The Research of House Purchase Restrictions on Real Estate
Take Shanghai Real Estate Market as an Example

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ABSTRACT

As my country's leading consumer market, real estate occupies a vast market consumption share. This paper uses multiple linear regression to rationalize the data to study the impact of housing purchase restrictions on Shanghai's housing prices, housing demand, consumer purchasing power ,and social welfare. The research results show that since the purchase restriction order, the affordability of Shanghainese has been reduced, the supply of real estate in Shanghai is in short store, which aggravates housing prices, and harms the society due to false divorce. It is hoped that the research in this article will enable people to have a more deep understanding of the housing purchase restriction policy to develop the real estate industry in Shanghai better and carry out effective regulation.

Keywords: House Purchase Restrictions; Shanghai; Linear Regression; Real Estate

1. INTRODUCTION

1.1. Background

In 2009, China's economy took the lead out of the financial crisis. Loose credit and investment policies led to an excessively rapid increase in housing prices in 2009. On December 14, 2009, the State Council promulgated the "Four Articles of the State," requiring continued extensive use of land, finance, and taxation to curb the rise in housing prices. Real estate control policies have shifted from stimulus to containment to protect the basic housing needs of ordinary people. The Chinese government has issued a series of macro-control policies, and the "purchase restriction order" is undoubtedly the policy with the most potent control. Some cities have begun to restrict purchases and increase the construction of affordable housing. In this article, we will focus on the purchase restrictions in Shanghai. The Shanghai Municipal Housing Security and Housing Administration and other five departments jointly issued the "Several Opinions on Further Strengthening the Regulation of the City's Real Estate Market and Accelerating the Promotion of Housing Security Work," which clarified that Shanghai would limit the number of houses purchased by households within a certain period. It is tentatively determined that families in this city and other provinces and cities can only buy a new set of commercial housing (including second-hand housing in stock). If a house is purchased in violation of the regulations, the real estate registration agency shall not accept real estate registration.

1.2. Short- And Long-Term Impact

Internal and external scholars have been studying the Shanghai real estate market for a long time. Professor Zhang Hui from Fudan University analyzed the reasons for the rise in residential prices in Shanghai. Among them, the permanent population, land prices, money supply, interest rates, the fundamental status of the housing market in short supply, and the loose monetary policy environment have a significant impact on Shanghai's residential prices [1]. Professor Mao Qianyun from Nanjing Normal University believes that the purchase restriction order mainly includes restrictions on the qualification and quantity of housing purchases and conditions on the transaction process of commercial housing. To a certain extent, it has its rationality, and the

effect of the purchase restriction order cannot be denied entirely. Existential value. However, with the transformation of modern government functions and administrative management methods, traditional administrative law faces new challenges. It has been difficult to respond to complex public administrative issues by relying solely on conventional legality theories, especially for administrative activities in the housing field fully. The purchase restriction order for commercial housing is an administrative control policy for the government to intervene in the real estate market for macro-control [2]. Professor Liu Yao of Fudan University believes that since implementing the purchase restriction order, the Shanghai real estate market has undergone some changes, but it is still lacking. The analysis and research on these changes, especially the analysis and research on the relationship between these changes and the purchase restriction order, is vital for evaluating the effect of the purchase restriction order and carrying out the next stage of real estate regulation [3]. Professor Zhang Yu of Inner Mongolia University found that before introducing the purchase restriction policy, the real estate market once appeared to be robbed of houses, just like buying a car lottery. To grab the ideal housing at the last moment, people began to purchase homes frantically. Caused real estate prices to soar in a short period. After the purchase restriction policy was introduced, people could not purchase ideal places due to purchase restrictions, so real estate prices dropped slightly, but this decline was relatively slight, which could not solve ordinary people's housing purchases. Although housing purchases are restricted and the country's macro-control of the real estate market, only ideals are often complete, but the reality is quite skinny. In more cases, developers invest in real estate to obtain good economic benefits. Even in the real estate market, housing supply is More than demand, they are still unwilling to sell at a low price, and the people do not have enough funds to purchase houses[4]. Zhang Hui of Fudan University stated that the residential purchase restriction policy could immediately affect the control of speculative demand in the short term. Still, in the long run, it has not solved the fundamental problems of the supply-demand relationship and the monetary policy environment and violates the laws of economic operation. On the other hand, due to the market downturn, the supply has further declined, exacerbated the imbalance between supply and demand, and dragged down the GDP growth rate and dozens of related industries. The Professor Li Meilin of southwestern University of Finance and Economics found that the first round of purchase restrictions lasted until 2014. To stimulate the recovery of the real estate market, local governments have "relaxed" the purchase restriction policies. Except for Beijing, Shanghai, Guangzhou, and Shenzhen, the first round of purchase restrictions have almost been canceled. The cancellation of the purchase restriction policy has caused the real estate market to heat up again, and the housing prices continue to heat up and

