

The influence of Real Estate tax on House Price in Shanghai

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ABSTRACT

The rapid growth of housing prices prevents the Chinese government from introducing policies related to real estate. This paper takes Shanghai's second-hand real estate market as the research object, takes GDP and income as the main indicators, analyzes and establishes an econometric multiple linear regression model to study the impact of the real estate tax. The research results of this paper show that the per capital disposable income of urban residents in Shanghai is highly correlated with the average price of commercial housing, and the real estate tax has relatively little impact on the housing with demand, but a relatively large impact on the improvement of housing and real estate speculators. After implementing the property tax, it will have a small impact on people below the tax-free zone and who only have one house, and to some extent, it will limit the demand of middle-class buyers who have enjoyment needs.

Keywords: Property tax policy; Shanghai second-hand real estate market; Multiple linear regression model.

1. INTRODUCTION

With China's rapid urbanization, the real estate sector has developed rapidly recently. So far, China's economy has entered a golden period, the overall ownership and development speed is greatly improved. While promoting our country's social and economic development, the management conditions of the relevant real estate administration are also improved accordingly. However, the real estate industry still has many drawbacks in the development process such as underusing of land, underusing and lack of science and systems in the early planning stages. Many factors have caused obstacles and difficulties in the development of major projects that cannot meet the needs of Chinese residents and may even lead to huge fluctuations in the real estate market, bringing social problems to those who have difficulty in obtaining housing and becoming major obstacles to the sustainable development of China's real estate economy.

For real estate, scholars at home and abroad have studied for a long time. Domestic scholars Kuang Great, Zhu Yong and Liu Jiangtao, used the housing market

data of 23 OECD countries from 1980 to 2009. The study found that housing price is not determined mainly by cost, and reducing housing construction costs cannot reduce prices [1]. Wang Min and Huang Ying used the panel data of the housing price index of 70 large and medium-sized cities released by the National Bureau of Statistics to make an empirical analysis of property tax policies. They found that introducing property tax can reduce housing prices in the short term but may increase the future long-term housing price [2]. Yu Jing and Zhou Jingkui based on the micro-data of the housing market in Shanghai and Chongqing from 2005 to 2013, the results showed that the impact on the average housing price was not obvious [3]. Liu Bin analyzed the impact of the real estate tax on housing price from the perspective of tax burden transfer. It concluded that the introduction of the real estate tax could not play a good role in restraining housing price due to the existence of tax burden transfer in the current housing market, but would promote the rise of housing price to a certain extent [4]. Huang Xiao studied the effect of property tax from the perspective of per capita income [5], and Zhang Hong found that property tax would have good tax elasticity [6].

Foreign scholars' theoretical research on the

relationship between property tax and housing price includes three representative viewpoints: "traditional viewpoint", "benefit viewpoint", and "new viewpoint" [7]. "Conventional View" was developed by Simon and Netzer. They assume that the capital returns of the whole country are fixed, and the capital flows freely, so that the capital does not bear any tax burden. The property tax is entirely borne by the local consumers of immobile housing, leading to high housing prices [8]. The "benefit view" was developed by Hamilton and Fischel. They assumed free movement of consumers, with different jurisdictions competing for them over property taxes and public services. Under the above assumptions, consumers in each jurisdiction pay the same property tax, local public services are provided entirely by property tax, and property tax and public services are not capitalized into housing value. Accordingly, they believe that real estate tax is only benefit tax and only affects local public expenditure without affecting housing value and resource allocation [9]. The "New View" is presented by Mieszkowski and Zodrow. They argue that the traditional view of local equilibrium analysis is highly misleading. On the one hand, conventional wisdom ignores that all jurisdictions have property taxes; On the other hand, property tax affects housing capital allocation and non-housing capital allocation. To this end, they assume that the entire economy consists of high-tax areas and low-tax areas. Capital flows from high-tax areas to low-tax areas, resulting in a misallocation of capital, resulting in "profit tax effect" and "turnover tax effect" [10].

The existing literature is mainly based on the correlation between property tax and real estate, and there are few studies on the effectiveness indicators of the Chinese market, especially the real estate in Shanghai. This paper takes the second-hand real estate market in Shanghai from 2011 to 2019 as the research object and takes GDP and income as the main indicators, to study the effect of property taxes on housing prices.

