IMPACT OF PROPERTY TAX ON HOUSING PRICE: AN ANALYSIS FOR REAL ESTATE DEVELOPMENT AND SUSTAINABLE RENEWAL

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The housing price is an equilibrium result of the demand and supply of houses, according to the neoclassic economic theory. In order to restrain the overheated real estate market, China introduced a property tax in two cities in 2011, Chongqing and Shanghai. The tax was targeted at second houses and high-end houses. This paper illustrates how property tax influences housing prices by affecting people's willingness to buy houses. The difference-in-difference (DiD) method was applied, and a two-phase panel micro model was constructed, with housing prices as the explained variable and family total assets, net income, and house size as explanatory variables. The results indicate that the property tax in Shanghai and Chongqing has no significant inhibitory effect on housing prices due to the narrow tax base, low tax rates, and an excessively large tax-exempt area. In the post-COVID19 era, despite the decline in housing prices, the income of the working class in many economies has also decreased. On the contrary, investors are given more opportunities to invest in speculative properties. The failure of the property tax pilot in China discussed in this paper, can serve as a warning for policymakers in other cities in China and around the world to consider the strengths of their policies and the response of the targeted groups. The results can also help to suppress negative trends and ensure a healthy real estate market development for post-COVID19 housing sustainable renewal.

Keywords: property tax; difference-in-difference model; real estate development

INTRODUCTION

As of May 2021, most countries around the world are still suffering from the effects of the COVID-19 pandemic. Even though China has announced its primary success in the battle against the virus in the first stage, its national economy has been hit severely. In terms of real estate, the housing prices of many big cities are expected to stay steady for a long time to allow their local economies to recover from losses in 2020. This could be a great opportunity for the government to control the overheated real estate market. To achieve this goal, the Chinese government has carried out various policies in the past decade, such as the house purchase restrictions, which are still applied in some cities. Another fiscal policy that was put into practice, a property tax, was implemented in two specific cities in China, Shanghai and Chongqing in 2011.

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This study explores the effectiveness of the property tax policy and how it works in the Chinese market, applying the difference-in-difference (DiD) method with analysis of micro data. It differs from past studies, which analysed changes in housing prices with macro variables such as the economical and sociable factors, so that it can better present the individual conditions of each household.

LITERATURE REVIEW

Property tax as a measure of fiscal policy

During depression times, countries must work out ways to stimulate the economy. Likewise, when the market is overheated, measures should be taken to restrain inflation. In 1930s, John Maynard Keynes proposed two economic instruments to manage the national economy, the monetary and fiscal policy (Keynes, 1936). These policies usually work together to promote national employment, ease economic fluctuation, prevent inflation and achieve steady growth by influencing the total demand. Monetary policies are implemented by the central bank via interest rates and money supply, while the government carries out the fiscal policies through government revenue and expenditure.

Taxation is the main source of government revenue, and it can affect the economy in two ways through tax rates and the tax structure (Ai, 2018). Firstly, as taxation is substantially a kind of redistribution of social income, countries can adjust the class of income by levying tax on specific groups. Additionally, taxation can affect production factors, for example, the labour supply realised through the income effect and tax substitution effect, the savings via income tax and indirect tax, and the investment via corporate tax, tax deduction, and tax allowance. Therefore, tax is one of the most widely used methods of fiscal policy. In addition, tax policy can be targeted at specific groups, communities, industries and commodities, so it can have improved pertinence. To some extent, the levy of property tax can change the consuming habit of people thus influencing the social demand for housing.

Neoclassic economic theory-the relationship between demand and supply

The concept of neoclassic economic theory proposed in the 1900s, in contrast with classic economic theory that believed that prices are only relevant for production costs, stressed the decisive factor of price-the equilibrium of demand and supply. Furthermore, the neoclassic theory states that the demand and supply also depend on other non-price factors such as the number of participants in the market, consumer income and preferences, and tax among others (Keynes, 1936). Fig 1 shows the equilibrium price.