ferment. In the face of rising housing prices, significant cities have successively introduced the second round of "purchase restrictions" starting in 2016, and the intensity is more stringent than the first round. Further research found that the purchase restriction order mainly acts on the third- and fourth-tier small and medium-sized cities. The effect is not apparent in the first-tier cities, provincial capitals, and municipalities directly under the central government. Finally, after comparing the implementation effects of the two rounds of purchase restrictions, it is found that the overall impact of the second round of purchase restrictions is stronger than the effect of the first round of purchase restrictions. Still, it is invalid for the city that has issued two purchase restrictions [5].

1.3. The Validity

Concerning curbing the demand for investment speculation, the purchase restriction order restrained the rapid development of investment speculation. The speculative investment atmosphere in the real estate market has dropped significantly. It has a significant impact on transaction volume and transaction prices in various cities. The year-on-year and month-on-month increase in house prices has been curbed to varying degrees, and the purchase restriction policy has achieved phased achievements. Looking at the leading indicators such as sales volume, the growth rate of China's real estate industry has begun to slow down, and housing prices have started to show volatility and fall. According to the "China Housing Development Report 2011-2012" released by the Chinese Academy of Social Sciences, "the momentum of national real estate price increases has been curbed, and housing prices in some areas have begun to decline, and purchase restrictions have played a vital role." Demand has had a more significant impact, especially for investment property purchases in different places. The policy orientation of real estate de-investment is obvious." On the other hand, the implementation of the "purchase restriction order" has also reduced the real estate tax contribution rate of various local governments, leading to a direct reduction in fiscal revenue. However, most cities have issued purchase restriction orders with the time attribute "tentative," indicating that the purchase restriction order is temporary. Commercial housing has the characteristics of consumer goods and investment. However, at this stage in my country, high housing prices hinder the rapid progress of urbanization, and high housing prices have suppressed them. Residents' consumer demand and high housing prices have led to a widening gap between the rich and the poor. It emphasizes the construction of social harmony. We should pay more attention to the consumer goods attributes of commercial housing and weaken its investment attributes to protect the "people's livelihood better." Therefore, this article believes that the purchase restriction policy is invalid in the long run, and once the suppressed demand is released, it will cause a rebound in

the market. At the same time, real estate developer Pan Shiyi believes that the key reason for rising housing prices is the relationship between supply and demand [6]. The introduction of the purchase restriction policy cannot solve this problem. The purchase restriction policy should be changed from a temporary to a long-term approach to solving the "house control problem," which has become an essential part of my country's real estate market system for a long time. However, Nie Meisheng, chairman of the housing industry of the China Federation of Industry and Commerce, believes that the implementation of the "purchase restriction order" must be supplemented by necessary supporting measures, such as effectively increasing supply and carrying out long-term institutional changes to achieve accurate results [7].

To a certain extent, the purchase restriction policy has curbed the role of malicious real estate speculators in promoting housing prices. But this purchase restriction policy, for people who meet the purchase policy, such as the local population in Shanghai, does not impose any restrictions on purchasing houses suitable for the crowd. They will also buy homes according to their own needs. For this group of people, housing prices and demand do not have any inhibitory effect, and housing prices are still increasing generally according to the market law. On the whole, the overseas population will still flow into Shanghai, with strong purchasing power. Therefore, Shanghai's purchase restriction policy has played a positive role in curbing the vicious rise in housing prices. However, the purchase restriction policy cannot affect the regular rigid demand for houses in Shanghai, nor will it affect the purchasing power of the people in Shanghai.

