Property tax pilot in Shanghai and Chongqing: increase or stabilized the selling price in china's real estate market

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Abstract

This paper aims to examine the effect of property taxes on selling prices in China's real estate market. I collect the data in China's 35 major cities before and after the property tax has been implemented, and estimate the effects of property taxes using the Differences-in-Differences method. I find that the effect of property taxes in Shanghai and Chongqing does not lead to lower house prices in these two cities.

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Chapter 1 - Introduction

As an essential participant, beneficiary, and contributor to world economic globalization, China has been deeply involved in the process of economic globalization. From 2013 to 2017, China's economic growth accounted for 25%-30% of the total world economic growth. Its average GDP growth per year was nearly 7.12% (National Bureau of Statistics of China, 2017).

Since the beginning of the 21-st century, China has been making unprecedented and rapid progress in investment, consumption and export. Along with this development, China's urbanization process has begun to accelerate and hundreds of millions of people have moved into cities and settled down over the last decade (National Bureau of Statistics of China, 2017). China's real estate industry has entered into a development period. In 2016, China's real estate industry growth contributed to 7.8% of China's GDP growth (National Bureau of Statistics of China, 2017). According to the National Bureau of Statistics' research, nearly 80% of Chinese urban residents' assets is composed of real estate properties.

There are several factors that could contribute to the boom in the real estate market in China. The first one is due to the imbalance of supply and demand that results from State misallocation in China (Yang & He, 2011). Before 1997, land was not allowed to be traded in China. All the housing units Ire constructed and owned by the government or state-owned enterprises in the city. The government provided and distributed housing for urban residents and there was no real estate market at that time. Yang & He (2011) examines the privatization of housing assets and finds that the degree of misallocation prior to privatization affects subsequent selling prices in real estate market.

At the same time, due to the rising price in the real estate market in the last two decades, large amount of capital has been flowing into the real estate market (Chen, 2011). Central bank adopts a loose monetary policy. This leads to an increase in the money supplied and lower interest rates. Rising selling prices also tend to lead to speculation that affects the investment behavior of residents, potentially amplifying the boom and bust cycle of the real estate market. However, there is often a crisis behind the boom.

Take Japan for an example. In the 1980s, the real estate market boom was accompanied by financial liberalization, with a large amount of money flowing into the real estate market. However, when the monetary policy was tightened, the bubble in Japan's real estate market burst

and thus led to Japan's economy stagnating for 20 years (Xu, 1998). The saving and loan crisis in the United States in the 2007 was also the result of financial liberalization and the expansion in the real estate market (Di, 2013). China's current economic status is similar to those of the United States and Japan at that time. Not only is the value-added ratio of China's financial sector far higher than that of the Japan in the 1980's (Xu, 1998), China's financial and real estate sectors' expansion is also faster than that of Japan before the crisis.

Therefore, it is important to keep the selling prices in real estate market at a stable and reasonable level to prevent a housing bubble. This is beneficial to the economic development of China and potentially the world.

Since 2003, the Chinese government has implemented a series of policies including land policy, housing supply policy, financial policy, and the most famous restriction - "purchase restriction."[1] (Nie, 2011) The property tax reform trial which began in Shanghai and Chongqing in 2011, was seen as a prelude to the start of property tax in China. The Chinese government regards the property tax as an essential part to maintain a stable long-term price of the real estate market. One of its aim is to relieve the dependence on land-transferring fees for local government and change the current situation of land finance. The second aim is to decrease the speculative and investment demand in the real estate market and stabilize the selling price in the real estate market. Third, it is to adjust the income distribution so that people who occupy more houses will pay more taxes. Last but not the least, it aims to prevent financial risks and keep out too much bank credit flowing into the real estate industry.

So far, it has been more than seven years since the property tax has been established in Shanghai and Chongqing. The effect of the property tax has yet to be determined. But is the property tax effective at reducing or stabilized the selling price in these cities? I use data from 35 major cities in China and estimate the effect of the property taxes using a difference-in-differences method. I find that the property taxes are not effective at reducing the house prices in Shanghai and Chongqing.

Since China's tax policy reform in 2011, researches on property tax have gradually increased. However, there are not many in-depth empirical researches on the impact of property taxes on

[1] These policies will be introduced in Chapter 2.

China's real estate market. Therefore, it's essential to understand and analyze the relationship between the property tax and the selling price in China's real estate market.

The structure of the paper is of the following. Chapter 2 discusses the pilot property tax policy in Chongqing and Shanghai. Chapter 3 specifies the empirical strategy used. Chapter 4 discusses the results. Chapter 5 concludes.

Chapter 2 - Property Tax

Property tax is widely recognized as one of the necessary measures taken by the government to stabilize the real estate market's selling price. Property is a tax tool used not only to increase government revenue but also to narrow the gap between the rich and the poor in order to benefit people. At the present time, most countries in the world have a relatively sophisticated property tax system.

Property tax in China

In China, all taxes directly related to the real estate market are real estate taxes, which are levied in circulation. The current real estate taxes include real estate business tax, enterprise income tax, individual income tax, urban land use tax, urban real estate tax, stamp tax, land value-added tax, investment direction adjustment tax, sale and purchase agreement tax, farmland occupation tax. Property tax, on the other hand, is a tax levied on the property itself. The tax basis is based on the value of the property.

Establishment of property tax: in 1949, China issued the "national guidelines for tax administration and implementation," which listed property tax as one of the 14 basic taxes. In 1951, property tax combined with land tax to become real estate tax. The <temporary property tax regulations> [2]Ire issued in 1986, but the regulations had not been effective for a variety of reasons.

Real estate tax pilot: In January 2011, the property tax reform trial began in Shanghai and Chongqing.

Property tax legislation: In March 2018, the Chinese government announced the adoption of the <property tax law proposal>[3], which is still in the process of advancing legislation. Up to now, apart from Shanghai and Chongqing, there is no clear implementation schedule for the national property tax.

The target of property tax is to relieve the dependence on land finance[4] and to stabilize the rising house prices.

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[2] The state council of the people's republic of China - http://www.gov.cn/gongbao/content/2011/content_1860812.htm

[3] The state council of the people's republic of China - http://www.gov.cn/gongbao/content/2011/content_1860812.htm

[4] land finance policy refers to the local government gain funds turned into local fiscal revenue from separating and assigning the use rights of land to real estate developer.

Property tax reform trial in Shanghai and Chongqing

In 2008, because of the world financial crisis, China issued a series of policies to support the real estate market. Influenced by those favorable policies, China's real estate market continued to heat up in 2009, with an increase in the number of transactions and the a steep increase in house prices in the real estate market. In order to stop the overheated momentum in the real estate market, the government issued many policies, known as "the most severe regulation policies in real estate market in history" between 2010 and 2013.

These policies include[5]:

(1) Supply policies: focus on construction of affordable housing and give support to land supply and financial policies.

(2) Land policy: strengthen land regulation and control, improve land supply and use efficiency, and increase the proportion of small dwelling-size apartment in the market.

(3) Financial policy: loan restriction measures, such as increasing the down payment ratio, in which for a second property, the down payment ratio is more than 50%, increasing the loan interest rate; stopping the loan for purchase third property.

(4) Purchase restriction policy: for the major cities such as Beijing and Shanghai. After policy been implemented, households which already have two properties are not allowed to buy the third one.

(5) Tax policy: increase real estate transaction tax rate

(6) Property tax: launch the property tax reform trial Shanghai and Chongqing.

Table 2-1 Brief summary of property tax policy in Shanghai and Chongqing

	Shanghai	Chongqing
Tax range	Resisted & NON-Resisted population	Resisted & NON-Resisted population
Object of taxation	Area of property	Value of property

The property tax in Shanghai

Starting in Jan 28, 2011, the property tax is imposed on Shanghai residents who purchase second or more properties and non-Shanghai residents who purchase any properties in Shanghai. [6]

[5] The state council of the people's republic of China -http://www.gov.cn/zhengce/content/2011-01/27/content_4593.htm

[6] Shanghai municipal people's government - http://www.shanghai.gov.cn/nw2/nw2314/nw2318/nw26472/u6aw492.html

Tax deduction: property area per capita in one family is less than or equal to 60m².