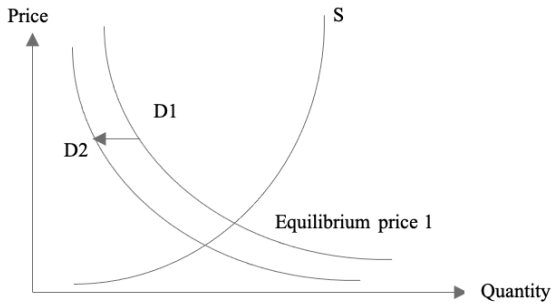

Fig 1: Supply and demand curve

On the one hand, the property tax will raise the cost for buying houses. For consumers buying houses for investment, their primary goal is to benefit from the

appreciation. If the costs increase, the need for buying will be reconsidered. Thus, the demand can be controlled. On the other hand, the rise of purchasing costs will prevent an overheated market, so real estate developers will hold the stock and the total supply of houses may be reduced. However, the reduction of supply is not a rapid process, so in the short term, the swift of demand will pull the equilibrium housing prices to a lower level (see Fig 1).

Property tax capitalisation

Property tax capitalization is the reflection of property taxes in the value of real property (Lilywhite, 1994). Jensen proposed this concept back in 1931 when he was researching property tax in the United States, and it is thought to be the major issue when scholars study the effect of property tax on housing value. According to studies conducted before 1980, the capitalization rate of property tax can vary from 50% to 100% (Oates, 1969, 1973; Edel and Sclar, 1974; Gustely, 1976; King, 1977; Rosen and Fullerton, 1977). These figures have many flaws, because of they use inaccurate discount rates and time zone, revealing the lack of control over the characteristics of each house and region and flaws in the capitalization models. After 1980, the survey scope was widened, the equation was amended, and more variables were included (Richardson and Thalhemier, 1981). Recent studies found that a significant negative effect of property tax on housing prices, which is between 50% and 60% negative capitalization rates, are using a 3% real discount rate (Yinger, 2020).

By investigating property tax rates, property taxes, and housing prices in 18 countries, Ai (2018) concluded that in the long run, the effect of property taxes brought to housing prices is gradually weakening. In the short term, property taxes in different countries vary widely via unit root test, VAR modelling, cointegration test, the impulse response function analysis, and variance decomposition. However, this study used the macroeconomic factors of housing price index, long-term interest rate, GDP growth rate, and price index as the endogenous variables of the model. As a result, from a macro point of view, the study of impact of property tax will definitely be affected by the fluctuation of housing prices in the long run.

Property Tax in China

Property tax, as a type of national tax, was firstly mentioned in 1950 in the "Guidelines for the Implementation of National Tax Administration". However, the property tax was not officially put into place until 1986. The Interim Action of the People's Republic of China on Property Tax regulated the levy of property tax on industrial and mining areas in cities and towns exempting on individual properties.

Due to the huge difference in economic development, population, and social customs (among other factors), it is difficult to levy property tax nationally in China. Therefore, Shanghai and Chongqing in 2011 were pointed as the pilot cities for the implementation of property tax targeted at individual properties. This application was expected to be the first move of national property tax to control the overheated real estate market. In Shanghai, a first-class city in China, the housing prices have remained high for years. In the sixth edition of the CBRE Global Living 2020 report (see Fig 2), the housing prices of Shanghai ranked number 4 in the world for an average of USD 905,834.

Similarly, Chongqing, located in the southwest of China, is the crucial hub for the One Belt One Road policy, ranking number 5 of Chinese cities in the GDP in 2019 for an average of USD 345 billion (see Fig 3). As a result, these two cities can be

representatives of the research object to study the impact of property tax on housing prices.