1.4. Main Contents

This article mainly studies the impact of the housing purchase restriction policy on Shanghai's housing prices, housing demand, consumer purchasing power, and social welfare. This policy shows that the purchase restriction policy reduces the   affordability of Shanghainese. At the same time, the information disclosure of the purchase rest riction policy may cause consumers to purchase houses in advance to circumvent the regulation, which will cause the demand for real estate to rise. The supply in the real estate market has slightly declined, causing the collection of houses to fall short of demand and exacerbating the rise in housing prices. It analyzes the effectiveness of the housing purchase restriction policy in Shanghai. Therefore, the government can introduce housing security policies such as public rental housing, price-limited housing, and housing provident fund.

2. DATA AND METHOD

2.1. Data

This article takes as the research object. The data on average monthly housing prices comes from the "Hundred Cities Price Index Report," published by the China Index Academy. The period of the data is from January 2010 to November 2016. Besides, the data on other characteristic variables comes from the Shanghai Annual Statistical Yearbook. The detailed information about the characteristic variables is referred to in following Table 1.

Table 1. Interpretation of The Variables

Variables	Unit	Souces
Average monthlyhouse price (Avr price)	Yuan/ squaremeter	https://fdc.fang.com/index/IndexDetail.aspx
The policy implementation period is 1, and thepolicy non-implementation period is 0-dummyvariable(res)	Yuan/ squaremeter	https://fdc.fang.com/index/IndexDetail.aspx
Permanent Residents (people)	Ten thousand	http://www.stats.gov.cn/tjsj/ndsj/2010/indexce.htm
Per capita income(income)	Yuan	http://www.stats.gov.cn/tjsj/ndsj/2010/indexce.htm
Number of housesavailable for purchase (supply)	Set	http://www.stats.gov.cn/tjsj/ndsj/2010/indexce.htm
Number of tradinghouses (trade)	Set	http://www.stats.gov.cn/tjsj/ndsj/2010/indexce.htm
Real estate investment amount (invest)	Billion	http://www.stats.gov.cn/tjsj/ndsj/2010/indexce.htm
Number of divorces (divorces)	Million pairs	http://www.mca.gov.cn/article/sj/tjgb/201708/20170815005382.shtm l

2.2. Method

This article uses linear regression, " A statistical analysis method to determine the quantitative relationship between two or more variables. " [8]. Its applicable conditions and scope are roughly divided into four categories. First, linear relationship, "there is a linear relationship between the independent variable x and the dependent variable y." It can be judged by drawing a scatter plot; we can perform regression if the data seems to fit a line roughly. The other is independence: "The residuals are independent. In particular, there is no correlation between consecutive residuals in time series data." Together with homoscedasticity, "For homoscedasticity, the residual has a constant variance at each level of x." The "cone" shape in the scatter plot is a typical sign of heteroscedasticity. Finally, the normality of the error distribution, "At any point of the x value, the data points should be normally distributed around the regression line."

Through the regression, we use the average monthly housing prices as the dependent variable, where the difference between the average housing prices before and after the implementation of the policy is the dummy variable. Also, we use the permanent residents, per capita income, housing supply, housing transaction volume, investment in real estate, and several divorces as the independent variables.

$$lavr\_price= \alpha + \beta 1res+ \beta 2people+ \beta 3lincome+ \beta 4lsupply+\beta 5ltrade+\beta 6invest+\beta 7divorce+\mu\ldots\ldots\ldots(1)$$

"avr_price" represents the monthly average housing price. The value of res"is 1 through the implementation period of the purchase restriction policy. The impotance of " res " is 0 through the non-implementation period, where it is a dummy variable. "people" represents the permanent population, and "income" indicates the per capita income. "supply" is the housing supply, and "trade" represents the Housing transaction volume. The "invest" and "divorce" shows the investment on real estate and some divorces respectively, where μ is a random error term.