The formula for calculating tax rates imposed per property in one year is generally as follows.

$$T = (A/N - 60 * N) * 0.0004P$$

Where A is total property area owned by one household, N is the number of people in one household, where P is the price for selling price for this property.

For example, Family A, B are all made up of three persons. There will be two different circumstances for property tax. family A purchased one 100m² property before property tax have been implemented, and bought another property which was 80m². Since (100+80)/3=60, family A did not need to pay property tax. For family B, instead of buying 80m² property like A, B purchased a 100m² property after property tax came out, (100+100)/3 was greater than 60 m². So, what B needs to pay is ((100+100)/3-60*3) = 20 m²tax based on the selling price for the property they just bought.

The property tax in Chongqing

Unlike Shanghai, the property tax in Chongqing is based on the types of properties: ordinary property, high-end property, and villas[7].

Tax deduction: property area per family is less than or equal to 180m² that residents already owned, and 100m² that residents newly purchased.

Tax rate:

For the property that selling price is less than three times larger than land selling price, tax rate is 0.5% of the property's total price.

For the property that selling price is more than three times and less than four times larger than its land selling price, tax rate is 1% of the property's total price.

For the property that selling price is more than four times larger than land selling price, tax rate is 1.2% of the property's total price.

Summary for property tax reform trial in Shanghai and Chongqing

Comparing the policy difference between Shanghai and Chongqing, it is clear that the property tax policy in Shanghai is more focused on the property's area while property tax policy in Chongqing is more focused the value of property. Because the property tax policy in Shanghai is

[7] Chongqing municipal people's government - http://www.cq.gov.cn/publicity_csqzf/czjrsj/swsw/391432

more focused on the property's area, smaller properties with prices far above the city's average price are exempt from the property tax while some other properties with prices far below the city's average price are subject to property taxes.

The tax revenue does not contribute much to local government finance. In 2011, the property tax revenue in Chongqing is 0.1 billion yuan, 2.1% of land-transferring fees. For Shanghai, the tax revenue is 2.76 billion-yuan, only 1.7% of land-transferring fees (Cai & Cai, 2014).

In the next chapter, I outline the empirical strategy to estimate the effect of property taxes.

Chapter 3 - Differences in Differences (DID) method

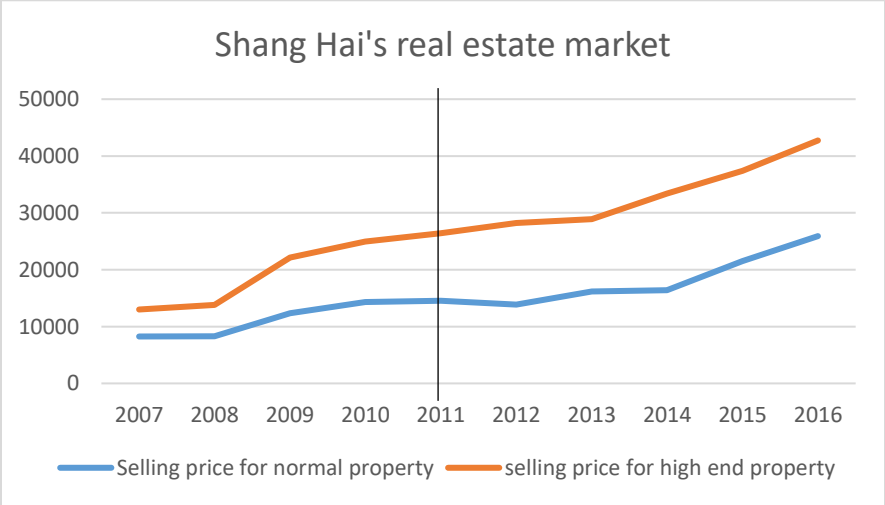
The aim of property tax is to reduce or stabilize the selling price in the real estate market. Therefore I use the selling price as the independent variable. In addition, Chongqing's property tax policy has different tax rates based on the price ratio between selling price and land price. Thus, I should separate the independent variable into two different kinds, which are the selling price in high-end property and the selling price in normal property.

I can use different methods to estimate the impact of property tax on the price change to the normal property and high-end property in Chongqing and Shanghai.

In the following figures, I plot the house prices in Chongqing and Shanghai before and after the property tax in 2011.

Figure 3-1 Selling price in Chongqing

Figure 3-2 Selling price in Shanghai



3.1 The DID method

After reading a large body of literature about the policy evaluation, I find it's better to use DID method to estimate the effect of these policies.

Heckman et al. (1985,1986) first proposed the use of DID method in econometric field to evaluate the effect of implementing public social policies. After this, research and application results of DID method emerged endlessly. Puhani (2000) assessed the impact of the unemployment relief policy reforms implemented by Pollan in 1991 on the duration of unemployment; Stewart (2004) assessed the employment impact of the minimum wage system introduced in Britain from 1999 to 2001. Donohue & Wolfers. (2005) found that the murder rate in the United States and Canada had the same trend of change. Canada, which abolished the death penalty, was used as the control group to evaluate the impact of resumption of death penalty system in the United States on the reduction of murder rate. The results showed that the death penalty policy in the United States did not affect the incidence of murder. Chen & Ravallion (2008) assessed the effects of world bank development projects using data from 2,000 households in China.

The expression of DID is described as follows:

$$Y = \beta 0 + \beta 1 * Policy_{\mathrm{i}} * Time_t + \beta 2 * Time_t + \beta 3 * Policy_i + \beta * X_{it} + \mu_{it}, \quad (1)$$

Where policy and time are both dummy variables. *Time* equals 0 for the years before the policy is implemented and1 for the years after the policy is implemented. Policy is equal to 1 for Shanghai and Chongqing and 0 for other cities. In other words, for treatment group, which is Shanghai and Chongqing, policy=1, another city (control group) policy=0. After setting up the interaction variable, I can investigate the effect of policy through the difference in each group.

For treatment group:

$$\triangle \text{ treatment group}(\text{Policy} = 1) = \text{Y}(\text{Time} = 1) - \text{Y}(\text{Time} = 0) = \beta 1 + \beta 2 \quad (2)$$

For control group:

$$\triangle \text{ control group}(\text{Policy} = 0) = \text{Y}(\text{Time} = 1) - \text{Y}(\text{Time} = 0) = \beta 2 \quad (3)$$

Last: △treatment group-△control group

$$(3) - (2) = (\beta 1 + \beta 2) - \beta 2 = \beta 1 \quad (4)$$

If β1 is significant, I can say that the policy has a significant effect on the independent variable.

The next thing is select appropriate treatment group and control group. Treatment group is definitely is Shanghai and Chongqing. And for the control group, I selected other 33 major cities have similar development level with treatment, which these cities are either capital/vice capital city of province or province-level municipality.

Because the property tax policies in Shanghai and Chongqing are different, thus I should have 3 different treatment and control groups.

Group 1: Treatment (Overall effect) group: Shanghai and Chongqing

Control group: other 33 cities

Group 2: Treatment group: Shanghai

Control group: Drop Chongqing, other 33 cities

Group 3: Treatment group: Chongqing

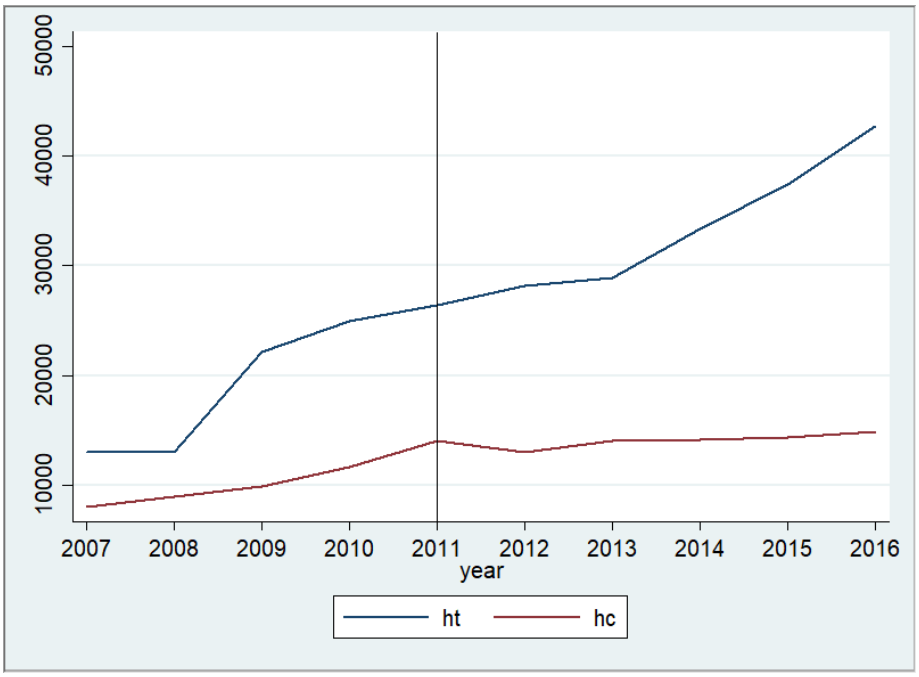
Control group: Drop Shanghai, other 33 cities

Thus, I should have 3*3=9 regressions in each stage.