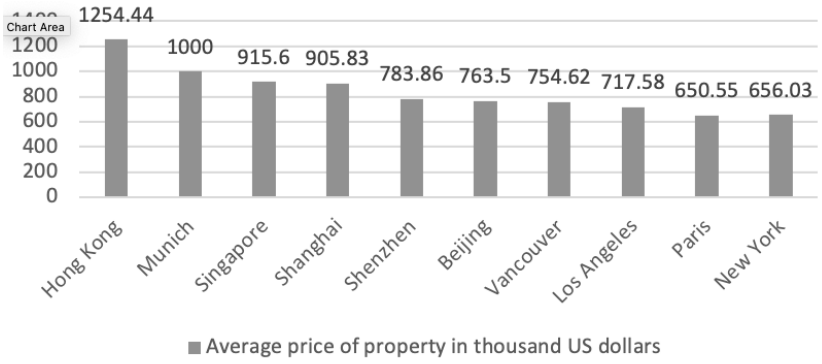

Fig 2: Most expensive residential property markets worldwide in 2020 (Source Statista)

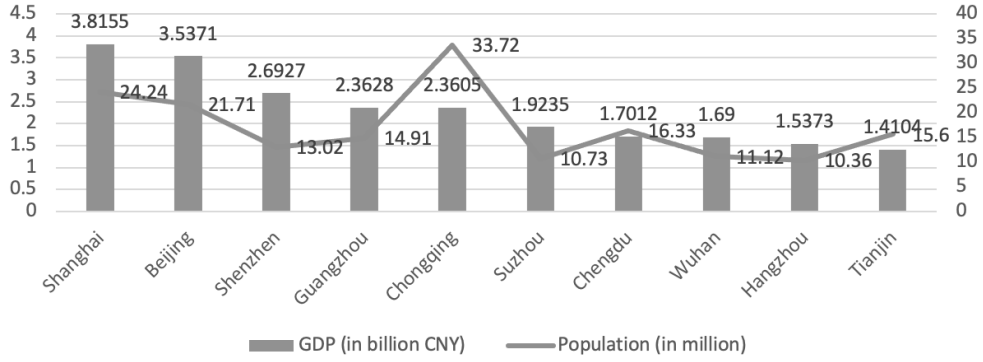

Fig 3: Top Ten Chinese Cities by GDP (Gross Economy) in 2019

The property tax policies in Shanghai and Chongqing have differences in specific terms (see Table 1). Overall, these policies mainly target high-end houses and second or above houses, in order to restrain the speculative purpose of house purchases.

Table 1: Comparison of property tax policy in Shanghai and Chongqing City

Applicable area	Shanghai	Chongqing
	Shanghai administrative area	Nine urban areas in main city
Taxable objects	(1) Second or above houses (including second-hand stock houses and newly built houses) (2) purchased by local resident New houses purchased by non-local residents	(1) Commercial condos and high-end houses owned by individuals; (2) Newly purchased second and above houses purchased by individuals without household registration or work
Tax base	70% of the transaction price of the house	Full transaction price
Tax rate	(1) 0.4% for houses whose unit price is below twice the standard price (2) 0.6% for houses whose unit price is over twice the standard price (standard price = the price of the commercial housing built the previous year)	(1) 0.5%/1%/1.2% for houses whose unit price is below three times/between three to four times/over four times the standard price (2) 0.5% for newly purchased houses by individuals without household registration or job (standard price = average price of newly built commercial housing of the nine urban areas in the past two years)
Tax-free area	60 square meters per capita	180 square meters for commercial condo stock; 100 square meters for newly purchased condos and high-end houses. (zero for houses purchased by individuals without household registration or job)