3. RESULT AND DISCUSSION

The research designed a multiple regression model based on the impact of housing purchase restrictions on average housing prices, affordability, housing demand, housing supply, and social welfare. According to Table 2, the influence of the policy could be intuitively reflected by the following results.

Table 2: The Summary of Multiple Regression model

Source	SS	df	MS	Number of obs	=	78
				F(7, 70)	=	100.60
Model	2.35439299	7	.336341855	Prob > F	=	0.0000
Residual	.234033729	70	.003343339	R-squared	=	0.9096
				Adj R-squared	=	0.9005
total	2.58842671	77	.033615931	Root MSE	=	0.05782

Lavr_price	Coef.	Std, Err.	t	P >| t|	[95% Conf.	Interval]
Res	.0949938	.0427305	2.22	0.029	.0097705	.1802171
People	-.0019262	.0005449	-3.54	0.001	-.0030129	-.0008395
lincome	.8993007	.1752432	5.13	0.000	.5497892	1.248812
lsupply	-.0773737	.0422564	-1.83	0.071	-.1616514	.0069041
ltrade	.0037706	.0273431	0.14	0.891	-.0507636	.0583048
invest	.0016651	.0011911	1.40	0.167	-.0007104	.0040406
divorce	.0109545	.0174592	0.63	0.532	-.0238668	.0457759
_cons	5.070382	2.015315	2.52	0.014	1.050964	9.0898

3.1. Coefficients

The coefficients of independent variables state the degree of change in the independent variables for every 1 unit of change in the dependent variable. As shown in Table 2, when other independent variables remain unchanged, the average housing price in Shanghai rises by 9.4% during the policy implementation, compared with the average housing price before the policy implementation. Also, while holding other variables constant, Shanghai people's per capita income increases by 0.89% when the local average housing price rises by

1%. The results of " supply " and " trade " show an opposite trend. When other independent variables are constant, 1% of growth in the average housing price of Shanghai leads to an 0.08% decrease in housing supply and a 0.004% increase in housing transaction volume. Besides, when other things are equal, the number of divorces and real estate investment in Shanghai enhances by 1.10% and 0.17%, respectively, while the average housing price grows by 1%. In summary, though Shanghai people's income increases, the growth rate of average housing price in Shanghai is greater.

3.2. P-Value

P-value can be used to determine whether the association between the dependent variable and each independent variable in the model is statistically significant, comparing it with the significance level to assess the null hypothesis. In most cases, a p-value of 0.05 shows a good significance level, which means that if p-value is equal to or less than 0.05, it is statistically significant. If the p-value is greater than 0.05, it is not statistically significant. Since the p-values of "res " , " people, " and " income " are less than 0.05, the relationships between average housing prices and permanent population, per capita income, and the difference of average housing prices before and after the implementation of the policy are statistically significant. The relationships between average housing prices and housing supply, housing transaction volume, investment in real estate, and the number of divorces are not statistically significant, as the p-values for "lsupply " , " ltrade " , " invest" and " divorce" are more critical than 0.05. A type 1 error is when a null hypothesis is rejected mistakenly, though it is accurate and should not be dismissed. Hence, statistical significance indicates the probability of committing a type 1 error assuming that the null hypothesis is true. Therefore, the likelihood for " res," " people, " and " income " occurring type 1 error is minimal.

3.3. R-Squared And Vif

Table 3: The Values of VIF for Sampled Variable

Variable	VIF	1/VIF
Lincome	27.14	0.036842
Invest	25.49	0.039238
People	25.49	0.083778
Divorce	9.98	0.100151
Res	4.76	0.210034
Lsupply	2.86	0.349355
Ltrade	1.70	0.587082
Mean VIF	11.98	

R-squared measures the proportion of the variation in dependent variables that can be explained by the independent variables in the model. Due to Table 2, 90.96% of data can be explained by "lavr price", which shows that the data values fit the model properly. The Variance Inflation Factor (VIF) is used to measure the multicollinearity among the independent variables in a multiple regression model and the formula for it is VIF=. Multicollinearity exists when an independent variable is highly correlated with one or more of the other independent variables, which decreases the statistical significance of an independent variable through a model.