The parallel trend assumption is the most important assumption to ensure I selected appropriate control group. In order to meeting the parallel trend assumption, during pre-intervention stage, the treatment and the control group should have similar trends to ensure internal validity in DID models.

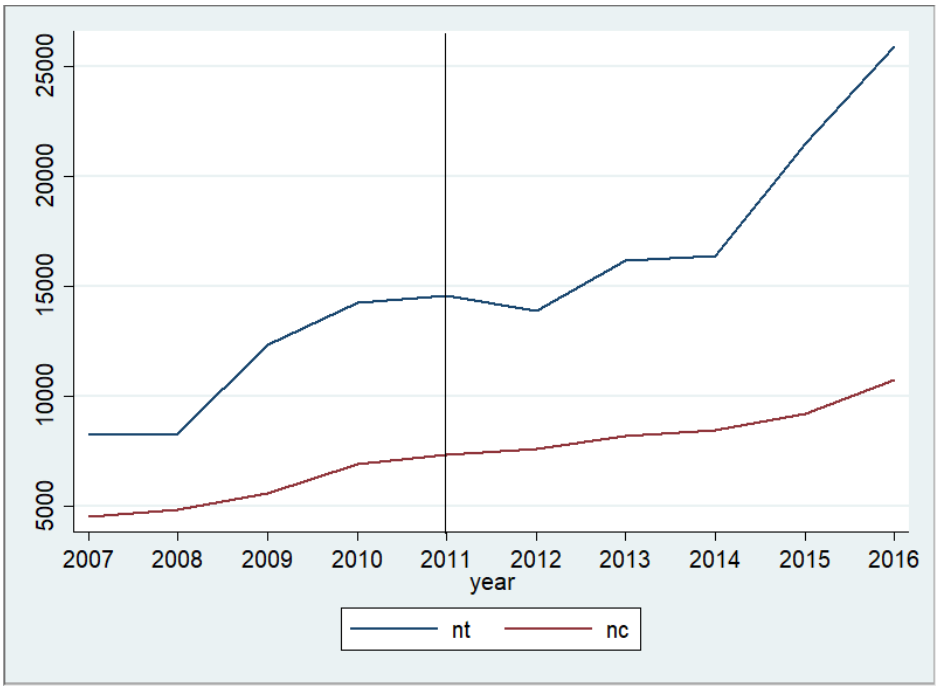
From the graphs below I can see that both Shanghai and Chongqing have the same linear trend with control group in pre-intervention stage. Thus, I can conclude that the selection of control group is appropriate and proceed using the DID method.

Figure 3-3 Liner trend between Shanghai's high-end property's selling price and average selling price for control group's high-end property



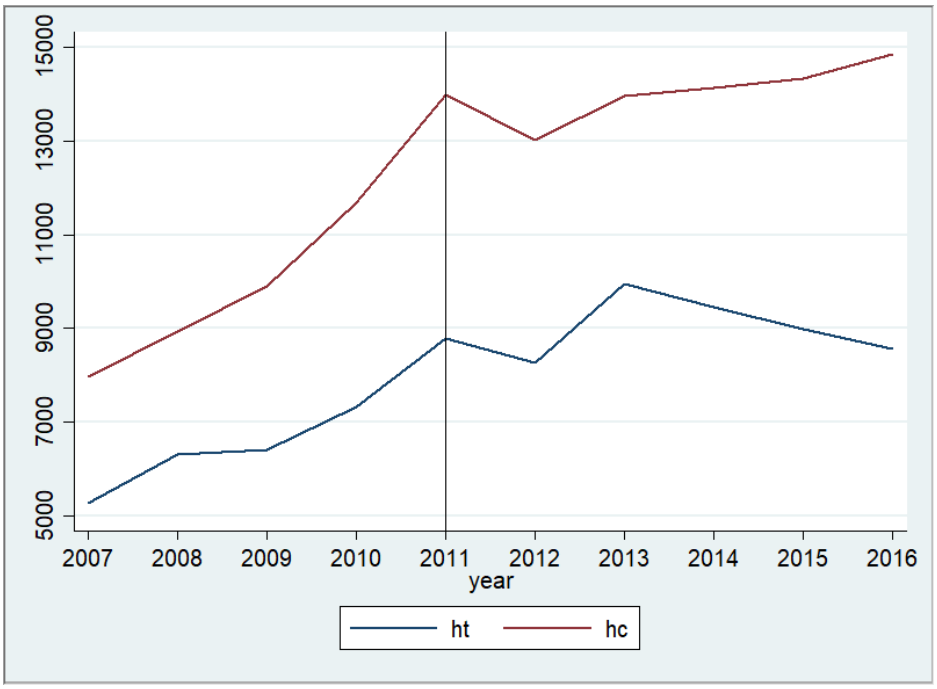
Where ht is Shanghai, hc is control group

Figure 3-4 Liner trend between Shanghai's normal property's selling price and average selling price for control group's normal property



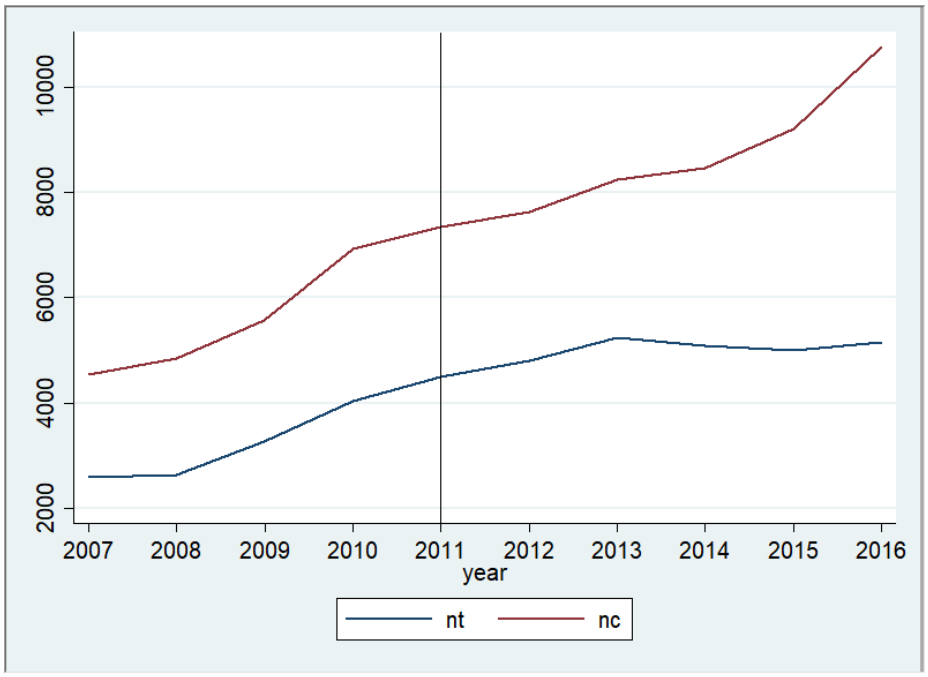
Where nt is Shanghai, nc is control group

Figure 3-5 Liner trend between Chongqing's high-end property's selling price and average selling price for control group's high-end property



Where ht is Chongqing, hc is control group

Figure 3-6 Liner trend between Chongqing's normal property's selling price and average selling price for control group's normal property



Where nt is Chongqing, nc is control group

3.2 The variables in DID model

After comparing lots of regression models from literature and combining personal experience with analysis on the unique China's real estate market, I include the following independent variables to control for city characteristics that change with time. The following variables affect housing demand in the city over time: city's GDP, registered population, non-registered population, disposable income, CPI and sex ratio. The following variables affect housing supply in the city over time: investment for the normal and high-end property, supply area for normal and high-end property.

