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A Study of Housing Price Drivers in China's New First-Tier Cities

Un estudio sobre los impulsores de los precios de la vivienda en la nueva ciudad de primer nivel de China

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ABSTRACT

Over the past two decades, urban housing prices in China have surged dramatically, prompting extensive research into the underlying causes. Despite scholarly efforts, a comprehensive analysis of the factors influencing housing prices in newly-designated first-tier cities remains elusive. This study aims to bridge this gap by examining a range of determinants impacting housing prices within these rapidly growing urban areas. Utilizing a detailed conceptual framework, the research identifies key influences such as financial expectations, market demand, and the availability of public services. The findings suggest that these factors play a substantial role in driving housing prices upwards, reflecting the rising purchasing power and urbanization trends in these cities. Interestingly, the study also highlights that limited land supply— often considered a primary driver of housing costs—does not significantly impact pricing in the context of new first-tier regions. This analysis underscores the complexity of the housing market dynamics in China, suggesting that policymakers should consider a broader range of influencing factors when addressing housing affordability and stability in these burgeoning urban centers. As a result, the study contributes valuable insights for stakeholders aiming to better understand and navigate the challenges of housing prices in China's evolving urban landscape.

Keywords: New First-Tier Cities; Housing Prices; Drivers; China.

RESUMEN

En las últimas dos décadas, los precios de las viviendas urbanas en China han aumentado drásticamente, lo que provocó una amplia investigación sobre las causas subyacentes. A pesar de los esfuerzos de los académicos, sigue siendo difícil realizar un análisis exhaustivo de los factores que influyen en los precios de la vivienda en las ciudades de primer nivel recién designadas. Este estudio tiene como objetivo reducir esta brecha mediante el examen de una serie de factores determinantes que afectan los precios de la vivienda en estas zonas urbanas de rápido crecimiento. Utilizando un marco conceptual detallado, la investigación identifica influencias clave como las expectativas financieras, la demanda del mercado y la disponibilidad de servicios públicos. Los resultados sugieren que estos factores desempeñan un papel importante en el aumento de los precios de la vivienda, lo que refleja el aumento del poder adquisitivo y las tendencias de urbanización en estas ciudades. De manera interesante, el estudio también destaca que la limitada oferta de tierra — a menudo considerada

un factor principal de los costos de la vivienda — no tiene un impacto significativo en la fijación de precios en el contexto de las nuevas regiones de primer nivel. Este análisis subraya la complejidad de la dinámica del mercado de la vivienda en China, lo que sugiere que los encargados del diseño de políticas deberían considerar una gama más amplia de factores influyentes al abordar la asequiy la estabilidad de la vivienda en estos centros urbanos en auge. Como resultado, el estudio aporta información valiosa para las partes interesadas que buscan comprender mejor y superar los desafíos de los precios de la vivienda en el paisaje urbano en evolución de China.

Palabras clave: Nuevas Ciudades de Primer Nivel; los Precios de la Vivienda; los Conductores; China.

INTRODUCTION

Over the past few decades, urban housing prices have experienced rapid increases globally. The data show that between 1970 and 2022, in 23 major international economies, house prices have cumulatively risen by an average of 32,4 times. The average annual growth rate for house prices has been over 6 %. Rapidly rising house prices bring a series of problems, such as high house prices leading to real estate bubbles and even financial crises, affecting the sustained and healthy growth of the national economy, and at the same time unaffordable house prices reduce the fertility intentions of urban populations and so on.[1,2,3,4,5] As a result, urban housing prices have attracted extensive attention from policy makers and scholars.[6,7]

Due to China's rapid urbanization, the country's housing prices have increased significantly. The average price of a home in China has increased from about Rmb 2,936 to about Rmb 10,396 in 2021.The rising prices of housing in China's new cities are among the issues that have raised concerns about the country's economy. A new first-tier city is a municipality that has a strong economic base, middle class, and political resources. It can also be located in a region that is able to connect to other provinces. These types of cities are usually accompanied by strong cultural deposits and good transportation. Another type of city is a coastal or provincial capital that is located in an economically developed area in the east.

It should be noted that the rising prices of housing within China's new high-ranking cities are becoming an increasing concern. According to the statistics released by the National Bureau of Statistic, the average annual increase in housing prices within China's new high-ranking cities from 2005 to 2020, is expected to be around 24 %. Economists have been conducting studies on the rising prices of housing in China's new cities to determine if they are worth investing in.