The value of VIF shows the percentage of the variance that is inflated for each coefficient. Usually, if the value of VIF is equal to or less than 1, the independent variable is not correlated with the other independent variables; if the value of VIF is range from 2 to 5, the independent variable is moderately correlated with the other independent variables; if the value of VIF is greater than 5, the independent variable is highly correlated with the other independent variables. By calculating the value of VIF, we can conclude that four of the VIF factors — 27.14, 25.49, 11.94 and 9.98 —are fairly large. For instance, the variance of the estimated coefficient of "lincome" is inflated by a factor of 27.14, since " lincome" is highly correlated with at least of the other independent variables in the model. The variance of the estimated coefficient of " ltrade" is inflated by a factor of 1.70, as "ltrade" is temperately correlated with at least of the other independent variables in the model.

3.4. Durbin Watson Test

The Durbin Watson (DW) test measures the autocorrelation of the residuals from the regression model. Autocorrelation shows the degree of similarity between the time series of the tested sample and its lagged version over successive time intervals. Usually, the values of DW test range from 0 to 4, where a value of 2 shows that there is no autocorrelation in the model. A value from 0 to less than 2 indicates that there is a positive autocorrelation and a value from 2 to 4 shows that there is a negative autocorrelation. The value of DW test is 0.89, showing a positive autocorrelation. For instance, since the average housing price in Shanghai grew from 2010 to 2016, it is likely to increase in the present as well. Therefore, as the model is positively autocorrelated, the implementation of housing purchase restrictions will boost up the average housing price in Shanghai over time

4. CONCLUSIONS

4.1. Main Explanation

Based on the conditions of linear regression, this paper conducts rigorous and sequential research on the impact of the real estate purchase restriction policy on

housing supply, affordability, and social welfare after implementing of the real estate purchase restriction policy in Shanghai. It is foreseeable that the purchase restriction policy will lead to a continuous increase in house prices in Shanghai in the future. From the theoretical logic and empirical analysis, the main explanation is that Shanghai 's per capita income has increased a bit from January 2010 to mid-November 2016, Shanghai's housing prices have increased significantly. This shows that the purchase restriction policy reduces the affordability of Shanghainese. At the same time, the information disclosure of the purchase restriction policy may cause consumers to purchase houses in advance to circumvent the regulation, which will cause the demand for real estate to rise. The supply in the real estate market has slightly declined, causing the collection of houses to fall short of demand and exacerbating the rise in housing prices. Multiple regressions indicate that the purchase restriction policy will lead to an increase in the divorce rate. Due to the policy restricting one household only to purchase one set of real estate, many consumers apply for "false divorce" to buy a house, which hurts social order.

4.2. Suggested Policy

Therefore, the government can introduce housing security policies such as public rental housing, price-limited housing, and housing provident fund. As Shanghai is a first-tier city with a large urban population, it is more urgent to solve the housing needs of the rigidly needed population and alleviate the imbalance between supply and demand in the real estate market. Increase bank loan interest rates, increase second-hand housing transaction tax, real estate tax, property tax, and other taxes to prevent excessive flow of investment funds into the real estate market and protect people's basic housing needs. And to increase the degree of opening up my country's financial capital market and broaden people's investment channels. Because bank deposit rates are too low, most people will invest in real estate to achieve high returns. Therefore, increasing the rate of return on investment in the real economy can reduce people's demand for investment housing, thereby slowing down housing prices.

4.3. Contribution

The research in this article has enriched the study's success in the implementating Shanghai's real estate policy. This article analyzes and demonstrates in practice and concludes that the purchase restriction policy is to invest heavily and satisfy the housing supply -demand of ordinary people. Still, the results of the implementation of this policy are not so satisfactory. For example, the reduction in people's affordability has brought about a harmful social impact. Therefore, its effectiveness is not apparent. For real estate enthusiasts, this is only a restraint, rather than a fundamental solution to the

problem of real estate speculation, but only short-term control. For ordinary people, the conditions are so good that supply exceeds demand. Both the rental and real estate markets will break the original intent of the purchase restriction policy for profit.

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