For demand side factors, I expect GDP to have a positive effect on housing prices. Similarly, when disposable income increases, the demand will increase, and this leads to an increase in selling price. CPI measures the inflation rate in the city. I expect CPI to be positively correlated with housing prices, however, it is possible that CPI is negatively correlated with housing prices if higher inflation leads to lower savings for households, and this lowers their ability to save for the down payment for a house purchase.

For supply side factors, I expect the area supplied is negatively correlated with house prices. Higher investment in the real estate market implies higher cost for houses, and this could lead to higher prices.

In addition, I include the sex ratio as an independent variable because an unbalanced sex ratio is an important and unique factor behind the high selling price in China's real estate market (Wang, 2011).

3.3 Traditional Chinese culture, Sex ratio, and Marriage market

In ancient China, family name right was directly related to the inheritance and prosperity of one family. To give up the family name right is to break away from any relationship with the family. Therefore, it can be seen that ancient China sticks to the family name, while men had higher social status compared to women because they could keep the family name.

The imperial examination system was a significant reform in Chinese history, which has improved the previous employment system and thoroughly broke the monopoly of blood ties and family ties so that some competent scholars from the middle and lower classes of society can

enter the upper class and get opportunities to put their talents into use. However, in ancient China, women are not allowed to participate in the imperial examination system.

Social status based on the division of labor also is an important factor. Ancient China divided labor work into four kinds and arranged them based on social status respectively (Chi, 2003), which are SHI, NONG, GONG, SHANG. Where SHI represent scholars and officials. NONG is the farmer. Gong is the craftsman and SHANG for the businessman. As mentioned above, women were not allowed to participate in the imperial examination system. When it comes to farmers and craftsmen. Because of the backward technology in ancient time while these jobs are also kind of physical work, leading to the demand for male labor force far exceeding the demand for female labor force. And businessman is the lowest social class in society. To conclude that, emphasis of ancient Chinese citizens on their family development and continuity leads to the preference for sons, which became a common concept in ancient China.

In modern times, although this kind of preference has eased, but it still persists. Moreover, the modern medicine, genetic technology also provides the technical condition to those parents who want to select birth gender. Some scholars like Zhang (2008) also mentioned that there is a positive correlation between medical technology development and sex ratio. Before the mid-1980s, the sex ratio was around 103:100 to 107:100, which is basically in a healthy range. However, according to the research data released by the national bureau of statistics at 2014, China's birth sex ratio was 115.88: 100.

As a result of the imbalance in sex ratio, the competition pressure of men in the marriage market will increase. According to the calculation by Li (2013), by 2020, the population of the male around 22-34 years old will be 26 million more than the population of the female at the same age in China. Wei & Zhang (2011) also pointed out that families are rushing to buy a larger, more expensive property to increase the competitive power for their son in the marriage market. Furthermore, it will increase the selling prices in local real estate market. Their research also shows that the unbalanced sex ratio can explain about half of the rise in China's household saving rate between 1990-2007. They also used 2000 urban-rural area data to examine the relationship between sex ratio and property selling price. It shows that the areas with higher sex ratio has not only higher selling prices, but also have larger average housing sizes. This effect is even more pronounced in urban areas, where 0.1% percent increase in sex ratio will lead to 3.7%

increase in unit selling price and 3.7% increase in selling area, resulting in 7.4% increase in total selling price.

Table 3-1 Predict relationship between dependent variables and independent variables

	The relationship with selling price is expected to be
GDP	Positive
Registered population	Positive
NON-registered population	Positive
Disposable income	Positive
CPI	Positive/negative
Sex ratio	Positive
Investment	Positive
Supply area	Negative

3.4 How property tax will affect the rental market

Since the real estate market has two markets, the ownership (selling) market and rental market. Property tax can also affect the rental market.

Normally, consumers in real estate market can be divided into three types (Guo, 2008). (Note, these types can both appear in one person, but in order to facilitate the analysis, I assume that everyone only has one type of demand in real estate market.)

1. Actual use demand. This type of demand is the primary demand of consumer in China's real estate market. Such consumers usually purchase, or rent a property for their own using.
2. Investment demand. This type of consumer usually purchases the property below its actual price. Because they forecast that the gross income of this property will be close to or even exceed its buying price in the future. They usually gain profit through the rental return.
3. Speculative demand. Different from the investor, the speculator can accept much higher buying price than the investor. As long as the speculator predicts that someone will pay the higher price to purchase this property. They usually gain profit through the price difference between buying and selling a property.

Suppose in City A's rental market (assume the property is indifference good) have equilibrium quantity EQ and equilibrium price R.

When property tax has been published, at the same time the local rental market is in surplus. The investor will be decreasing the rent in order to rent their property out, leading to the price back to equilibrium price. But, after decreasing the rent, some investor found they are having negative rent revenue (tax>rent). Thus, they decided to sell their property to stop the loss. This will decrease supply in rent market and increase supply in selling market. Thus, as supply decrease in rental market, the rent price will increase. Meantime, the supply increase in selling market will leading to selling price decrease, and attract consumer from rental market to selling market, decrease the demand in rental market and increase the demand in selling market. So, the quantity in rental market will decrease and quantity in selling market will increase.

Figure 3-7 Rental market (surplus)

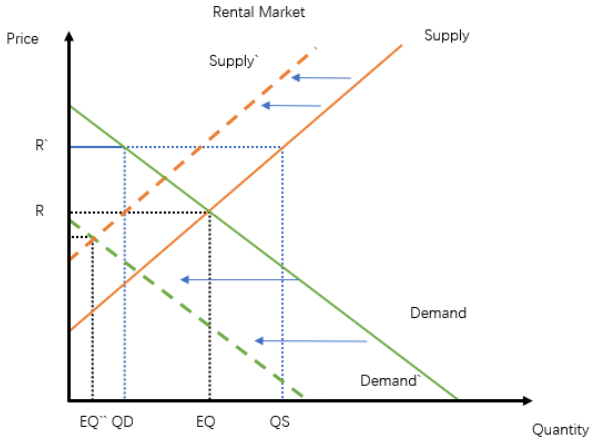


Figure 3-8 Selling market (surplus)

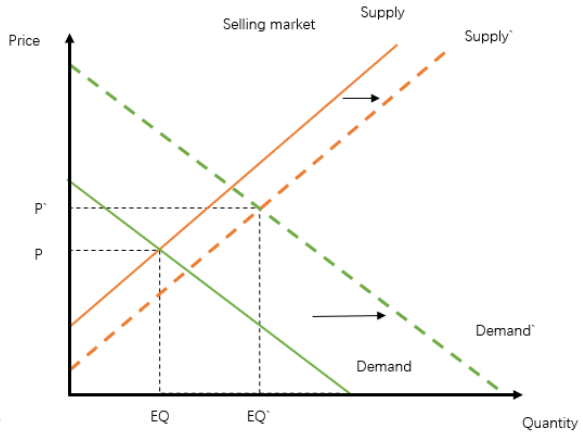


Table 3-2 Then change in both markets will rental market is in shortage

	Rental market	Selling market
Step 1	Property tax cause supply decrease, price increase	Supply increase, price decrease
Step 2	Demand decrease	Demand increase
Overall	Quantity decrease, price unknown	Quantity increase, price unknown

When property tax has been published, at the same time the local rental market is in shortage. Investor will find out if there is an increase in their price to R, they can shift the costs including both maintenance fees and property tax to the consumer. The will attract the speculator in selling market enter rental market because they found that they will have more profit in long run. So, when speculator entering rental market, that will lead supply in selling decrease, increasing the price in selling market, and the supply in rental market will increase lead to rent price decrease. This will attract consumer from selling market to rental market, increase the demand in rental market and decrease the demand in selling market. So, the quantity in rental market will increase and quantity in selling market will decrease.