2. DATA AND METHOD

The paper takes the Shanghai real estate market data from 2011 to 2019 as the analysis object to judge the impact of the real estate tax on the real estate market. The data is provided by the Shanghai Bureau of Statistics and records 5 items of data such as the total annual real estate investment in Shanghai from 2011 to 2019, the total land area of Shanghai, and the permanent resident population of Shanghai at the end of the year (10000). The method chose using time series, select Shanghai housing prices, GDP, per capita consumption level and related consumption index for ten years as variables; compare the changes of house prices after the implementation of real estate tax to judge the specific impact of the real estate tax on the real estate market. Shanghai began levying a property tax in 2011, analyzing data from 2011

to 2019 to determine the impact of the property tax on house prices. In this data analysis, the econometric multiple linear regression model is established, STATA calculates the overall data, the goodness of fit is tested, eliminates the multicollinearity one by one and correct as well.

The Linear regression is a statistical analysis method that uses regression analysis in mathematical statistics to determine the interdependent quantitative relationship between two or more variables. Its expression is $y = w =$ normal distribution in which the error obeys the mean value of 0. linear regression is a statistical analysis method that uses regression analysis in mathematical statistics to determine the interdependent quantitative relationship between two or more variables. In regression analysis, only one independent variable and one dependent variable are included, and the relationship between them can be expressed approximately by a straight line. This kind of regression analysis is called univariate linear regression analysis. Linear regression requires a linear relationship between the response variable y and the prediction variable x in the data. First, we need the independence of the error term, and the error terms corresponding to different observations should be independent of each other. Second, homoscedasticity, the parameter estimation of linear regression, is a linear combination of some equation of prediction variable and response variable corresponding to each observation. The greater the change if the observation, the greater its weight in the linear combination. Third, normality requires that the error term comes from a normal distribution. The fourth multicollinearity, multicollinearity, is a phenomenon. In the multiple regression model, one prediction variable can be linearly predicted from other prediction variables and has considerable accuracy.

3. ANALYSIS OF RELEVANT INFLUENCING FACTORS

After the analysis of the selected property tax policy, analyze the data from 2011-2019 years, average home prices in Shanghai to be explained variables, the Shanghai urban per capita disposable income, Shanghai at the end of the resident population (ten thousand people), per capita GDP in Shanghai, the average annual wage in Shanghai, the Shanghai GDP as explanatory variables. Y -- average housing price in Shanghai; X_1 -- per capita disposable income of urban residents; X_2 -- Permanent resident population at year-end (10,000 people); X_3 -- GDP per capita; X_4 -- average annual salary; X_5 -- GDP of Shanghai Municipality

3.1. Model Setting

This paper will choose the sectional data model to discuss the explained variables and explanatory variables.

Multiple linear regression model construction

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \mu$$

$i = 1, 2, \dots, n$

3.2. Empirical Process

The ordinary least square method is used to estimate the model

$$Y = -1199809 + 1.602X_1 + 471.97X_2 + 15.537X_3 + 1.806 X_4 - 68.91X_5$$

(-0.96) (1.36) (0.93) (1.19) (0.65) (-1.24)

TABLE 1. REGRESSION RESULT

SOURCE	SS	DF	MS	NUMBER OF OBS	=9
Model	1.5581e+09	5	311614138	F(1,7)	=10.6
				Prob > F	=0.0401
Residual	88169993.7	3	29389997.9	R-squared	=0.9464
				Adj R-squared	=0.8572
				Root MSE	=5421.3
Y	Coef.	Std.Err.	t	P> t	[95% Conf. Interval
X1	1.602109	1.181501	1.36	0.268	-2.157954 5.362172
X2	471.9707	509.1481	0.93	0.422	-1148.366 2092.307
X3	15.53786	13.10647	1.19	0.321	-26.17279 57.2485
X4	1.806649	2.775317	0.65	0.561	-7.02565 10.63895
X5	-68.91256	55.64046	-1.24	0.304	-245.9853 108.1602
-cons	-1199809	1245795	- 0.96	0.407	5164486 2764868

TABLE 2. MULTIPLE COLLINEARITY TEST

	Y	X1	X2	X3	X4	X5
Y	1.0000					
X1	0.9454	1.0000				
X2	0.6054	0.7424	1.0000			
X3	0.9313	0.9732	0.6859	1.0000		
X4	0.9387	0.9838	0.7164	0.9971	1.0000	
X5	0.9304	0.9771	0.7074	0.9995	0.9983	1.0000

