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Research on factors influencing housing prices in Beijing

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Abstract. This paper delves into the issue of soaring housing prices in China's real estate sector, with a particular focus on Beijing. Employing a multiple linear regression model, it conducts an empirical analysis to identify the factors influencing housing prices. Furthermore, it synthesizes scholarly perspectives to offer a comprehensive discussion on these influencing factors. The research highlights Beijing's real estate development, residential investment, and residential sales area as pivotal determinants of housing prices. Building upon these findings, the study advocates for the implementation of effective measures such as land policy regulation and restrictions on real estate transactions to guide the real estate market development prudently and maintain housing prices within a rational range. Results show that real estate development residential investment has a significant positive impact on housing prices, while residential sales area has a significant negative impact. Ultimately, the research endeavors to furnish a scientific foundation for policy formulation and assess its impact, thereby fostering the healthy growth of the real estate market, ensuring stable economic progress, and enhancing the well-being of people.

Keywords: Housing prices, multiple linear regression, interaction effects.

1. Introduction

The ongoing expansion of the Chinese economy coupled with the steady rise in per capita income has sparked heightened demand for housing, consequently driving up property prices. This trend, particularly prominent in major cities, has emerged as a pressing public concern, impacting residents' living standards and escalating the financial burden of homeownership, especially for young individuals and families with moderate incomes [1]. Moreover, the surge in property prices poses the risk of a brain drain, potentially hindering urban development and innovation. Additionally, there's the looming threat of a real estate bubble, the rupture of which could unleash significant repercussions on the financial system and the broader economy [2].

As the nation's capital, Beijing has witnessed remarkable economic growth alongside soaring property prices [3]. Statistics from the National Bureau of Statistics of China illustrate a substantial increase in the average price of commercial housing in Beijing over the past decades [4]. This escalating concern has prompted regulatory measures, such as stringent property purchase restrictions and price controls in Beijing and other cities. However, these regulatory efforts alone may fall short in addressing the underlying causes of high property prices, given the complexity of vested interests pervading the entire real estate ecosystem, from land allocation to development [5].

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A comprehensive understanding of the factors influencing property price fluctuations is imperative for effective control measures. Numerous scholars have delved into this subject, offering insights from various perspectives. For instance, Abraham's research on US city data underscores the correlation between real estate prices and housing construction costs [6]. Similarly, Lan and Zhang identified construction and land costs as primary drivers of real estate price fluctuations [7]. Zhou et al. emphasized the pivotal role of income levels, while Meng et al. highlighted the correlation between property prices and economic indicators [8, 9]. Furthermore, factors such as currency devaluation, expectations, and macroeconomic conditions, as discussed by He, Chen, and Meng, respectively, contribute to the intricate dynamics shaping property prices.

Against this backdrop, this study employs a multiple linear regression model to empirically analyze the key determinants of property prices in Beijing. By providing a scientific foundation for policy formulation, it aims to foster the prudent and sustainable development of the real estate market, thereby addressing the multifaceted challenges posed by escalating property prices [10].

Upon closer examination of the aforementioned perspectives, it becomes evident that the determinants shaping property prices are far from monolithic. Rather, they constitute a complex tapestry of interrelated factors, wherein the availability of land, economic forces, and the intricate dynamics of supply and demand play pivotal roles in driving fluctuations in property prices. This nuanced understanding underscores the multifaceted nature of the real estate market, wherein a confluence of influences converges to shape the trajectory of property values. By recognizing the interplay between these diverse factors, stakeholders can glean deeper insights into the mechanisms driving property price dynamics, thereby laying the groundwork for informed decision-making and strategic interventions aimed at fostering a more sustainable and inclusive real estate environment.

2. Methodology

2.1. Data source

In order to facilitate comprehensive analysis and ensure robust data accessibility, this study meticulously curated pertinent annual data from Beijing spanning the years 2012 to 2022. The selection of this temporal scope allows for a thorough examination of the factors influencing property prices within a substantial timeframe, enabling a nuanced understanding of long-term trends and dynamics. It's noteworthy that the data utilized in this study have been meticulously sourced from the esteemed National Bureau of Statistics of China, renowned for its unwavering commitment to data accuracy, integrity, and reliability. Given the authoritative stature of this institution, the data employed in this study carry significant weight and credibility, instilling confidence in the findings and conclusions drawn herein. This judicious selection of data sources underscores the rigorous methodological approach adopted in this study, thereby enhancing the robustness and validity of the analytical insights derived.

2.2. Variable selection

Based on the requirements of the research question, this study selected property prices as the dependent variable and chose residential sales area, permanent resident population, per capita gross domestic product, consumer price index, land acquisition area by real estate development enterprises, and inflation rate as the independent variables (Table 1).

Table 1. List of variables

Variable	Logogram
Residential area sold	X1
Permanent resident population	X2
Real estate enterprises purchase land area	X3
Consumer Price index	X4
Housing investment in real estate development	X5
Average selling price of residential commercial housing	Y

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2.3. Method introduction

Multiple regression analysis refers to using a regression equation to quantitatively explain the linear relationship between a dependent variable and two or more independent variables. To explore the impact relationships and degrees of influence of each independent variable on property prices, this study establishes a multiple linear regression model between the dependent variable Y and six independent variables.

$$Y = \beta_0 + \beta_1 X_1 + \cdots + \beta_p X_p + \varepsilon \quad (1)$$

Where β_p's are the regression coefficients of each independent variable, β0 is the constant term, and ε is the random disturbance term

3. Results and discussion

3.1. Correlation analysis

The examination presented within this paper elucidates the multitude of factors that wield influence over Housing Prices. Table 2 encapsulates a comprehensive correlation analysis, where an exploration into the interplay between property prices and five key determinants unfolds: namely, residential sales area, permanent resident population, land acquisition area by real estate enterprises, consumer price index, and residential investment in real estate development. This analysis doesn't merely scratch the surface; rather, it delves deep into the intricacies of these relationships, employing Pearson correlation coefficients to gauge the strength of their associations. Through this meticulous examination, the paper endeavors to unveil the nuanced connections that underpin the dynamics of housing prices, offering invaluable insights into the complex interplay of factors shaping the real estate landscape

Table 2. Results of Pearson correlation analysis.