Figure 3-9 Rental market (shortage)

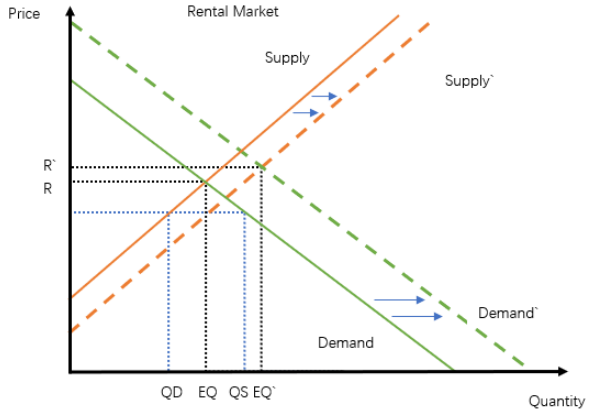


Figure 3-10 Selling market (shortage)

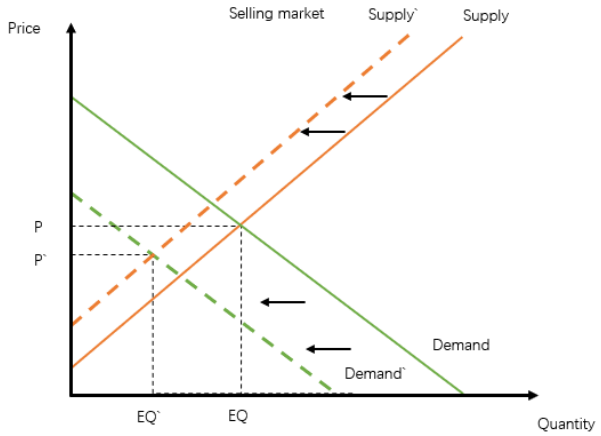


Table 3-3 Then change in both markets will rental market is in shortage

	Rental market	Selling market
Step 1	Property tax cause supply increase, price decrease	Supply decrease, price increase
Step 2	Demand increase	Demand decrease
Overall	Quantity increase, price unknown	Quantity decrease, price unknown

3.5 Conclusion of Chapter 3

In this chapter, the empirical strategy is specified and the list of independent variables included is explained. Lastly, I also explain that property taxes could have an effect on the rental market. In next chapter, I will use DID model to examined the effect of property taxes in Shanghai and Chongqing.

Chapter 4 - Empirical analysis

For the regression model, I estimate that:

For the high-end property:

$$ln(p\_h) = \beta 0 + \beta 1 * Policy_i * Time_t + \beta 2 * Time_t + \beta 3 * Policy_i + \beta 4 * Ln(GDP_{it}) + \beta 5 * ln(CP_{it}) + \beta 6 * ln(NP_{it}) + \beta 7 * ln(I_{it}) + \beta 8 * ln(CPI_{it}) + \beta 9 * ln(SR_{it}) + \beta 10 * ln(i_{h_{it}}) + \beta 11 * ln(s_{h_{it}}) + \mu \quad (5)$$

For the normal property:

$$ln(p\_n) = \beta 0 + \beta 1 * Policy_i * Time_t + \beta 2 * Time_t + \beta 3 * Policy_i + \beta 4 * Ln(GDP_{it}) + \beta 5 * ln(CP_{it}) + \beta 6 * ln(NP_{it}) + \beta 7 * ln(I_{it}) + \beta 8 * ln(CPI_{it}) + \beta 9 * ln(SR_{it}) + \beta 10 * ln(i_{n_{it}}) + \beta 11 * ln(s_{n_{it}}) + \mu \quad (6)$$

From the last chapter I can know that the property tax will cause the quantity change in rental market, so I can set up another DID regression model for total rental area. And combine with the sign of coefficient of interaction variable from the selling model, I can find out how the circumstance in rental market will affected the selling price after the property tax is implemented.

$$ln(r) = \beta 0 + \beta 1 * Policy_i * Time_t + \beta 2 * Time_t + \beta 3 * Policy_i + \beta 4 * Ln(GDP_{it}) + \beta 5 * ln(CP_{it}) + \beta 6 * ln(NP_{it}) + \beta 7 * ln(I_{it}) + \beta 8 * ln(CPI_{it}) + \beta 9 * ln(SR_{it}) + \beta 10 * ln(i_{t_{it}}) + \beta 11 * ln(s_{t_{it}}) + \mu \quad (7)$$

Table 4-1 Variables

Variable	Obs	Mean	Std.Dev.	Min	Max
Selling price for normal property	350	7483	5027	1602	45498
Selling price for high-end property	350	12576	9439	1823	71306
Total rental area in rental market	350	850.5	2338	0	13552
CPI	350	116.4	15.30	100	256.2
City's GDP	350	6035	6420	357.9	82900
Disposable income	350	26444	9783	9046	57692
Registered population	350	603.0	298.2	17.60	1450
Non-Registered population	350	197.5	258.6	2	1404
Sex ratio	350	104.0	6.590	91.56	155.0
Investment for normal property	350	617.7	516.6	25.54	4113
Investment for high-end property	350	46.63	66.27	0.0100	416.5
Supply area for normal property	350	721.5	567.4	45.57	3386
Supply area for high-end property	350	40.55	57.08	0.130	390.6
Total investment in real estate market	350	664.3	559.7	29.83	4130
Total supply area in real estate market	350	762.0	606.9	55.17	3490

4.1 Regression result

I first report the baseline results without controlling for any city-time characteristics and fixed effects.

Table 4-2 Basic regression

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.059	0.045	0.604
	(0.240)	(0.198)	(0.839)
Year	0.435***	0.450***	-0.672***
	(7.365)	(8.333)	(-3.877)
Property tax	0.270	0.158	1.940***
	(1.409)	(0.902)	(3.480)
Constant	8.980***	8.485***	5.549***
	(196.244)	(203.030)	(41.491)
Observations	350	350	343
R-squared	0.158	0.183	0.145

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.185	0.063	0.721
	(0.551)	(0.207)	(0.746)
Year	0.435***	0.450***	-0.672***
	(7.545)	(8.648)	(-4.022)
Property tax	0.785***	0.767***	3.835***
	(3.012)	(3.268)	(5.121)
Constant	8.980***	8.485***	5.549***
	(201.019)	(210.711)	(43.049)
Observations	340	340	333
R-squared	0.211	0.242	0.228

Table 4-3 Shanghai Basic regression

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-4 Chongqing Basic regression

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	-0.067	0.027	0.486
	(-0.198)	(0.088)	(0.503)
Year	0.435***	0.450***	-0.672***
	(7.564)	(8.673)	(-4.020)
Property tax	-0.245	-0.452*	0.045
	(-0.943)	(-1.931)	(0.061)
Constant	8.980***	8.485***	5.549***
	(201.545)	(211.334)	(43.023)
Observations	340	340	333
R-squared	0.155	0.205	0.048

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In this model I only add the interaction variable as one of the independent variables. The interaction variable in Chongqing shows negative and insignificant relationship to high-end property selling price, while the overall group and Shanghai group both have positive sign. This means that because of the market scale and policy differences, the property tax may have different effect on different cities.

In the next set of regressions, I report the results after controlling for the following independent variables that vary over city and time: GDP, registered population, and non-registered population.

Table 4-5 Overall regression after adding variable from city level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.097	0.077	0.665
	(0.514)	(0.489)	(1.070)
Year	0.135***	0.174***	-1.225***
	(2.656)	(4.133)	(-7.290)
Property tax	-0.216	-0.358***	0.747
	(-1.434)	(-2.852)	(1.510)
GDP(LOG)	0.442***	0.362***	0.648***
	(9.491)	(9.373)	(4.206)
Registered population (LOG)	-0.283***	-0.174***	-0.139
	(-5.622)	(-4.157)	(-0.831)
Non-Registered population (LOG)	0.088***	0.134***	0.363***
	(3.387)	(6.198)	(4.216)
Constant	6.867***	6.122***	-0.269
	(27.752)	(29.760)	(-0.331)
Observations	350	350	343
R-squared	0.509	0.606	0.369

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-6 Shanghai regression after adding variable from city level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.352	0.214	1.038
	(1.390)	(1.031)	(1.237)
Year	0.120**	0.161***	-1.275***
	(2.455)	(4.032)	(-7.817)
Property tax	0.214	0.102	2.276***
	(1.050)	(0.613)	(3.379)
GDP(LOG)	0.496***	0.412***	0.819***
	(10.915)	(11.023)	(5.372)
Registered population (LOG)	-0.351***	-0.236***	-0.352**
	(-7.098)	(-5.807)	(-2.113)
Non-Registered population (LOG)	0.049*	0.098***	0.241***
	(1.892)	(4.622)	(2.800)
Constant	7.028***	6.277***	0.231
	(29.409)	(31.990)	(0.291)
Observations	340	340	333
R-squared	0.557	0.647	0.425