Through calculation, it is found that r-square is large and close to 1, F=26.10, and the residual value is 88169993.7. The sum of the squares of the residual is large, S=8961218.8, and the standard error of the equation is 5421.3. The F statistic to test the significance of the whole equation is 10.60, and its corresponding P value is 0.0401. It shows that the overall height of the regression equation is significant. Therefore, it is considered that the overall linear relationship between average housing prices in Shanghai and the above explanatory variables is significant. Conclusion: Through the model test, independent variable X1-- per capita disposable income of urban residents; X2-- Permanent resident population at year-end (10,000 people); X3-- GDP per capita; X4-- average annual salary; X5-- The GDP of Shanghai and the dependent variable Y-- the average housing price of Shanghai, but the variables X1, X2, X3, X4 and X5 did not pass the test,

and the parameter sign of X5 had unreasonable economic significance, so the explained variables were considered to have multicollinearity.

It can be seen that multicollinearity exists among all factors. Thus, independent variable X1-- per capita disposable income of urban residents; X2-- Permanent resident population at year-end (10,000 people); X3-- GDP per capita; X4-- average annual salary; X5-- There is multicollinearity between the GDP of Shanghai, and the explained variable Y is highly correlated with X1, X3, X4, and X5, X2 is relatively less correlated with other explanatory variables, and the other X1, X3, X4, and X5 are previously highly correlated.

Stepwise regression, backward regression, The goodness of fit of the model is improved significantly, the parameter sign is reasonable, and X1 conforms to the economic significance, so it reaches the best. The fitting

result obtained by excluding variables is that $Y=f(X_1)$ should be the best. Then the equation results

are as follows $Y=-20846.31+1.012541X_1$
 (-2.80) (7.68)

TABLE 3. BACKWARD REGRESSION, MODEL CORRECTION

SOURCE	SS	DF	MS	NUMBER OF OBS	=9
Model	1.4712e+0.9	1	1.4714e+0.9	F(1,7)	=58.91
				Prob > F	=0.0001
Residual	174844266	7	24977752.3	S-squared	=0.8938
				Adj R-squared	=0.8786
				Root MSE	=4997.8
Y	Coef.	Std.Err.	t	P>t	[95% Conf. Interval
X1	1.012541	0.1319242	7.68	0.000	0.70059 1.324492
-CON	-20846.31	7446.723	-2.80	0.027	-38455.01 - 3237.605

3.3. Policy Analysis

Over some of the personal housing in accordance with the "Shanghai to carry out a property tax pilot of the interim measures for the notification, the Shanghai households in new purchases and belong to the household of Shanghai the second set of or more housing, consolidation, all family housing area, housing construction area) less than 60 square meters per person (namely tax-exempt housing area, including 60 square meters), Its newly purchased housing is temporarily exempted from property tax; If the average person exceeds 60 square meters, the property tax shall be calculated and levied on the excess area of newly purchased housing.

3.4. Requirements analysis

For immediate housing, residents who are above or below the average level of demand generally pay no or very little property tax. For the middle & low income class, when the area below the tax exemption exceeds the area exempted, they can enjoy the dual benefits of reducing transaction taxes and not paying property taxes. As a result, property taxes have a relatively small impact.

For the middle class who need to buy a second house because the area of the improved house is larger than the area of the tax exemption, buying a house is more to obtain a better quality of life based on their own economic conditions. The purchase of a second house is generally larger than the exemption area, and the area is larger, more inclined to high-grade houses. Suppose the buyer's personal economic conditions are good. In that case, the payment of real estate tax will have little impact on the buyer: If the buyer's personal economic conditions temporarily do not support their demand for a housing area, the introduction of the real estate tax will affect their

housing affordability, and in the short term, the buyer may delay the purchase demand. Therefore, the influence on it is relatively large.

For those with investment needs generally have good economic conditions. If the purchase area is less than the amount of exemption, the impact is relatively small. However, assuming that each house purchased is greater than the exemption amount, then introducing the real estate tax will bring investors a certain degree of economic burden. The specific degree of the burden will be considered by the housing area, location and tax rate. Therefore, the impact on invest relatively large.

3.5. Impact analysis

For buyers, buying a house is at the demand end of the economic supply and demand structure, and the economic basis determines the superstructure. Thus, investors' own purchasing power determines their demand for buying.

