intensive Land Finance has exerted far-reaching and deep-going impacts on China's economy, politics and people's livelihood.

An important feature of the study in Chapter 4 is to link the promotion expectations of officials with their behavioral consequences from a behavioral perspective. Actions may incur either positive or negative consequences. When it comes to local officials, they may attain the opportunity of promotion eventually after working hard to win the competition, or may be dismissed, squeeze out, or even sentenced to imprisonment for deploying unauthorized policies or administrative measures. Negative consequences are worse than stably whiling away the tenure. The ex-ante probability of a promotion will induce effort (Demeré, 2015), so the commitment to hard work is closely related to the ex-ante probability of a promotion. This relationship has been introduced into the research on public management behaviors and used to explain specific industry phenomenon in this thesis.

Sound policies produce positive behavior and results. China's promotion mechanism for local officials based on relative performance appraisal facilitates the fulfillment of many policy objectives like environmental governance, social stability, population management and so on,

which is also a reference for institutional improvement in other countries. Nevertheless, it should be noted that excessive emphasis on one single governance target also incurs other social costs under this system. For example, excessive emphasis on population management causes plenty of extremely ruthless forced abortions and displaced people for having extra children, which is even widely criticized nowadays.

5.4 Future research

Future research can be conducted in the following aspects. Firstly, price is used as the explained variables throughout this thesis. Future research may center on other explained variables. For instance, research can be conducted on the correlation between house retention rate and social psychological factors. Qualitative and quantitative methods can be adopted to study the social psychological factors that determine the house ownership rate. Secondly, based on findings from Chapter 2, studies can be furthered on the influence of sentimental variables on the fluctuation of house prices. Thirdly, based on results from Chapters 2 and 3, researchers may further explore the sentimental indicator in the real estate market, so as to identify more suitable barometers to regulate the market and guide investment decision making. Fourthly, based on the estimate of promotion expectation in Chapter 4, research can be carried out to further determine the assessment criteria related to economic development that affect local officials' promotion expectations. Finally, the study on the influence of promotion expectations on the real estate market can be extended to the prefectural level where the influence may be enhanced. Moreover, researchers may work on the influence of local officials' promotion expectations in other fields, such as environment pollution.

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