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-7 Chongqing regression after adding variable from city level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	-0.148	0.052	0.324
	(-0.588)	(-0.252)	(0.385)
Year	0.121**	0.162***	-1.272***
	(2.488)	(4.076)	(-7.788)
Property tax	-0.595***	-0.768***	-0.621
	(-3.012)	(-4.747)	(-0.946)
GDP(LOG)	0.494***	0.410***	0.813***
	(10.906)	(11.045)	(5.331)
Registered population (LOG)	-0.350***	-0.235***	-0.348**
	(-7.087)	(-5.810)	(-2.085)
Non-Registered population (LOG)	0.049*	0.098***	0.242***
	(1.917)	(4.673)	(2.809)
Constant	7.034***	6.281***	0.244
	(29.529)	(32.188)	(0.307)
Observations	340	340	333
R-squared	0.526	0.631	0.290

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

First, the interaction variable's sign and significance are not changed compare to the basic regression model. And for the rest of variables, GDP shows a significant and positive relationship on three different model's independent variable as I expected. The city development will lead to an increase in the selling price in the real estate market, and will also attract more population to this city seeking for better job opportunities, thus resulting in an increase in rental area. The registered population has a significant negative effect on the selling price of high-end property and normal property in each city and a significant negative effect on total rental area, while non-registered population shows a significant positive effect on the selling price for each city's normal property market and total rental area. These relationships indicate the non-registered population is the primary consumer in either selling market or rental market.

Although R^2 increase significantly as compared to the basic regression model, but it still relatively low. In the next set of regressions, I control for disposable income and sex ratio at city level that vary over time.

Table 4-8 Overall Regression result after adding variable from Consumer level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.130	0.121	0.684
	(0.801)	(1.040)	(1.107)
Year	0.017	-0.054	-1.083***
	(0.277)	(-1.242)	(-4.630)
Property tax	-0.050	-0.157*	0.796
	(-0.382)	(-1.676)	(1.595)
GDP(LOG)	0.206***	0.075**	0.573***
	(4.298)	(2.185)	(3.138)
Registered population (LOG)	-0.139***	-0.003	-0.055
	(-2.954)	(-0.089)	(-0.303)
Non-Registered population (LOG)	0.035	0.083***	0.310***
	(1.511)	(5.032)	(3.515)
Disposable income (LOG)	0.931***	1.082***	0.407
	(9.120)	(14.827)	(1.041)
CPI (LOG)	-1.549***	-1.162***	-2.162**
	(-6.217)	(-6.527)	(-2.275)
Sex ratio (LOG)	1.409***	1.486***	1.734
	(3.932)	(5.806)	(1.268)
Constant	-0.368	-4.506***	-1.922
	(-0.179)	(-3.065)	(-0.245)
Observations	350	350	343
R-squared	0.642	0.787	0.383

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-9 Shanghai Regression result after adding variable from Consumer level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.363*	0.223	1.090
	(1.654)	(1.436)	(1.315)
Year	0.051	-0.027	-0.951***
	(0.849)	(-0.639)	(-4.188)
Property tax	0.256	0.140	2.357***
	(1.454)	(1.123)	(3.543)
GDP(LOG)	0.293***	0.144***	0.921***
	(6.013)	(4.164)	(4.973)
Registered population (LOG)	-0.200***	-0.051	-0.299*
	(-4.289)	(-1.550)	(-1.678)
Non-Registered population (LOG)	0.006	0.060***	0.194**
	(0.278)	(3.726)	(2.226)
Disposable income (LOG)	0.763***	0.947***	-0.261
	(7.387)	(12.962)	(-0.663)
CPI (LOG)	-1.521***	-1.137***	-2.053**
	(-6.308)	(-6.671)	(-2.242)
Sex ratio (LOG)	1.729***	1.744***	3.036**
	(4.926)	(7.029)	(2.276)
Constant	-0.521	-4.640***	-2.626
	(-0.262)	(-3.298)	(-0.347)
Observations	340	340	333
R-squared	0.672	0.806	0.445

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-10 Chongqing Regression result after adding variable from Consumer level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	-0.092	0.027	0.323
	(-0.422)	(0.172)	(0.389)
Year	0.057	-0.022	-0.937***
	(0.958)	(-0.511)	(-4.111)
Property tax	-0.396**	-0.485***	-0.906
	(-2.239)	(-3.879)	(-1.351)
GDP(LOG)	0.295***	0.145***	0.922***
	(6.039)	(4.204)	(4.963)
Registered population (LOG)	-0.200***	-0.051	-0.298*
	(-4.298)	(-1.562)	(-1.669)
Non-Registered population (LOG)	0.006	0.060***	0.195**
	(0.286)	(3.746)	(2.234)
Disposable income (LOG)	0.754***	0.938***	-0.282
	(7.253)	(12.780)	(-0.710)
CPI (LOG)	-1.535***	-1.149***	-2.078**
	(-6.380)	(-6.758)	(-2.266)
Sex ratio (LOG)	1.731***	1.745***	3.046**
	(4.942)	(7.051)	(2.281)
Constant	-0.378	-4.517***	-2.376
	(-0.190)	(-3.212)	(-0.313)
Observations	340	340	333
R-squared	0.648	0.796	0.315

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

For the interaction variables, both sign and significance are not affected compared to the basic regression model except the interaction term on selling price in Shanghai's high-end property market model. The interaction variable on selling price in Shanghai's high-end property market model indicates that the property tax will significantly increase the selling price in Shanghai's

high-end property. This is puzzling because most of the literature finds that property taxes should lead to lower house prices. One possible explanation for this is that Shanghai's property tax is levied based on area exceeding the per capita area allotted. This implies that buyers and real estate companies after the property tax have incentives to purchase and construct houses with smaller areas. This could lead to a higher house prices per square meter in Shanghai because smaller units are usually less cost efficient and tend to have higher per-unit prices.

For disposable income, it comes as no surprise that it has a significant and positive relationship on the selling price for each kind of market. As purchase power increases, demand will increase as well, leading to an increase in selling price in both markets. CPI shows a significant negative relationship on the selling price for each kind of market and rental area. The main reason for this could be that as the inflation rate increases, the real interest rate decreases (real interest rate = nominal interest rate – inflation rate). Therefore, people are saving less, and this lowers their ability to come up with the down payment for a house. Furthermore, bank lending is decreased. This lowers people's ability to get loans (Guo & He, 2010). These factors will lead to a decrease in demand and reduce the selling price. And just like Wei & Zhang (2011), the sex ratio has significant relationship with selling price in each city's each property selling market. An increase in sex ratio leads to higher prices. In addition, the rental area is also positively affected by the sex ratio. Since the non-registered population is the primary consumer in either selling market or rental market, demand in rental market is also driven by the non-registered male population.

After controlling for these additional variables, I can find that R^2 increases. In the next set of regressions, I include the variables from supply side.