The mismatch between the demand and supply of housing in China's new cities is the main reason why the prices of homes have increased. The continuous increase in the number of urban residents has created a demand for housing that has driven up the prices of homes. According to data released by the NBS, the number of people living in China's new first-tier cities has increased significantly over the past ten years. From 2010 to 2020, the population of these cities grew by 24,98 %. The growth of the economy has also resulted in significant regional variations in the level of public services.[8] Most of the new first-tier cities are regional centers or provincial capitals with better education and healthcare resources, which directly promotes the rise of local housing prices while further attracting the concentration of foreign populations and bringing about a continuous rise in housing prices. From a supply perspective, urban housing prices in China are significantly influenced by the land system. Unlike the private land system in most Western developed countries, China has a public land system. The supply of urban land is largely regulated by the government. China's urban land supply is based on a top-down quota system. Every five years, China develops the China Land Use Master Plan, which determines the amount of new urban land that can be added to the country over the next five years and allocates it to each province, which in turn allocates it further down to individual cities. China has started allocating land indicators to smaller and medium-sized cities in western and central China in an attempt to promote balanced economic development. But, large cities, especially those in the new first-tier tier cities, are struggling with a lack of supply. The mismatch between the supply and demand of housing has caused house prices to rise rapidly. This study aims to analyze the changes that have occurred in the prices of housing in first-tier cities in China. It also looks into the various factors that have affected these prices.

The theory of supply and demand is the central idea of the concept of housing prices. It states that when the supply of a commodity is less than the demand of that commodity, prices will rise, while when the supply exceeds the demand, prices will fall. Similar to market equilibrium, this concept also determines the prices of housing. The capitalization theory explains that housing prices are influenced by the various characteristics of a property. This concept of the feature price model indicates that a property's utility determines its price. The price of real estate can vary due to the combination of various features and the number of fixed factors. This is why it is important to decompose the influence of these factors on the price of real estate. By doing so, you can determine the true value of the property based on the characteristics of the multiple fixed factors and the

changes in the pure market price.

A large number of studies have examined the factors influencing housing prices, and in general these factors can be categorized into four main groups: supply factors, demand factors, public services and financial expectations.

Land is the main supply factor affecting urban housing prices. The limited land resources determine its scarcity. The scarcity of land resources is the national condition of China. Although China has a vast territory, the land types are mostly mountainous and desert, so the available land area is extremely limited (add references).[9] This makes the land in China always in short supply, so the supply of land, especially residential land, will directly affect the supply of real estate.

The limited land resources and the regulation of land supply are important factors leading to the difference in housing prices. Due to the limited land resources, housing cannot be supplied indefinitely. In cities with relatively abundant land resources and relatively cheap land prices, housing supply will increase accordingly, which will lead to a decline in housing prices. A large number of scholars have conducted empirical research on how land supply affects housing prices, and found that there is a significant negative correlation between them.[10] Jia Haiyue pointed out that there was a mismatch in land supply in China, and a large amount of land was allocated to the areas where the population flowed out.[11] If the land supply area of population inflow cities is increased, the decline of housing prices will be the most obvious; The population density of certain cities has higher absolute values than those of other places. This indicates that the mismatch in the demand and supply of land will lead to higher housing prices.[12] The supply structure of urban land will also affect housing prices. The difference between the proportion of road traffic, industrial, and residential land is the main factor that has caused the prices of urban housing to vary. According to Wang Ruigong, China's industrial land has accounted for over 50 % of the country's land supply since 2008 while the residential land has contributed around 38 %.[13]

Demand Factor
Population size and structure

Urban housing prices are influenced by the population size of a town. This is the most vital demand factor that can be considered when it comes to developing a real estate market. The increase in population can directly boost the demand for real estate.

The number of floating residents in first-tier and new cities has increased, and this phenomenon has led to the outflow of people in small cities. According to Yang Yufang, the floating population has a positive effect on the prices of urban housing, and its individual and time effects are different.[14] Due to the rapid urbanization of China, the country's population has migrated from rural areas to cities. The shift has led to the formation of new first-class cities. According to Ming, the majority of the country's floating population resides in cities with relatively advanced economies.[15] In 2017, Li Jian conducted a study that analyzed the data collected from a sample of the population of a small city in 2005.[16] He found that the higher proportion of migrants, as well as the urban population size, was associated with higher housing prices. For every 10 % increase in the number of migrants, the price of housing rises by 7,5 %.