METHOD

The difference-in-difference (DiD) model used in this paper is widely applied in studies of public policy reforms and project implementation in quantitative economics. Such studies usually have extensive samples in geographical distribution, so it is difficult to control the scope of the research object and ensure the randomness of the samples. In addition, before the implementation of the policy, samples in different groups show priori differences. Only to adopt horizontal comparison or vertical comparison will ignore these differences, leading to biased estimates of the effect of policy implementation. Therefore, the DiD model combines the "pre and post difference" and "with and without difference" and adds other covariates to the model to control the effect of other factors other than the explanatory variables. This will result in a better model for the study of the impact of property tax reform instead of a simple analysis using regression (Elinder and Persson, 2017). The formula used to analyse the effect of property tax is expressed as (Li, 2020):

$$\ln(price_{it}) = \beta_{0+}\beta_1 \ln(asset_{it}) + \beta_2 \ln(income_{it}) + \beta_3 \ln(size_{it}) + \beta_4 year_t + \beta_5 region_i + \rho * region_{it}$$

The variables price_{it}, asset_{it} and, size_{it}, represent the housing price per square meter, the net asset and the family size of the i-th family, respectively. The variable year_t represents the time dummy variable, where $\text{year}_{2010} = 0$ and $\text{year}_{2016} = 1$; region_i represents the policy dummy variable, where $\text{region}_{\text{Shanghai and Chnongqing}} = 1$ and $\text{region}_{\text{Beijing and Chengdu}} = 0$. Furthermore, $* \text{region}_{it}$ represents the differential dummy variable. The DiD dummy variable and its estimator, $\rho * \text{region}_{it}$, represents the net effect of property tax (Li, 2020). Only when the samples are for Shanghai and Chongqing in 2012, $* \text{region}_{it} = 1$. Otherwise, $* \text{region}_{it} = 0$.

Data and Variables

This study focuses on the micro level change in housing prices by exploring the relationship between supply and demand. The supply of houses is assumed to remain at a certain level, that is, each individual family decides the demand of houses, so the willingness to buy a house will be the main factor. Furthermore, previous research efforts mostly use housing prices of newly built houses as the explained variables, which in this case is not reasonable as the property tax in Shanghai and Chongqing mainly targets at second-hand houses. The housing prices here refer to the market prices obtained by dividing the total market price of a family house by the building area of the house, representing actual transaction prices.

The variables are obtained from the China Family Panel Survey (CFPS) database, which is managed and conducted by the Institute of Social Science Survey (ISSS) and Peking University and funded by the Chinese government. The database covers most Chinese cities and the time zones before and after the property tax policy. This paper uses the data of 2010 pre-implementation, and the latest data of 2018. Some data that may affect the housing prices was eliminated from the model, considering their incompleteness and confidentiality such as house type and distance to the city centre. In addition, some data was also eliminated for multicollinearity, for example the family income and expenditure. As a result, to ensure the accuracy of the model, the explanatory variables considered are family total asset, family net income, and family size.

RESULTS

Descriptive statistics

As shown in Table 2, the housing prices of Shanghai and Beijing are at a high level in China, though actions have been taken to control the real estate market. However, the standard deviations are also relatively high, showing a large gap between the rich and the poor in these two cities.

Table 2: Descriptive statistics of Shanghai and Beijing as for 2018

Variable	Sample size	Average	Standard deviation	Min	Max
Price (CNY¥)	142	43,257.61	33,488.46	1,923.08	250,000
Total asset (CNY¥)	142	3,424,220.18	2,649,095.08	79,200	16,150,000
Net income (CNY¥)	142	304,059.37	1,039,224.50	7,000	9,158,800
Family size	142	2.24	1.21	1	6

Compared to the prices in Table 2, Table 3 shows that the housing prices in Chongqing and Chengdu seem to remain mildly, allowing more choices for people to buy houses.

Table 3: Descriptive statistics of Chongqing and Chengdu as of 2018

Variable	Sample size	Average	Standard deviation	Min	Max
Price (CNY¥)	84	7,292.66	9,474.86	66.67	63,125.89
Total asset (CNY¥)	84	714,318.26	740,146.16	7,812.50	4,715,000
Net income	84	97,208.36	102,161.51	3,900	575,000
Family size	84	2.76	1.99	1	10

Difference-in-difference analysis

Different from the case in Shanghai and Beijing, the estimator of DiD dummy is negative in the analysis of property tax in Chongqing and Chengdu, indicating that the property tax did work in controlling housing prices in Chongqing, and this impact is rather significant.