Table 4-11 Overall Regression result after adding variable from producer level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.136	0.108	0.709
	(0.835)	(0.953)	(1.166)
Year	0.006	-0.052	-0.861***
	(0.093)	(-1.168)	(-3.609)
Property tax	-0.065	-0.077	0.816
	(-0.486)	(-0.829)	(1.626)
GDP(LOG)	0.187***	0.122***	0.687***
	(3.766)	(3.381)	(3.557)
Registered population (LOG)	-0.145***	0.029	0.138
	(-3.020)	(0.813)	(0.712)
Non-Registered population (LOG)	0.038*	0.089***	0.329***
	(1.650)	(5.529)	(3.745)
Disposable income (LOG)	0.914***	1.007***	0.823**
	(8.925)	(13.467)	(2.033)
CPI (LOG)	-1.496***	-1.070***	-2.445***
	(-5.966)	(-6.129)	(-2.592)
Sex ratio (LOG)	1.400***	1.378***	1.941
	(3.913)	(5.503)	(1.437)
Investment on high-end property (LOG)	0.036*		
	(1.741)		
Supply area on high-end property (LOG)	-0.020		
	(-1.134)		
Investment on normal property (LOG)		0.025	
		(0.701)	
Supply area on normal property (LOG)		-0.130***	
		(-4.199)	
Total investment on property (LOG)			-0.702***
			(-3.639)
Total Supply area on property (LOG)			0.382**
			(2.272)
Constant	-0.266	-3.650**	-6.239
	(-0.130)	(-2.510)	(-0.796)
Observations	350	350	343
R-squared	0.645	0.799	0.407

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-12 Shanghai Regression result after adding variable from producer level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.366*	0.201	1.142
	(1.670)	(1.314)	(1.397)
Year	0.040	-0.043	-0.800***
	(0.666)	(-1.010)	(-3.460)
Property tax	0.240	0.177	2.209***
	(1.359)	(1.438)	(3.359)
GDP(LOG)	0.273***	0.162***	0.917***
	(5.449)	(4.547)	(4.814)
Registered population (LOG)	-0.206***	-0.041	-0.235
	(-4.344)	(-1.124)	(-1.187)
Non-Registered population (LOG)	0.010	0.064***	0.189**
	(0.418)	(3.954)	(2.147)
Disposable income (LOG)	0.747***	0.880***	0.153
	(7.210)	(11.632)	(0.375)
CPI (LOG)	-1.469***	-1.063***	-2.441***
	(-6.056)	(-6.297)	(-2.679)
Sex ratio (LOG)	1.720***	1.647***	3.390**
	(4.908)	(6.688)	(2.555)
Investment on high-end property (LOG)	0.035*		
	(1.771)		
Supply area on high-end property (LOG)	-0.019		
	(-1.079)		
Investment on normal property (LOG)		0.065*	
		(1.831)	
Supply area on normal property (LOG)		-0.109***	
		(-3.614)	
Total investment on property (LOG)			-0.520***
			(-2.754)
Total Supply area on property (LOG)			0.503***
			(3.074)
Constant	-0.417	-3.799***	-7.050
	(-0.209)	(-2.703)	(-0.932)
Observations	340	340	333
R-squared	0.675	0.813	0.465

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-13 Chongqing Regression result after adding variable from producer level

	(1) Selling price for high-end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	-0.086	0.026	0.344
	(-0.393)	(0.173)	(0.421)
Year	0.047	-0.038	-0.786***
	(0.779)	(-0.877)	(-3.388)
Property tax	-0.412**	-0.416***	-1.044
	(-2.318)	(-3.263)	(-1.525)
GDP(LOG)	0.275***	0.163***	0.918***
	(5.479)	(4.570)	(4.807)
Registered population (LOG)	-0.206***	-0.041	-0.234
	(-4.354)	(-1.140)	(-1.180)
Non-Registered population (LOG)	0.010	0.064***	0.190**
	(0.421)	(3.967)	(2.152)
Disposable income (LOG)	0.737***	0.873***	0.137
	(7.076)	(11.471)	(0.333)
CPI (LOG)	-1.484***	-1.077***	-2.471***
	(-6.129)	(-6.383)	(-2.708)
Sex ratio (LOG)	1.723***	1.651***	3.402**
	(4.925)	(6.713)	(2.561)
Investment on high-end property (LOG)	0.035*		
	(1.752)		
Supply area on high-end property (LOG)	-0.018		
	(-1.046)		
Investment on normal property (LOG)		0.063*	
		(1.792)	
Supply area on normal property (LOG)		-0.106***	
		(-3.526)	
Total investment on property (LOG)			-0.524***
			(-2.772)
Total Supply area on property (LOG)			0.507***
			(3.087)
Constant	-0.274	-3.699***	-6.831
	(-0.138)	(-2.631)	(-0.901)
Observations	340	340	333
R-squared	0.651	0.804	0.339

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

In this set of regressions, I add investment and supply area for each kind of property. So far, I've included all variables that vary by city and time. For the variables I add from previous stage, both the sign and the significance are not affected. The result shows that property tax has significant positive effect on selling price in Shanghai's high-end market. And has no significant effect on the selling price for other different kinds of property market and total area in the rental market in each city.

Lastly, in terms of investment and supply area, investment has a significant positive relationship on selling price for high-end property and normal property in each city, and the supply area shows an insignificant negative relationship on the selling price of high-end property and normal property. I can find that the consumer more focus on quality. The increasing in investment will leading to increase in property's quality, furthermore will increase the selling price. The supply area for normal property and selling price of normal property has a significant negative relationship, and supply area for high-end property and its selling price has an insignificant negative relationship, which can be accounted for by basic market rule, whereas supply goes up, the price goes down. And given that investment has a significant negative impact on the total rental area in the rental market, I can assume that as investment goes up, the increase in selling price also leads to the rise in rent price. So, renters tend to rent a smaller property instead of a larger one.

However, I can't conclude that the property tax does not affect the selling price because the model still has some problems. In panel data, house prices at city level are correlated over time. In the next set of regressions, I need to include the city fixed effects and time fixed effects to control for unobservable characteristics at city level and changes in time trends. I also cluster by city to allow correlation in the error time within a city over time.

Table 4-14 Overall Regression result after adding fixed effects

	(1) Selling price for high end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.103	0.063*	0.649***
	(0.825)	(1.767)	(3.243)
GDP(LOG)	0.023	-0.039	0.188
	(0.257)	(-1.199)	(1.055)
Registered population (LOG)	-0.085	0.107**	0.038
	(-1.102)	(2.090)	(0.093)
Non-Registered population (LOG)	-0.025	-0.003	0.168
	(-0.437)	(-0.121)	(0.709)
Disposable income (LOG)	0.555	0.248	1.269
	(1.524)	(0.975)	(1.241)
CPI (LOG)	-0.047	-0.042	-1.799***
	(-0.153)	(-0.328)	(-4.380)
Sex ratio (LOG)	0.500***	0.192	-0.623
	(2.817)	(0.577)	(-0.431)
Investment on high end property (LOG)	0.042*		
	(1.746)		
Supply area on high end property (LOG)	-0.004		
	(-0.305)		
Investment on normal property (LOG)		0.068**	
		(2.041)	
Supply area on normal property (LOG)		-0.030	
		(-1.110)	
Total investment on property (LOG)			-0.750***
			(-4.100)
Total Supply area on property (LOG)			0.113
			(0.570)
City Fixed effects	YES	YES	YES
Time Fixed effects	YES	YES	YES
Constant	2.526	5.481*	8.731
	(0.674)	(2.020)	(0.635)
Observations	350	350	343
R-squared	0.855	0.963	0.771

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-15 Shanghai Regression result after adding fixed effects

	(1) Selling price for high end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	0.262***	0.089**	0.750***
	(4.025)	(2.183)	(2.810)
GDP(LOG)	0.040	-0.036	0.197
	(0.447)	(-1.082)	(1.111)
Registered population (LOG)	-0.078	0.108**	0.047
	(-1.027)	(2.099)	(0.116)
Non-Registered population (LOG)	-0.019	-0.002	0.175
	(-0.329)	(-0.070)	(0.733)
Disposable income (LOG)	0.599	0.249	1.327
	(1.632)	(0.955)	(1.274)
CPI (LOG)	-0.080	-0.051	-1.834***
	(-0.267)	(-0.392)	(-4.439)
Sex ratio (LOG)	0.492**	0.182	-0.647
	(2.717)	(0.545)	(-0.448)
Investment on high end property (LOG)	0.043*		
	(1.820)		
Supply area on high end property (LOG)	-0.004		
	(-0.260)		
Investment on normal property (LOG)		0.067**	
		(2.045)	
Supply area on normal property (LOG)		-0.028	
		(-1.052)	
Total investment on property (LOG)			-0.754***
			(-4.048)
Total Supply area on property (LOG)			0.124
			(0.616)
City Fixed effects	YES	YES	YES
Time Fixed effects	YES	YES	YES
Constant	2.019	5.500*	8.192
	(0.539)	(1.953)	(0.578)
Observations	340	340	333
R-squared	0.854	0.962	0.772

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4-16 Chongqing Regression result after adding fixed effects