Spatial structure of population

Fang Yuping pointed out that from the perspective of population spatial structure,[17] the increase of permanent floating population and registered population will make housing prices rise, and the increase of registered population has a greater impact on housing prices than the increase of permanent population. Urbanization is the process of choosing whether to live in a city or a country, and housing is the microscopic embodiment of housing. In addition to promoting the demand for housing, urbanization also helps improve the quality of housing. in 2011, China's rapid economic growth has resulted in the country's growing rural population moving into cities, which has increased the demand for housing. The increasing number of people moving into new cities will also lead to a rise in housing prices. This is because the rapid urbanization and immigration are driving the demand for housing. In addition, the process of migration and urbanization in new cities is more intense.

Urbanization and population mobility have played an important role. The study conducted by Xin and colleagues in 2017 looked into the link between urbanization, housing prices, and population mobility in China's urban-rural dual economy. According to Xin, if the urbanization rate increases by one percentage point, housing prices will go up by 0,343 percent.[18] For every 1 percentage increase of urban floating population, the urban housing price will increase by 0,701 percentage, and the impact of the increase of floating population with high education level is more obvious. Tian also pointed out that the improvement of urbanization level will promote the demand of urban residents for housing purchase, which will lead to an increase in housing prices. Zhu Yanyan found that the scale of population inflow will increase the population, expand the population density, directly increase the consumption demand of commercial housing, affect the balance between supply and demand of commercial housing market, and then promote the rise of housing prices.[19] The scale of population

outflow is large, and the urban population has a "negative growth", which reduce the population density, thus directly reducing consumer demand and curbing the rise in housing prices.

Population age structure

As a growing nation, China has become one of the most densely inhabited countries in the world with an aging population. According to the statistical bulletin released by the country's economic and social development agency in 2019, the country's population had reached over 1,4 billion, and 253,9 million of them were over 60 years old. The number of people over 65 years old made up 12,6 % of the total. According to a study conducted by Fang Yuping in 2020, the increase in the population's dependency ratio can have an adverse effect on the prices of housing. It can also reduce the purchasing power of the young population and increase the burden on them. According to Del Negro, the structural changes that affect different ages can have different effects on housing demand.[20] For instance, in South Korea, the elderly prefer to live in an open environment. The country's aging population and the introduction of a two-child policy have led to the rise of family demand and the reduction of housing supply.

In 2019 that looked into the link between the structure of the population and housing prices in China. The researcher utilized data from the population census and the LSS method to test the link. It revealed that the ratio of child dependency negatively affected housing prices. On the other hand, the elderly's dependency ratio has a positive effect on housing prices. The study also found that the link between housing prices and family savings is very strong. According to the researchers, the effects of population aging on the housing market are different depending on the level of household savings. For instance, the older generation's savings can gradually depress the prices of housing. However, this doesn't mean that the market will collapse.

The national structure of the floating population, as well as its gender, age structure, and income structure, will affect the prices of housing. For instance, the more males and young people that the city has, the higher its housing costs will be. Also, the more inter-provincial and high-income groups the city has, the more its housing prices will increase. In terms of regions, housing prices in developed regions are jointly affected by the size of floating population and population structure; The housing prices in less developed areas is mainly influenced by floating population and population structure; Developing areas are mainly affected by population size.

Income level of residents

One of the most critical factors that impacts real estate consumption is the income level of residents. Annual income levels determine the affordability of housing. An increase in residents' purchasing power can help boost the demand for housing and increase the prices of homes. The increase in housing prices is expected to be driven by the people's increasing demand for better and more affordable homes. The per capita disposable income of people increased by over 120 times in four decades. The rise in disposable income has resulted in a better standard of living and increased the demand for housing.

Purchase restriction policy

Since 2010, many provinces and cities have issued policies to restrict the purchase of commercial housing. The introduction of a series of policies has caused great changes in housing prices and purchases in various places, which has aroused some scholars' interest in the policy. In 2012, Qiao Kunyuan conducted a study that compared the prices of houses in the cities that had a purchase restriction to those that did not.[21] She found that the purchase restriction led to a 2,5 % decrease in the housing prices, but a 0,15 % increase in the transactions. In the study of the purchase restriction policy in Hangzhou, Zhang Ling et al. found that in 2016, Hangzhou issued the purchase restriction policy for foreign household registration and in 2017, the housing price dropped by 400,26 yuan and 4082,2 yuan respectively.[22] It shows that a series of policies promulgated by the government have suppressed the rise of housing prices. According to Ren Yunan, in 2022, the purchase restrictions policy could help slow down the growth of the housing prices, but it is not clear if this strategy would have a long-term effect.[23] The purchase restriction guidelines in the city have varying restrictions for different areas, which makes it difficult for people with non-local residency to buy homes. However, this policy has less obvious restrictions on some local residents and non-local residents who meet the purchase restriction policy.