Table 4: DiD analysing the cities of Shanghai and Beijing

	Estimator	Standard error	P-value
Total asset	0.677875	0.028179	< 2e-16
Net income	-0.007907	0.026420	0.7648
Family size	-0.354271	0.055816	3.60e-10
Time dummy	0.095872	0.151038	0.5258
Region dummy	-0.624821	0.115945	9.23e-08
DiD dummy	0.377745	0.163395	0.0210
Intercept	0.829109	0.412627	0.0448

Note that the effects of family total asset, family income, and family size are the same as those of Shanghai and Beijing.

Analysis of the Results

Based on the above analysis, the data suggests that property tax did not play an important role in controlling the housing prices. It also shows a different influence in both cities as the estimators of DiD dummy for both analyses are not significant. For the city of Shanghai, the property tax revenue for 2018 is 21.4 billion RMB (USD

3.34 billion), only accounting for 1.24% of the total tax revenue of Shanghai for 2018 of 1720.2 billion RMB (USD 268.46 billion).

Table 5: DiD analysing of Chongqing and Chengdu

	Estimator	Standard error	p-value
Total asset	0.781792	0.045723	< 2e-16
Net income	-0.005509	0.045489	0.9037
Family size	-0.369002	0.081448	8.14e-06
Time dummy	0.658095	0.130584	7.57e-07
Region dummy	0.666373	0.107709	1.75e-09
DiD dummy	-0.547195	0.217390	0.0123
Intercept	-2.184044	0.523682	3.86e-05

It is far less, compared with the index of 15% for the American local government, 20% for the South Korean local government, and 40% for the Japanese local government. As the consumption level of Shanghai citizens is relatively high, the consumption elasticity is extremely low, and the majority are not sensitive to the mild property tax policy. For the city of Chongqing, the property tax revenue for 2018 is 6.7 billion RMB (USD 1.05 billion), accounting for 4.2% of the total tax revenue of Chongqing for 2018 of 160.3 billion RMB (USD 25.02 billion. It is also lower than the average percentages of other mature markets. In general, the housing prices of these two cities were not reduced as expected. Firstly, this may be caused by the lag in time of the effect of property tax. In addition, multiple factors may have opposite effects against property tax on housing prices. Even more, as shown in the results, the tax policies in Shanghai and Chongqing are relatively mild with low tax rates and narrow range of taxable houses. Therefore, the present property tax policies still have many limitations, and many reasons may lead to this result, leaving plenty of room for the Chinese government to improve.

CONCLUSIONS

This paper studied the impact of property tax, implemented in 2011 in the cities of Shanghai and Chongqing, on the housing prices from the perspective of demand of houses. It firstly looked into the relationship of supply and demand as in the neoclassic economic theory and their decisive role in affecting the price. Then, the detailed property tax rules were discussed, which allowed making comparisons between the two cities. The micro data of 2010 and 2018 was used to analyse the effect of property tax with the application of a DiD model, which showed an unapparent impact of the tax. Excluding the error caused by the data, the results may inform policy making. Additionally, a few recommendations for the government are provided for future improvement.

First, the range of taxable can be widen for the stock houses rather than only the incremental ones. Second, a more reasonable tax base and tax rates need to be considered. The lack of a uniform standard of valuation of housing market prices can cause deviations in the calculation of tax. Additionally, the low tax rate in China compared with 1% to 3% in the UK and US will show a faint impact on restrict the speculative demand for high-end houses. Finally, the property tax system is still not incomplete and a unified platform to register is much needed to improve the efficiency of the government officer. In the post-COVID19 era, the economy in each country is waiting for recovery. However, for the over-heated real estate market in some countries, this is a great opportunity to carry out a forceful property tax policy to take control of it and provide a sustainable industry renewal.

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