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Relationship Between Rent and the Overall Economy in 21st Century California

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Abstract: The primary purpose of this study is to probe the relationship between rent and economy and of the 21st-century California. The findings show a significant relationship between GDP and rent prices, underscoring the importance of economic prosperity in shaping the housing market. However, there were no statistically significant correlations between rent prices and the inflation rate (IR), vacancy rate (VR), or population growth (P). These findings emphasize the particular features of California's housing market, highlighting the need for specific policy interventions. This study adds to our understanding of the complex interplay between economic conditions and housing affordability, providing insights for policymakers and future localized investigations.

Keywords: Vacancy Rate, GDP, Rent Pricing, Inflation Rate

1. Introduction

The housing market holds a crucial role in the economic dynamics of any region, not only affecting the living conditions of its residents but also shaping the broader economic landscape [1]. California, a highly populous and economically significant state in the United States, serves as a microcosm illustrating the complex interplay between rent prices and the overall economy in the 21st century. Known as the Golden State for its diverse geography, thriving technology sector, and cultural abundance, California's housing market has experienced remarkable transformations and encountered various challenges throughout the years [2]. This study embarks on an exploration of the intricate relationship between rent prices and the state's economy during this century.

This study explores the complex interactions that exist between California's primary economic indicators and rent pricing in the twenty-first century. The average yearly rent price serves as the main point, providing a comprehensive indicator of housing affordability and illuminating the locals' financial circumstances. The study includes the GDP, vacancy rate, and inflation rate as significant independent factors, acknowledging their importance in affecting the dynamics of the housing market. In addition, population growth plays a significant role as a control variable, taking into account its possible impact on housing demand as well as economic indicators.

California's housing market is renowned for its intricate nature, encompassing distinct regional dynamics, diverse demographic compositions, and a susceptibility to macroeconomic influences [2]. In light of these complexities, the study endeavors to untangle the subtle correlations between rental prices and various economic indicators. Through the utilization of quantitative techniques, particularly employing SPSS for conducting multiple regression analysis, this research aims to

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conduct a thorough investigation into how inflation, GDP fluctuations, vacancy rates, and population growth collectively impact the formation of rent prices within the state.

2. Literature Review

The complex relationship between rent prices and the entire economy has been a subject of extensive scholarly inquiry, particularly in the context of California's dynamic and diversified state. This review of the literature provides an overview of the important discoveries and theories that have affected our knowledge of this relationship.

2.1. Rent Prices and Economic Growth

The relationship between the growth of the economy and rental prices is a highly researched topic in contemporary literature. This debate holds particular importance within the context of California, a state known for its economic vitality. Numerous studies have contributed diverse perspectives to this discussion. Thornberg et al. [1] closely examine the practical consequences of rent control laws in cities across California, investigating whether these policies truly benefit low-income households. Their findings paint a nuanced picture: while rent control does reduce rental costs for middle-income households, it also hinders the expansion of rental housing supply and drives up median rent growth. This contrast highlights the inherent trade-offs involved in intervening in the market.

In their thorough investigation of the state's high housing costs, O'Malley et al. [3] offer insights into the origins and effects of California's housing affordability issues. They emphasize the lack of housing as the main cause of high prices, which is exacerbated by things like neighborhood opposition, environmental regulations, financial disincentives, and a lack of available land. Along with driving up property prices and rentals, this shortage also has a negative impact on the state's overall economic attractiveness and commute times.

Addressing the broader national perspective, Anthony [4] explores the influence of housing affordability on per capita GDP growth in the top 100 most populous metro areas in the United States, taking into account the broader national context. The findings of his study reveal a noteworthy negative impact, underscoring the urgent need to address housing affordability from an economic standpoint. In addition to this perspective, Chakrabarti and Zhang [5] propose a model that sheds light on the connection between unaffordable housing and employment growth, backed by empirical data from municipalities in California.

2.2. Inflation and Rent Prices

The relationship between inflation and rental housing is a topic that has been extensively researched by scholars, studies have shown a strong relationship influenced by geographical and temporal factors This study highlights the interplay between these studies and emphasize their collective contribution to our understanding of this multifaceted relationship.

In the contexts of Malaysia, Zainuddin and Rosylin's [6] study investigates the impact of fundamental factors, such as inflation, on terrace home values in Penang. Their findings imply that the cost of renting terrace residences has no effect on house values. This means that rental costs in Penang remain largely steady, a pattern that is relevant to the broader debate over the influence of inflation on property markets. Agwaral et al.'s [7] Australian study adds to this view by addressing the financial stress encountered by renter households, many of which have lower earnings. Their findings indicate that rent increases, which are impacted by inflation and other factors, might aggravate financial stress. The study underscores the importance of knowing how inflation affects rent pricing, as it can have far-reaching financial effects for households.