Financial and Expected Factor
Influence of interest rate on housing prices

The rise of interest rates has a significant impact on the housing market. It will lead to a decline in the prices of homes in the long run. According to Fang Yi, most of the liquidity that the real estate market has is coming from bank loans.[24] The increase in bank credit could have a positive effect on housing prices, but the rise in loan interest rates would have a negative impact. Some scholars also looked into the relationship between housing prices and the macro-economy through the lens of Hong Kong experience. They discovered that interest

rate is the most important variable that can affect the long-term price fluctuation of housing. Looked into the housing market's channel in the monetary transmission system. The results indicated that interest rates have a significant effect on housing prices.

The influence of monetary policy on housing prices

The real estate industry has played a significant role in China's national development since 2003. As the country's economy continues to expand, the rising prices of homes will also continue to be a concern. To address this issue, the government has enacted various regulations for the real estate sector.According to Tang Qianqian, in 2021, public policies can have a significant impact on the price fluctuation of the real estate market in China.[25]

The influence of expectation on housing prices

Wang Yuelong et al. put forward that the expected housing price increase of 1 % will significantly promote the increase of household consumption expenditure by 1,07 %, and the excessive expectation of housing price by families will cause the illusion of wealth, which will further strengthen the influence of housing price expectation on household consumption expenditure.[26] Wang Pin and Hou Chengqi further introduced the impact of housing price expectation into the land price determination model, and believed that the price expectation of real estate developers became the transmission intermediary of the interaction between land price and housing price.[27] When there is expectation of rising housing prices, real estate developers are willing to bear higher land purchase cost and pay higher land premium for it, while sales strategies such as linkage pricing and over-selling ensure that developers can transfer the premium burden at lower cost.

Public Service Factors

From the perspective of public service, public service, as a scarce public product, not only affects the life quality of residents, but also plays an important role in regional economic development. At present, there is a significant gap between regions in China's public services, and housing prices also show obvious regional differences. Many people go to new first-tier cities to buy houses for better educational and medical resources.

The influence of education, medical care and environment (greening) on housing prices

According to Shi Runhe and Zhang Xuanyi, the closer a city is to the center, the more influence its service facilities have on the distribution of housing prices.[28] This suggests that optimizing the service facilities in a city should be considered. In 2020, Cong Ying and colleagues discovered that there is a link between public service supply and housing prices.[29]

The influence of high-speed railway on housing prices

The total number of kilometers traveled by China's high-speed railways reached 37,900 by the end of 2020. It is regarded as the world's largest such railway network. The country's high-speed railway now has the potential to connect almost 190 cities. High-speed railway construction places tend to have active economies, as housing prices stay high. The objective of such projects is to connect cities with the outside world and improve their urban resource exchange. According to Yu Peitai, in 2022, the operation and opening of high-speed railways have a greater impact on housing prices than the planning and design stage or the construction phase.[30] Zhang Ting, in 2021, said that the railways have a positive effect on the prices of residential and commercial real estate in developed cities.[31]

METHOD

Research Object

New first-tier cities are regarded as being of significant importance to China's economic development. They play a key role in the country's growth by contributing to the establishment of various industries and financial centers. There are 14 evaluation indices that measure the development of new cities. The evaluation system has focused more on the comparison of the strength of various cities. According to the seventh census, the number of people living in new first-tier cities has increased to over 200 million. According to data, the gross domestic product of China's new first-tier cities is expected to reach over 20 trillion yuan in 2020. This figure is about 20,4 % of the country's total GDP. In addition, 13 of the 15 cities have already exceeded the trillion-yuan mark, while two have exceeded the two trillion-yuan mark. These data show the importance of the new cities in the country's economic development.