	Y	X1	X2	X3	X4	X5
Y	1					
X1	-0.808**	1				
X2	0.473	-0.646*	1			
X3	-0.702*	0.584	-0.246	1		
X4	-0.523	0.478	-0.523	0.418	1	
X5	0.860**	-0.497	0.306	-0.560	-0.560	1

*p<0.05 **p<0.1

3.2. Model results

The variables residential sales area, permanent resident population, land acquisition area by real estate enterprises, consumer price index, and residential investment in real estate development were used as independent variables, while property prices were taken as the dependent variable for linear regression analysis.

From Table 3, it can be seen that the model has an R-squared value of 0.945, which means that residential sales area, permanent resident population, real estate enterprises' land purchase area, consumer price index, and real estate development residential investment can explain 94.5% of the variation in housing prices. When conducting an F-test on the model, it was found that the model passed the F-test (F=17.271, p=0.004<0.05), indicating that the model is meaningful. The model formula is:

$$Y = -1.49 - 18.664X_1 - 1.298X_2 - 6.204X_3 + 1580.86X_4 + 20.984X_5 \quad (2)$$

With an R-squared value of 0.945, meaning that the 5 independent variables can explain 94.5% of the variation in housing prices. The regression coefficient for residential sales area is -18.664 (t=-2.860, p=0.035<0.05). It is an important negative impact on housing prices for residential sales area. The regression coefficient for permanent resident population is -1.298 (t=-0.032, p=0.975>0.05), indicating

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that permanent resident population does not have an impact on housing prices. The regression coefficient for real estate enterprises' land purchase area is -6.204 (t=-0.830, p=0.444>0.05), showing that this variable does not influence housing prices. The regression coefficient for consumer price index is 1580.826 (t=0.679, p=0.527>0.05), showing that CPI does not affect housing prices. The regression coefficient for real estate development residential investment is 20.984 (t=4.274, p=0.008<0.01), indicating that it has a significant positive impact on housing prices.

In summary, real estate development residential investment has a significant positive impact on housing prices, while residential sales area has a significant negative impact. However, permanent resident population, real estate enterprises' land purchase area, and consumer price index do not have an impact on housing prices.

Table 3. Linear regression analysis results.

	Unstandardized coefficient		Standardization Coefficient	t	p	Diagnosis of collinearity	
	B	Standard error	Beta			VIF	Degree of tolerance
C	-149404.606	286782.601	-	-0.521	-.625	-	-
X1	-18.664	6.525	-0.485	-2.860	0.035*	2.631	-.380
X2	-1.298	40.054	-0.005	-0.032	0.975	2.110	0.474
X3	-6.204	7.472	-0.120	-0.830	0.444	1.901	0.526
X4	1580.826	2328.391	0.097	0.679	0.527	1.849	0.541
X5	20.984	4.910	0.607	4.274	0.008**	1.843	0.543
R2	0.945						
Adjust R2	0.891						
F	F(5,5)=17.271, p=0.004						
DW	2.544						

Dependent variable: Y
*p<0.05, **p<0.01

4. Conclusion

With the advancement of urbanization and rapid economic development, the real estate market has increasingly become an important component of the economy. However, the relationship between real estate development residential investment and housing prices, as well as the impact of residential sales area on housing prices, has always been a focus of attention. This article aims to analyze in depth the influence of these two factors on housing prices and propose corresponding policy recommendations. First, this paper delves into the positive impact of real estate development residential investment on housing prices. It is well known that an increase in real estate development investment implies more resources such as land, construction, and labor being injected into the market. This growth in investment often leads to an increase in residential supply, thereby driving housing prices up to a certain extent. However, this relationship is not linear. When the investment amount reaches a certain level, market competition will intensify, and the rate of housing price increase may slow down. On the other hand, the negative impact of residential sales area on housing prices should not be overlooked. The expansion of residential sales area means an increase in the available housing supply in the market, which increases the choices for homebuyers. In this scenario, in order to attract homebuyers, developers may adopt price reduction strategies, leading to a decrease in housing prices. This relationship is particularly evident in situations where the market faces oversupply.

Based on the above analysis, this article proposes the following policy recommendations:

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Land Policy Regulation. To control real estate development costs, the government should strengthen the management of land supply and limit the land transfer prices. In addition, for essential housing and affordable housing projects, the government should provide certain policy and financial support to promote the healthy development of the real estate market.

Purchase and Sales Restriction Policies. In order to prevent speculative home purchases, the government should limit the number of homebuyers and the quantity of home purchases. By cracking down on irregularities, it can effectively prevent an overheated real estate market. Furthermore, adjusting the interest rates and loan amounts for housing loans in banks can further restrict speculative homebuyers from obtaining housing loans, thereby curbing rapid housing price increases.

In conclusion, real estate development residential investment and residential sales area are important factors influencing housing prices. The government should use measures such as land policy regulation and purchase and sales restrictions to guide the rational development of the real estate market and ensure that housing prices fluctuate within a reasonable range. Only in this way can the sustained and healthy development of the real estate market be achieved, making a contribution to stable economic growth and the well-being of the people.

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