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Ahrens et al. [8] extend the discussion by examining the impact of inflation control on lease agreements in Ireland. Their study shows that overall mortgage rate increases decreased following regulatory interventions. More importantly, the study shows that the impact varies across segments of the rental market. These nuanced insights highlight the complex relationship between price controls and rents, suggesting that a one-size-fits-all approach may not be appropriate

Collectively, these studies help us comprehend the complex interactions between inflation and rent pricing. They show that the link is not constant but rather depends on things like geography, legal restrictions, and socioeconomic dynamics. These findings offer a basis for policymakers, economists, and stakeholders to make educated judgments on inflation and its effects on the housing market in the context of California's distinctive economic environment, where housing affordability is of fundamental concern.

2.3. GDP and Housing Market

The relationship between the GDP and the housing market is a multidimensional interplay that has received considerable study in economic literature. The GDP, a key metric of economic health, has a complex relationship with housing dynamics. A strengthening economy can lead to increased demand for homes, putting upward pressure on rent prices. A healthy housing market, on the other hand, can contribute significantly to GDP through construction activity, real estate transactions, and the other sectors that are intertwined with the housing sector.

According to Howard and Liebersohn [2], the desire to live in housing-supply-inelastic cities increases demand for housing, a phenomena that has a major impact on both GDP and housing affordability. Housing demand increases when cities become magnets for job opportunities and cultural facilities. As a result of the increased competition for housing units, prices rise, resulting not only in economic prosperity but also in housing affordability issues.

The symbiotic relationship between GDP and the housing market is best shown by California, a state known for its economic diversity. The importance of housing in California's economic environment is emphasized by Kholodilin [9] and O'Malley et al. [3]. The sizeable property market in the state has historically been crucial in determining economic outcomes. While California's booming economy drives up home demand, it also significantly boosts the state's GDP through the building, real estate, and other related sectors. Additionally, the study carried out by Samarin and Sharma [10] offer a typology of American metropolises based on rent burden and its causes. This typology emphasizes the different ways that housing dynamics affect different geographic areas, highlighting the various ways that housing and GDP are connected throughout the United States.

3. Method

The methodology used in this study requires the examination of several key variables to better understand the relationship between rental housing and various economic factors in California. These variables include the dependent variable, rent price (RP), defined as the average annual rental price in California. In addition, there are several independent variables: inflation (IR), gross domestic product (GDP), and vacancy rate (VR). A control variable, Population Growth (P), is also considered to account for its potential impact on rent prices.

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3.1. Definition of the variables

Table 1: Variables

Variable	Type	Description	Source of Data
Rent Price (RP)	Dependent	Rent Price is defined by the average annual rent price in California.	Department of Numbers Website https://www.deptofnumbers.com/rent/california/
Inflation Rate (IR)	Independent	This variable reflects the impact of changes in the general price level on rental prices. Inflation can contribute to an increase in rents due to rising costs.	State of California, Department of Industrial Relations https://www.dir.ca.gov/oprl/cpi/entireccpi.pdf
GDP	Independent	GDP represents the economic output of California and influences the ability of residents to afford housing.	U.S. BUREAU OF LABOR STATISTICS https://www.bls.gov/eag/eag.ca.htm
Vacancy Rate (VR)	Independent	The vacancy rate represents the availability of rental units in the market.	Department of Numbers Website https://www.deptofnumbers.com/rent/california/
Population Growth (P)	Control	Population growth plays a significant role in both demand and supply within the housing market.	Microtrends Website https://www.macrotrends.net/states/california/population

3.2. Regression Model

The analytical framework adopted for this study involves a multiple linear regression model, expressed mathematically as follows:

$$RP = \beta 0 + \beta 1\,(IR) + \beta 2\,(GDP) + \beta 3\,(VR) + \beta 4\,(P) + \varepsilon$$

3.3. Model Explanation: Economic Meaning of the Relationship

The statistical model adopted offers a comprehensive framework for analyzing the intricate relationship between inflation rate, GDP, vacancy rate, and population growth in California and their effect on the average annual rent price. Each coefficient (β) signifies the estimated impact on RP when there is a one-unit change in the corresponding independent variable, while keeping other factors constant. The main aim of this model is to elucidate the fluctuations in rental prices by considering the dynamic interplay of inflation rate, GDP, vacancy rate, and population growth. It provides a quantitative approach to understand the various factors influencing California's housing market and how they shape rental prices.