Research Methods

In order to test the various influencing factors of urban housing prices, this study constructed the following

econometric model for regression.

$$HP_{ct} = \beta_0 + \beta_1 X_{ct} + city_c + year_t + \varepsilon_{ct}$$

Where c stands for city and t stands for year. stands for urban housing price, specifically, the average housing price of each city is calculated by the ratio of urban housing sales to urban housing sales area. X_{ct} stands for a series of factors affecting urban housing prices. $city_c$ stands for the urban factors that do not change with time, and $year_t$ stands for the time-fixed effect. The availability of land is one of the most crucial factors that can impact the prices of residential properties. Increasing the supply of land can result in more housing units being created. This study looked into the urban land supply area in each region to determine its influence on housing prices. It also looked into the impact of real estate investment on the supply of housing. Another indicator of the supply is the growth rate of investment and development in real estate. The demand indicator is a statistical model that takes into account the various factors that affect the prices of urban homes. It shows that the increase in the population size, per capita disposable income, and urbanization rate can promote the demand for housing. This study was conducted to analyze the three main factors that affect the demand for housing: the total urban population, the population migration rate, and the per capita income. The quality of urban settlements is also one of the factors that can influence the prices of housing. The study looked into the various indicators that can be used to measure the impact of these factors on the housing market. These include the number of teachers and doctors per thousand residents, the number of urban road areas, and the per capita green space area. Another important factor that can affect the price of housing is the interest rate and money rate on loans. These two factors can directly affect the supply and demand of housing. The M2 and interest rate are two of the most common indicators of the housing market's growth.

Table 1. Setting of variables affecting housing prices				
Dimension	**Explanatory variable**	**Unit**	**Variable code**	**Expected impact**
Supply	Per capita housing land supply area	Km2/ person	PLAND	-
	Real estate development and investment growth rate	%	INVEST	-
Demand	Total urban population	Ten thousand people	POP	+
	Population migration rate	%	MIG	+
	Urban per capita disposable income	Yuan/person	PINC	+
Public services	Number of teachers per thousand people	Teachers/a thousand people	PTEC	+
	Number of doctors per thousand people	Doctors/a thousand people	PDOC	+
	Per capita urban road area	M2/ person	PROAD	+
	Per capita urban park green space area	M2/ person	PGARD	+
Finance and expectation	Interest rate	%	LR	Uncertain
	M2 month-on-month growth rate of money circulation	%	M2	Uncertain
	Per capita loan balance of financial institutions		PLOAN	Uncertain
	Expectation of housing price growth	%	EXP	+

Data Sources

This study analyzed the data collected from 15 first-tier cities in China between 2005 and 2020. It aims to identify the factors that influence the prices of urban housing. The study's statistical analysis is based on the multiple databases that are used in this research.

Table 2. Descriptive statistical analysis of variables					
VarName	Obs	Mean	SD	Min	Max
HP	225	10026,17	4566,811	3281,57	27448,13
PLAND	225	0,17	0,152	0,00	0,97
INVEST	225	16,23	13,518	-32,30	72,50
POP	225	1096,54	560,286	585,83	3209,00
MIG	225	0,47	0,857	-0,16	4,20
PINC	225	39018,91	12257,241	17193,62	70966,40
PROAD	225	15,64	5,427	4,95	34,21
PGARD	225	3702,90	3520,845	659,00	20693,00
PTEC	225	3,20	0,481	2,23	4,29
PDOC	225	2,59	0,721	1,26	4,42
LR	225	0,05	0,011	0,04	0,07
M2	225	0,15	0,056	0,07	0,28
PLOAN	225	140384,68	78757,266	24639,90	411070,66
EXP	225	0,08	0,111	-0,26	0,57

RESULTS

Benchmark Regression

The study analyzed the various factors that affected the prices of housing in 15 new cities in China from 2005 to 2020. It was done using three different statistical models: the Pooled OlS model, the Random Effect model, and the Fixed-Effect model. The results of the research revealed that the fixed-effect model performed better than the random model when it came to calculating the F statistic. On the other hand, the effects of real estate investment and land supply on housing prices were not significant. One possible reason is that there is a time lag in real estate development. It takes about 3-5 years for a real estate development enterprise to get the land and sell it after development. Therefore, the current land supply may have little to do with housing prices. Some developers may choose to buy land when the housing price is high, and some developers may buy land when the housing price is low, which eventually leads to the insignificant regression result of land quantity and housing price.

