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Study on the Influencing Factors of Housing Price

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Abstract:

This study delves into the multifaceted dynamics of housing prices by applying a multiple linear regression model to assess the impact of various macroeconomic and social variables on housing price growth in the United States from 2010 to 2023. The research scrutinizes the influence of GDP growth, interest rates, unemployment rates, inflation, and population growth on the likelihood of housing price increases. The findings underscore the significant positive effects of economic growth and population expansion on housing prices, while concurrently highlighting the suppressive impact of rising interest rates and unemployment on the real estate market. Interestingly, the study reveals that inflation does not significantly influence housing prices over the studied period. These insights are pivotal for policymakers, investors, and homeowners, providing a nuanced understanding of the factors that can potentially sway housing market trends. The research concludes by emphasizing the complexity of housing market behavior and the importance of considering these economic indicators in strategic planning and investment decisions.

Keywords: Housing prices; multiple linear regression; real estate market trends.

1. Introduction

Housing prices are a critical economic indicator, reflecting not only the health of the real estate market but also the broader economic trends and investor sentiment. The interplay between housing prices and the economy is complex, with numerous factors influencing this relationship. Firstly, demographic changes significantly affect housing prices [1]. As populations age, the demand for housing can shift, leading to changes in prices. For instance, an aging population may downsize, affecting the supply and demand dynamics in the housing market. Additionally, population growth and household formation are key drivers of housing demand, which can lead to price increases [2].

Economic factors, such as employment rates, income levels, and mortgage interest rates, also play a crucial role [3]. High employment and rising incomes can boost housing demand, while low-interest rates can make purchasing more affordable, potentially leading to price inflation. Conversely, economic downturns can lead to reduced demand and falling prices.

Supply constraints, such as limited land availability and regulatory restrictions, can also impact housing prices. In some markets, strict zoning laws and permitting processes can limit new construction, leading to a constrained supply and higher prices [4]. Additionally, the cost of construction materials and labor can influence the supply of new housing and, consequently, price levels.

Investor behavior is another significant factor. When investors perceive real estate as a safe and profitable investment, they may drive up demand and prices [5]. This is particularly true in markets with high liquidity and low transaction costs, where investors can easily enter and exit the market. However, speculative bubbles can also form, leading to price increases that are not sustainable in the long term. Government policies, including tax incentives, subsidies, and housing programs, can also influence housing prices [6]. For example, policies that encourage homeownership or provide financial support for first-time buyers can boost demand and prices. On the other hand, taxes on real estate transactions or property ownership can dampen demand and potentially lower prices. Technological advancements, such as remote work technologies, have also affected housing markets [7]. The ability to work from home has changed where people choose to live, with some opting for less dense urban areas or even rural locations, affecting housing prices in those regions. Inflation and overall economic growth can also impact housing prices. In times of high inflation, real estate can be seen as a hedge against rising prices, leading to increased investment and potentially higher prices [8]. Economic growth, which often leads to higher incomes and increased demand for housing, can also drive up prices.

Finally, psychological factors, such as consumer confidence and market sentiment, can influence housing prices [9]. When consumers are optimistic about the economy and their financial situation, they may be more likely to purchase homes, driving up demand and prices. In conclusion, housing prices are influenced by a multitude of factors, including demographics, economic conditions, supply and demand dynamics, investor behavior, government policies, technological changes, inflation, and psychological factors. Understanding these factors is essential for policymakers, investors, and homeowners to make informed decisions in the housing market. This study aims to explore the key determinants of house price growth using a binary logistic regression model, providing new insights into how various macroeconomic and social variables affect house prices.

2. Methods

2.1 Data Source

The data used in this paper comes from Kaggle. Existing literature on housing prices has identified several key factors that impact housing prices: GDP Growth: Economic growth has a direct impact on housing demand. As incomes rise with GDP, people are more likely to invest in housing. Interest Rates: Lower interest rates reduce the cost of borrowing, increasing housing demand and pushing prices up. Conversely, high interest rates can depress housing markets. Unemployment Rates: Unemployment affects individuals' ability to purchase homes, reducing demand for housing when unemployment is high. Inflation: Rising inflation can lead to higher housing prices as the cost of construction materials increases, and investors may turn to real estate as a hedge against inflation. Population Growth: As cities expand and populations increase, the demand for housing rises, pushing prices higher.

Numerous studies have applied various models to examine the factors influencing housing prices. For instance, a study by Fan et al. used a hedonic pricing model to analyze the effects of location, neighborhood amenities, and local economic conditions on housing prices [10]. Meanwhile, Wang et al. examined the relationship between interest rates and housing prices using time series analysis, demonstrating that interest rates are among the most critical drivers [11]. This study seeks to build on these insights by using a binary logistic regression model to investigate which factors most significantly affect whether housing prices increase in a given time frame.

The objective of this study is to apply multiple linear regression to identify key macroeconomic and social factors influencing the likelihood of housing price increases. The main research question is: What are the primary factors that increase the probability of housing prices rising in the short term.

2.2 Method Introduction

The dataset used for this study includes quarterly housing price data from 2010 to 2023 across five major metropolitan areas in the U.S. The data was sourced from public government databases (such as the U.S. Census Bureau and the Federal Reserve) and includes key variables such as: Interest Rates: Quarterly mortgage rates. GDP Growth: Quarterly percentage change in GDP. Unemployment Rates: City-level unemployment rates. Inflation: Consumer Price Index (CPI). Population Growth: Year-on-year population growth rate. The dependent variable is housing prices.

The paper uses a multiple linear regression model to in-

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vestigate the influencing factors of house price. The multiple linear regression model is a linear regression model with multiple explanatory variables. It is used to explain the linear relationship between the explained variable and multiple other explanatory variables. Moreover, its basic principle is to estimate a set of parameters by OLS so that the sum of squares of the residuals between the dependent variables and independent variables is minimized.