3.5.1. For home buyers

Combined with the above analysis, when urban residents' per capita disposable income increases, the housing price is positively correlated with it and increases accordingly. Thus, with the increase of disposable income, the source is that people's demand for housing increases correspondingly, and the real estate market is in short supply. Therefore, to maintain the stability and balance of the market and people's demand for housing, the housing price increases correspondingly.

After implementing the property tax, for those below the duty-free area and have only one house, the property tax has less impact on their purchasing power. It is more related to their own disposable income level.

For middle-class buyers with improved housing demand, their improved housing conditions are highly correlated with their disposable income level, limiting their demand to a certain extent.

3.5.2. For investors

The implementation of the property tax, to a certain extent, affects the purchasing power of investors on housing, liquidity ratio may slow. Investors will need more disposable income if they want to maintain their pre-policy levels of property speculation.

The average price of commercial housing. Data analysis shows that the per capita disposable income of urban residents in Shanghai is highly correlated with the average price of commercial housing. From an economic perspective, if other factors remain

4. Conclusion

According to the research of this paper, after the implementation of property tax, such factors as year-end permanent resident population (ten thousand), per capita GDP of Shanghai, the average annual wage of Shanghai, and GDP of Shanghai have no significant impact on the unchanged, the average price of commercial housing will increase by 1.012541 yuan when the per capita disposable income index of urban residents in Shanghai increases by 1 yuan.

According to the understanding and analysis of the policy, the per capita duty-free housing area is 60 square meters. According to data analysis and objective facts, for people with a demand for self-living, residents floating around the average demand level generally do not need to pay property tax or only need to pay a very small amount of tax. For the middle and low income class, when the area below the tax exemption exceeds the area exempted, they can enjoy the dual benefits of reducing transaction taxes and not paying property taxes. For people with speculative demand and real estate speculation generally have good economic conditions. Therefore, if the area of real estate speculation is less than the amount of exemption, the impact is relatively small; Assuming that each property purchased by speculators is greater than the exemption amount, then the introduction of the real estate tax will bring a certain degree of economic burden to speculators, the specific degree of the burden will be considered by the housing area, lot and tax rate. Therefore, the impact of real estate speculators is relatively large.

Combined with the data analysis, when the per capita disposable income of Shanghai increases, the housing price is positively correlated with it and increases accordingly. With the increase of disposable income, the source is that people's demand for housing increases correspondingly, and the real estate market is in short

supply. To maintain the stability and balance of the market and people's demand for housing, the housing price increases correspondingly.

After implementing the property tax, for those below the duty-free area and have only one house, the property tax has less impact on their purchasing power. It is more related to their own disposable income level. As for the buyers with enjoyment needs, the improvement of housing conditions is highly correlated with their disposable income level, limiting their demand to a certain extent.

REFERENCES

- [1] Kuang Da-da, Zhu Yong, & Liu Jiangtao. (2012). The Impact of property tax on housing price: Evidence from OECD countries. *Finance and Trade Economics*, 000(005), 121-129.
- [2] Wang Min, & Huang Ying. (2013). The impact of purchase restriction and property tax on housing price: Based on long-term dynamic equilibrium analysis. *Journal of Global Economics*, 036(001), 141-159.
- [3] YuJingjing, & Zhou Jingkui. (2016). Real estate tax, housing price and housing supply structure: Based on the analysis of micro data in Shanghai and Chongqing. *Exploration of Economic Problems*, 000(001), 42-48.
- [4] Liu Bin. (2013). The impact of property tax on housing price in the current market environment. *Journal of Shijiazhuang University of Economics*.
- [5] Huang Xiao. (2014). Mechanism, conditions and reform direction of property tax regulation of income distribution. *Western Forum*, 000(001), 38-45.
- [6] Zhang Hong. Research on the relationship between Property tax and economic growth in China.
- [7] Zhao Xingang. (2013). Review on the contribution of real estate tax to housing price. *China Business*, 139-139.
- [8] Zheng Keyuan. (2017). Analysis on the Impact of real estate Tax Pilot Policies on housing Prices. (Research Institute of Fiscal Sciences, China).
- [9] Lu Hongliang. (2013). Theoretical and practical analysis of Property tax reform in China. *China Economic And Trade Review*, 000(035), 48-49.
- [10] Zhao Yang, & Wang Yifan. (2017). Research Review on the impact of property tax on housing price. *Management and Management* (24), 3