The demand point of view shows that the per capita income and the urban population size can be positively correlated with the regression coefficients. This suggests that the increase in the number of people living in a city and the high per capita disposable income can lead to higher housing prices. This finding is consistent with previous studies conducted by Zhao, Mu, and Sun. Contrary to expectations, the impact of population migration rate on housing prices is significantly negative, that is, the more cities with non-local population, the lower housing prices. One possible reason is that the new first-tier cities attract a large number of low-income migrants to work because there are many job opportunities. However, due to their low income level, it is difficult for them to afford housing prices in new first-tier cities, so they often choose to rent a house in new first-tier cities and then go back to their hometown to buy a house Wang.[32] As a result, the demand for housing by non-local people is low, and therefore, the housing prices in cities with large inflows of non-local people are relatively low.

The data collected from public services such as teachers, doctors, and urban road area per capita provide a positive correlation between the number of people and the housing price. The increase in the number of doctors and teachers is also associated with the better medical environment and education level. Song Weixuan and et al. have also done the same research, focusing on the influence of "location" attribute on housing price and rent based on the characteristic price method.[33] The results show that "unconventional" factors such as education, medical care, leisure and entertainment are on the rise, and the more hospitals within 1 kilometer of the community, the higher the price and rent of the house.

From the perspective of finance and expectation, the regression coefficients of interest rate, per capita loan balance of financial institutions and housing price growth expectation are all significantly positive. It shows that with the increase of interest rate, the per capita loan balance of financial institutions and the expectation of housing price growth, housing prices will also increase. Contrary to expectations, the regression coefficients of M2' s growth rate of money circulation are all significantly negative. It shows that the higher the month-on-month growth rate of money circulation M2, the lower the housing price will be. The results show that income, interest rate and investment in real estate development have the greatest influence on housing prices.

Table 3. Benchmark regression model			
	(1)	(2)	(3)
	Pooled OLS Model	Fixed Effect Model	Random Effect Model
LnPLAND	-0,034**	0,001	0,002
	(-2,03)	(0,09)	(0,17)
INVEST	0,004***	0,001	0,001
	(3,17)	(1,09)	(1,33)
LnPOP	0,264***	1,155***	0,461***
	(4,91)	(7,11)	(4,09)
MIG	0,139***	-0,221**	0,077
	(4,51)	(-2,27)	(1,29)
LnPINC	0,845***	0,363***	0,594***
	(7,53)	(3,29)	(5,56)
lnproad	-0,001	0,043	0,004
	(-0,02)	(0,78)	(0,08)
lnpgarden	-0,103***	0,084**	0,036
	(-3,49)	(2,00)	(0,83)
lnpteacher	0,068	0,284***	0,295***
	(0,63)	(2,62)	(2,70)
lnpdoc	0,163	0,225*	0,189
	(1,61)	(1,88)	(1,54)
lr	4,191**	2,079	2,001
	(2,24)	(1,57)	(1,41)
m2	0,448	-0,154	-0,251
	(1,14)	(-0,53)	(-0,81)
lnploan	0,270***	0,015	0,039
	(4,60)	(0,33)	(0,78)
EXP	0,687***	0,680***	0,696***
	(5,37)	(8,50)	(8,02)
Constant	-4,698***	-4,231***	-1,757
	(-4,19)	(-3,45)	(-1,45)
N	225	225	225
R2	0,788	0,859	0,842

Endogenous Test

Many factors that affect the housing price may be affected by the housing price at the same time, so it is difficult to say whether the housing price rise is caused by some factors or driven by some factors. In other words, there are endogenous issues between housing prices and many influencing factors. A common way to solve the endogenous issues is to lag the independent variable by one period. Based on this, all kinds of influencing factors are delayed for one period and regressed again, and the results are shown in table 4. As before, this study tested three regression models and showed that the fixed effect was the best regression model. The regression results of independent variables lagging behind by one period are basically consistent with the benchmark model, and only the regression coefficient of interest rate becomes significantly negative, which shows that after considering endogenous issues, the decline of interest rate can significantly promote the rise of housing prices.

Table 4. Regression results of independent variables lagging by one period			
	(1)	(2)	(3)
	Pooled OLS Model	Fixed Effect Model	Random Effect Model
L.lnphsland	-0,030*	0,006	0,013
	(-1,72)	(0,44)	(0,91)
L.investrate	0,003**	0,000	0,001