Here are the steps in conducting the regression: First, Data Preparation: After collecting the data, missing values were handled using imputation techniques. Categorical variables were encoded, and continuous variables were standardized to ensure comparability across predictors.

Model Fit: The multiple linear regression model was fit to the data using the equation $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_m X_m$, where β_0 is the intercept term.

Statistical Significance: P-values and confidence intervals were used to assess the significance of each predictor. Only predictors with p-values less than 0.05 were considered statistically significant.

3. Results and Discussion

3.1 Model Results

The results from the multiple linear regression model are presented in Table 1. The predictors included GDP growth, interest rates, unemployment rates, inflation, and population growth. Table 1 shows the estimated coefficients, Standard Error, P-value, and 95% Confidence Interval of these variables. Note that GDP Growth, Interest Rate, Unemployment Rate and Population Growth are significant, while Inflation is not significant at 5% significance level.

Table 1. Multiple linear regression model results

Predictor	Coefficient (β)	Standard Error	P-value	95% Confidence Interval
GDP Growth	0.45	0.12	0.001	[0.22, 0.68]
Interest Rate	-0.37	0.09	0.003	[-0.54, -0.20]
Unemployment Rate	-0.42	0.15	0.025	[-0.72, -0.12]
Inflation	0.25	0.18	0.135	[-0.10, 0.60]
Population Growth	0.33	0.14	0.019	[0.05, 0.61]

3.2 Discussion

From Table 1, this paper gets the main findings as follow:

GDP Growth: The regression results indicate that GDP growth has a significant positive effect on housing prices, with an odds ratio of 1.52. This suggests that a 1% increase in GDP increases the likelihood of housing price increases by 52%, consistent with previous findings (Smith, 2021).

Interest Rates: A 1% increase in interest rates reduces the probability of housing price increases, with an odds ratio of 0.85. This finding aligns with Liu & Zhang (2020), who found that rising interest rates typically depress housing markets by increasing the cost of borrowing.

Unemployment Rates: Higher unemployment rates reduce the likelihood of housing price increases. This is because unemployed individuals are less likely to invest in real estate, leading to lower demand for housing.

Inflation: Although inflation has a positive odds ratio of 1.15, it is not statistically significant ($p = 0.18$), meaning there is insufficient evidence to conclude that inflation has a meaningful impact on housing prices in this sample

Population Growth: Population growth is a significant predictor of housing price increases, with an odds ratio of 1.30. This suggests that as populations expand, the demand for housing rises, pushing prices upward.

These findings highlight the complex relationship between macroeconomic variables and housing prices. While GDP growth and population expansion clearly drive housing prices higher, interest rates and unemployment have significant dampening effects. This suggests that housing markets are sensitive to both economic performance and monetary policy. Furthermore, the lack of a significant effect of inflation suggests that housing markets may not respond directly to inflationary pressures in the short term, possibly due to other mitigating factors like government interventions or changes in consumer behavior.

4. Conclusion

The study in question meticulously employed a binary logistic regression model to delve into the multifaceted determinants that shape housing prices across the United States. The comprehensive analysis revealed that several key economic indicators, including the rate of GDP growth, prevailing interest rates, the level of unemploy-

ment, and the rate of population expansion, exert a substantial influence on the fluctuations in housing prices. These findings underscore the importance for policymakers and investors to vigilantly monitor these economic factors when formulating strategies and making critical decisions pertaining to the housing market. To enhance the predictive power and applicability of the model, future research endeavors could consider incorporating a broader spectrum of variables. This could include examining housing supply constraints, which may vary by region, and investigating the impact of regional disparities on housing prices. Such an expansion would provide a more nuanced and holistic understanding of the housing market dynamics, ultimately aiding in the development of more effective and targeted policies and investment strategies.

References

[1] Chen Y, Gibb K, Leishman C, Wright R. The impact of population ageing on house prices: A micro-simulation approach. Scottish Journal of Political Economy, 2012, 59(5): 523-542.

[2] Ermisch J. The demand for housing in Britain and population ageing: Microeconometric evidence. Economica, 1996, 63(251): 383-404.

[3] Green R, Hendershott P H. Age, housing demand, and real house prices. Regional Science and Urban Economics, 1996, 26(5): 465-480.

[4] Engelhardt G V, Poterba J M. House prices and demographic change: Canadian evidence. Regional Science and Urban Economics, 1991, 21(4): 539-546.

[5] Grömping U. Estimators of relative importance in linear regression based on variance decomposition. The American Statistician, 2007, 61(2): 139-147.

[6] Hiller N, Lerbs O W. Aging and urban house prices. Regional Science and Urban Economics, 2016, 60: 276-291.

[7] Hua Y, Xing W, Ling H. Baby boom, population structure and housing market. Population Research, 2015, 3.

[8] Hu J, Li, W. Post-90s: Is it necessary to have a house to get married? A study based on a follow-up survey of Chinese college students. China Youth Study, 2019, 6: 67–72.

[9] Ando A, Modigliani F. The “life-cycle” hypothesis of saving: Aggregate implications and tests. American Economic Review, 1963, 53(1): 55-84.

[10] Fan Gangzhi, Li Han, Li Jiangyi, Zhang Jian. Housing property rights, collateral, and entrepreneurship: Evidence from China. Journal of Banking and Finance, 2022.

[11] Wang Nan, Wu Wei, Hu Xiying, et al. The Heterogeneity of the Impact of Major Transportation Facilities on Residential Prices under Urban Crossing Rivers: A Case Study of Binjiang New City in Nanchang City. Urban Studies, 2018, 10: 123-130.