	(1) Selling price for high end property (LOG)	(2) Selling price for normal property (LOG)	(3) Total rental area (LOG)
Property tax*year	-0.050	0.034	0.557***
	(-1.148)	(1.550)	(3.383)
GDP(LOG)	0.050	-0.029	0.199
	(0.561)	(-0.932)	(1.115)
Registered population (LOG)	-0.078	0.108*	0.050
	(-1.026)	(2.015)	(0.123)
Non-Registered population (LOG)	-0.016	-0.000	0.176
	(-0.267)	(-0.017)	(0.735)
Disposable income (LOG)	0.561	0.168	1.369
	(1.367)	(0.637)	(1.189)
CPI (LOG)	-0.072	-0.033	-1.830***
	(-0.240)	(-0.255)	(-4.350)
Sex ratio (LOG)	0.515***	0.213	-0.602
	(2.860)	(0.643)	(-0.418)
Investment on high end property (LOG)	0.041*		
	(1.718)		
Supply area on high end property (LOG)	-0.003		
	(-0.197)		
Investment on normal property (LOG)		0.071**	
		(2.171)	
Supply area on normal property (LOG)		-0.028	
		(-1.022)	
Total investment on property (LOG)			-0.745***
			(-4.010)
Total Supply area on property (LOG)			0.123
City Fixed effects	YES	YES	YES
Time Fixed effects	YES	YES	YES
Constant	2.149	5.990**	7.446
	(0.522)	(2.070)	(0.495)
Observations	340	340	333
R-squared	0.845	0.962	0.718

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Based on the results in Tables 4-14, 4-15, 4-16, I find the following:

1. From overall equation, seems like the property tax will leading to price insignificantly increase in high-end property market and significantly increase the selling price increase in normal property market while the rental area in the rental market is also significantly increase because of property tax.
2. From different city regression: From Shanghai, I can see that the interaction variable has significant and positive effect in all markets. This suggests that the property tax pilot in Shanghai was a total failure. And about Chongqing, from the Table 4-13 I find that interaction variable has negative but insignificantly relationship to the selling price of high-end property and positive insignificant relationship on normal property. Also, has significant positive relationship with rental area. So, I can say that property tax in Chongqing is relatively success compare to Shanghai because the property tax actually decreases the selling price for high-end property.
3. From the result I can see that property tax will significantly increase the total area in both cities' rental market, combining with the circumstance that both Shanghai and Chongqing's rental market are in shortage in past 8 years (Wu, 2015) I can prove that, when the city is experiencing shortage in the rental market, property tax will increase the selling price in real estate market. Moreover, the main property in rental market is normal property, means the when there is shortage in the rental market, property tax will more likely to increase the selling price in normal property market. But just like I said in previous chapter, because Shanghai's property tax policy is based on the property's area, there is very likely that some of high-end property with small area was calculated as normal property. Thus, leading to selling price increase in Shanghai's property markets. While because the policy tax is based on the value of property, Chongqing's property tax can decrease the selling price in high-end property market.

4.2 Conclusion of Chapter 4

In this chapter, by selecting the appropriate control variables, I use DID method to estimate how the property tax will affect the selling market and rental market. The results show that the property tax does not lower the house prices in Shanghai, and significantly increases the total rental area in Shanghai's real estate market. Thus, I conclude that Shanghai's property tax in

Shanghai didn’t achieve its goal. Although the property tax still leading to increasing in selling price of normal property in Chongqing, but it’s not significant. And the property tax will decrease the selling price for high-end property insignificantly. Also, from the sign of coefficient of interaction variable in rental model, I can say that the property tax will increase the price and decrease the quantity in selling market while the rental market is under shortage.

Chapter 5 - Conclusion

Based on the regression results from DID model, I can conclude that the current property tax does not lower the selling price in the real estate market.

Problems in current property tax pilot policy:

1. Unclear target in Shanghai's property tax policy. It merely classifies high-end property and normal property based on area of each property, which is contrary to the public's perception of these two types of property.
2. Lack of consideration of substitute goods market such as rental market inside. Based on the conclusion I obtained from chapter 3, I can find that different rental market condition will cause property tax to have the different effect on the selling price.
3. Relative low taxes rate as compared to selling price. For those taxpayers who have purchased high-end property or have multiple properties, given their economic condition and affordability, it's necessary to set up high tax rates, so that property tax can increase the government's tax revenues, while shortening the gap between rich and poor in society.

The property tax implemented in Shanghai and Chongqing both has great limitations. It is unrealistic to achieve the effect of reduced selling price only by property tax. The property tax must also be carried out by combining other corresponding policies to achieve its effect of stabilizing the selling price in China real estate market.

Some advices for future property tax and how to stabilized or decrease the selling price in China's real estate market

1. The property tax system, as mentioned above, is not sophisticated or fully developed. Currently, the tax rate is relatively low, and the tax system is a flat rate. The government can consider combining the current tax system with a stepwise tax system (more property held by an individual, the higher tax rate one has to pay each year). In this way, the property can not only effectively reduce the possibility for investors transferring the pressure of the property tax to renters, but also raise the cost for speculators' market behavior. Besides, the government should also establish and improve the price evaluation mechanism in the real estate market. Currently, the tax is only levied on the difference

between selling price and land price. From the historical trend of selling price in the real estate market in each city, it is easy to find that as urban development accelerates, the selling price will gradually increase as well. Under such condition, the existing tax system is undoubtedly one-sided, which not only fails to show the fluctuation of the selling price in real estate market but also fails to closely combine the property tax with the selling price. In order to solve this problem, I can match the annual appraisal price in real estate market with the land price, in order to better exert the regulative power of property tax on China's real estate market.

2. Formulate different policies for different types of consumer. As is mentioned above, investors can increase the rent in order to transfer the pressure of property tax to renters and the former will gain the profit and avoid the property tax by buying and selling properties in a short period. For investors, although the rent revenue tax is within the levying range of China's personal tax, lack of supervision will render this taxation ineffective. Hence, the government can increase supervision to make sure investors pay their rent revenue tax, thus reducing the possibility of transferring cost to renters, forcing investors to sell their property, and increasing the supply in real estate market. For speculators, I can increase transaction cost for those who buy and sell property in a short time to reduce their profit gain and reduce the potential speculators.
3. Put more effort on indemnification property and public rental property's construction. I can learn from Chapter 3, when rental market under shortage, the property tax will lead to selling price in selling market increase. However, the public rental property can effectively alleviate the shortage of rental market by decreasing the demand, leading to rental market back to the equilibrium level. And the indemnification property's main consumer is non-registered population. And the non-registered population is also the main driven factor in the rental market and normal property's selling market. Compares to commercial property, indemnification property has much lower and stable price, indemnification property will attract more consumer from the rental market and normal property's selling market in order to decrease the demand in those two markets.

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43. National Bureau of Statistics of China

Appendix-List of 35 Major City in China

Bei Jing	Capital city of China; Province-level municipality
Chang Chun	Capital of Jilin province
Chang Sha	Capital of Hunan province
Cheng Du	Capital of Sichuan province
Chongqing	Province-level municipality
Da Lian	Vice capital of Liaoning province
Fu Zhou	Capital of FuJian province
Guang Zhou	Capital of Guangdong province
Gui Yang	Capital of Guizhou province
Ha Er Bin	Capital of Heilongjiang province
Hai Kou	Capital of Hainan province
Hang Zhou	Capital of Zhejiang province
He Fei	Capital of Anhui province
Hu He Hao Te	Capital of Inner Mongolia autonomous region
Ji Nan	Capital of Shandong province
Kun Ming	Capital of Yunnan province
Lan Zhou	Capital of Gansu province
Nan Chang	Capital of Jiangxi province
Nan Jing	Capital of Jiangsu province
Nan Ning	Capital of Guangxi province
Ning Bo	Vice capital of Zhejiang province
Qing Dao	Vice capital of Shandong province
Shanghai	Province-level municipality
Shen Yang	Capital of Liaoning province
Shen Zhen	Province-level municipality
Shi Jia Zhuang	Capital of Heibei province
Tai Yuan	Capital of Shanxi province
Tian Jing	Province-level municipality
Wu Han	Capital of Hubei province
Wu Lu Mu Qi	Capital of Inner Xinjiang autonomous region
Xi An	Capital of Shanxi province
Xi Ning	Capital of Qinghai province
Xia Men	Vice capital of Fujian province
Yin Chuan	Capital of Inner Ningxia autonomous region
Zheng Zhou	Capital of Henan province