	(2,55)	(0,38)	(0,77)
L.lnczpop	0,248***	1,143***	0,302**
	(4,36)	(5,47)	(2,54)
L.flowrate	0,146***	-0,201*	0,094
	(4,58)	(-1,69)	(1,57)
L.lnpincome	0,702***	0,309**	0,485***
	(5,94)	(2,58)	(4,31)
L.lnproad	0,029	0,082	0,057
	(0,57)	(1,40)	(1,00)
L.lnpgarden	-0,114***	0,088**	0,015
	(-3,67)	(1,97)	(0,34)
L.lnpteacher	0,063	0,346***	0,254**
	(0,55)	(2,89)	(2,12)
L.lnpdoc	0,035	-0,134	-0,109
	(0,33)	(-1,04)	(-0,84)
L.lr	-1,433	-4,220***	-4,943***
	(-0,75)	(-3,00)	(-3,33)
L.m2	0,597	-0,086	-0,403
	(1,46)	(-0,27)	(-1,21)
L.lnploan	0,317***	0,075	0,100*
	(5,23)	(1,54)	(1,96)
L.growth	0,568***	0,529***	0,549***
	(4,25)	(6,28)	(6,02)
_cons	-3,139**	-3,742**	0,596
	(-2,60)	(-2,39)	(0,43)
N	210	210	210
R2	0,770	0,835	0,815

CONCLUSION

The study looked into China's rapid urbanization and examines the various factors that affect housing prices in the country's new first tier cities. It used data collected from 15 cities from 2005 until 2020. The study found that various factors, such as financial expectations, demand, and public services, are responsible for the rapid rise of housing prices in China's new first- tier cities. According to the study, the larger the population, the more disposable income, and the better level of education and health care, the more housing prices can be expected to increase.

REFERENCES

1. Li Lunyi, Zhang Xiang. Price bubbles and spatial contagion effects of real Estate Market in China [J]. Financial Research, 2019(12): 169-186.

2. Liu Jun, ZHAO Kui, ZHANG Ping. Estimation of China's real estate bubble based on wavelet analysis [J]. Statistics and Decision, 2020, 36(03): 113-116.

3. Mu XueYing. Floating population geographic mobility and housing differentiation [D]. East China normal university, 2022. The DOI: https://10.27149/,dcnki.Ghdsu.2022.000816.

4. Sun Wei & Zhao Yu. A study on the effects of income level and population size on real estate prices.

Journal of Yuncheng University, 2023(02),1-9. doi: https://10.15967/j.cnki.cn14-1316/g4.2023.02.013.

5. Dong Ziyi. Research on the Impact Mechanism of China's Real Estate Prices on Residents' Consumption Upgrade [D] Hebei economic and trade university, 2021. DOI: https://10.27106/,dcnki.Ghbju.2021.000057.

6. Zhou Ke. Restrictions of real estate in our country house prices effect research [D]. Shanghai university of

finance and economics, 2021, DOI: https://10.27296/,dcnki.Gshcu.2021.000075.

7. Yuan Ziwen. Research on the Impact of Population Agglomeration on Commercial Housing Prices in Chinese Cities [D] Jilin university, 2021. DOI: https://10.27162/,dcnki.Gjlin.2021.004549.

8. Xu Tong. China's urban population flow and the relationship between housing price research [D]. Jilin university, 2020. The DOI: https://10.27162/,dcnki.Gjlin.2020.005739.

9. Lyu Yue. A study on the allocation mechanism of urban land resources under tight resource constraints. Shanghai Land and Resources 2020 (04),9-13.

10. Hu Xiaoke. The Mechanism and Economic Effects of Construction Land Allocation: A Study from the Perspective of Land Indicators [D] Tsinghua university, 2019. DOI: https://10.27266/,dcnki.Gqhau.2019.000682.

11. Wang Ruigong & He Jiachen. A study on the relationship between urban land resource allocation and housing price dynamics: A model analysis of housing price from the perspective of supply and demand. Price Theory and Practice, 2019 (08),60-63. Doi: https://10.19851/j.carolcarrollnkicn11-1010/f2019.08.013.

12. Lin Xueni. Research on the Influence Mechanism of Urban Land Supply Structure on Residential Price Differentiation [D] Zhengzhou university, 2021. DOI: https://10.27466/,dcnki.Gzzdu.2021.000910.

13. Jia Haiyue. The influence of Chinese land supply for urban property prices [D]. Jilin university, 2021. The DOI: https://10.27162/,dcnki.Gjlin.2021.004606.

14. Yang Yufang. Population flow's influence on urban housing price effect research [D]. Jinan university, 2021. The DOI: https://10.27167/,dcnki.Gjinu.2021.001292.

15. Tian Ming. Inter-city horizontal migration of migrant population in eastern China. Geographical Research 2013 (08),1486-1496.

16. Li Jianan, You Weixiang & Sun Puyang. Does the foreign population promote the rise of urban house prices? --An empirical study based on Chinese city data. Nankai Economic Research 2017 (01), 58-76. doi: https://10.14116/j.nkes.2017.01.004.

17. Fang Yuping. Population structure change on the influence of urban housing price research [D]. Shanghai university of finance and economics, 2020, DOI: https://10.27296/,dcnki.Gshcu.2020.000332.

18. Zhang Biying. Empirical Analysis on the Impact of New Urbanization on Commercial Housing Prices [D] Xiangtan University,2017. https://kns.cnki.net/kcms2/article/abstract?v=v0gKrRoz1Ud9tMmWoASV0_yYYBdXhoxb3zoGwxGRydcaqRmL0sBUAx5rCoaQ6-zoFrRL73f3iZKsrf2CWT1ud1QqL4h_pVS9qvzT7c_m5EYssYme3ZtJtCN_3ql2W476gmFLDHxLoiE=&uniplatform=NZKPT&language=CHS

19. Zhu Yanyan. Population flow influence on urban house price differentiation between research [D]. Anhui architecture university, 2022. The DOI: https://10.27784/,dcnki.Gahjz.2022.000414.

20. Qiao Kunyuan. Does the housing purchase restriction really work? - evidence from China's 70 large and medium-sized cities. The economic and management research 2012 (12), 25 to 34. Doi: https://10.13502/j.carolcarrollnkiissn1000-7636.2012.12.004.

21. Zhang Ling, Li Fei. The effect of purchase restriction policy on the price of new commercial housing in Hangzhou: An empirical study based on the regression of breakpoint. Journal of Zhejiang University,2022 (05),623-632.

22. Ren Yunan. Restrictions on housing price research [D]. The influence of jiangxi university of finance and economics, 2022, DOI: https://10.27175/,dcnki.Gjxcu.2022.001249.

23. Fang Yi. Analysis of bank risk-taking under monetary policy and real estate price shocks. World Economy, 2015 (07), 73-98. doi: https://10.19985/j.cnki.cassjwe.2015.07.006.

24. Tang Qianqian. Monetary policy and its expected impact on house prices in China [j].journal of hunan normal university, 2021. The DOI: https://10.27137/,dcnki.Ghusu.2021.000323.

25. Wang Yuelong, Cai Yulong & Tang yuchen. Expectation of house price appreciation, wealth illusion and household consumption - Evidence based on the Sixth Article of the State. Research on Quantitative and Technical Economics, 2023 (09), 116-137. doi: https://10.13653/j.cnki.jqte.20230726.001.

26. Wang Pin & Hou Chengqi . Expectation shocks, house price volatility and economic volatility. Economic Research, 2017 (04), 48-63.

27. Zhang Xuanyi & Shi Runhe. An Exploration of the Influence of Urban Service Facilities on House Price Distribution Patterns. Journal of East China Normal University (Natural Science Edition), 2019 (06),169-178.

28. Cong Ying, Du Hongyu & Yang Wenjing. Spatial Econometric Analysis of the Impact of Public Service Capitalization on House Prices: An Empirical Study Based on 269 Prefecture-level Cities in China. Research on Financial Issues, 2020 (07), 69-77. doi: https://10.19654/j.cnki.cjwtyj.2020.07.007.

29. Yu Peitai. High-speed railway construction of urban real estate prices impact study [D]. The northeast university of finance and economics, 2022, DOI: https://10.27006/,dcnki.Gdbcu.2022.000807.

30. Zhang Ting. Research on the Differential Impact of High-Speed Railways on Urban Real Estate Prices [D] Shanghai university of finance and economics, 2021. DOI: https://10.27296/,dcnki.Gshcu.2021.000292.

31. Wang Dongzhi. Research on the Relationship between Industrial Structure, Population Mobility and Housing Price-Income Ratio in the Yellow River Basin [D] Shanxi university of finance and economics, 2023. DOI: https://10.27283/,dcnki.GSXCC.2023.001193.

32. Song Weixuan, Chen Peiyang, Chen Hao & Yin Shanggang. Spatio-temporal pattern and differentiation mechanism of residential "sales-rent ratio" in Nanjing. Geoscience,2018 (12), 2084-2092. doi: https://10.13249/j.cnki.sgs.2018.12.017.

CONFLICT OF INTEREST
None.

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