3.4. Hypotheses Formulation

The literature review has formed the basis for the formulation of the following hypotheses, which would be statistically tested, using STATA software.

1) H1: There is a relationship between IR and the average RP in California during the 21st century.

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2) H2: There is a significant relationship between the GDP and RP in California during the 21st century.

3) H3: There is a significant relationship between the VR and the RP in California during the 21st century.

4) H4: There is a significant relationship between P and the RP in California during the 21st century.

4. Results

4.1. Descriptive Statistics

In Table 2, the descriptive statistics provide a snapshot of the key variables in the study. The variable RP, representing the average annual rent price in California, has a mean of approximately 1313.5, with a standard deviation of 280.1254, indicating a considerable degree of variability in rental prices. The IR exhibits a mean of 2.875553, showcasing the average rate of change in prices over time. California's GDP demonstrates a mean of 2,171,934, reflecting the state's substantial economic output. The VR has a mean of 4.714583, suggesting the average proportion of unoccupied rental units. Population growth (P) displays a mean of approximately 37,200,000, illustrating the substantial population figures in California. These statistics provide essential insights into the central tendencies and variations within the dataset, forming the foundation for more in-depth analyses of the relationships between these variables.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
RP	24	1313.5	280.1254	960	1812
IR	24	2.875553	1.526885	-0.6230243	7.563887
GDP	24	2171934	388450.4	1574306	2885627
VR	24	4.714583	0.9503728	3.31	6.6
P	24	3.72E+07	1957115	3.31E+07	3.95E+07

4.2. Regression Analysis

The regression model exhibits a robust fit, as evidenced by an R-squared value of 0.9516, indicating that approximately 95.16% of the variation in rent prices can be explained by the combination of inflation rate, GDP, vacancy rate, and population growth. The model is statistically significant, as denoted by the F-statistic (F(4, 9) = 93.33) with a probability of 0.0000. This suggests that at least one of the independent variables significantly contributes to the prediction of rent prices. The low root mean square error (Root MSE = 67.827) signifies a minimal difference between the observed and predicted values, emphasizing the model's accuracy in explaining the variations in rent prices.

Table 3: Model Summary

Number of Obs	=	24	
F(4, 9)	=	93.33	
Prob > F	=	0.0000	
R-squared	=	0.9516	
Adj R-squared	=	0.9414	
Root MSE	=	67.827	

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The regression analysis was performed to establish the relationship between several key economic indicators and the RP in California during the 21st century. The following hypotheses were tested:

H1: There is a relationship between IR and RP in California.

The regression results reveal that the coefficient for IR is -25.2985, with a standard error of 14.5122, and a t-statistic of -1.74. The p-value associated with IR is 0.097, indicating that there is no statistically significant relationship between inflation rate and RP in California.

H2: There is a significant relationship between GDP and RP in California.

The coefficient for GDP is 0.0006648, with a standard error of 0.0001455, and a t-statistic of 4.57. The p-value for GDP is 0.000, suggesting a highly significant relationship between GDP and RP in California.

H3: There is a significant relationship between VR and RP in California.

The coefficient for VR is -15.43787, with a standard error of 17.74381, and a t-statistic of -0.87. The p-value for VR is 0.395, indicating that there is no statistically significant relationship between vacancy rate and RP in California.

H4: There is a significant relationship between P and RP in California.

The coefficient for P is 7.62E-06, with a standard error of 0.0000276, and a t-statistic of 0.28. The p-value for P is 0.785, demonstrating that there is no statistically significant relationship between population growth and RP in California.

Table 4: Regression Results

RP	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
IR	-25.2985	14.5122	-1.74	0.097	-55.67295.075881
GDP	0.0006648	0.0001455	4.57	0	0.00036 0.000969
VR	-15.43787	17.74381	-0.87	0.395	-52.576121.70034
P	7.62E-06	0.0000276	0.28	0.785	-5E-05 6.54E-05
-cons	-268.4156	775.382	-0.35	0.733	-1891.311354.478

Overall, the regression analysis affirms that GDP has a significant positive relationship with rent prices in California. Conversely, IR, VR, and P do not appear to have statistically significant relationships with rent prices in the state during the specified time frame. These findings provide valuable insights into the dynamics of the California housing market and its sensitivity to economic changes.

4.3. Discussions

The results of the regression analysis clarified the complex relationship between economic factors and rent prices in California in the twenty-first century. The findings support past studies that suggested a link between economic expansion and the dynamics of the housing market, and also show a substantial relationship between GDP and RP. This result is in line with the finding made by O'Malley et al. [3] that a booming economy in California adds to increased housing demand, which could raise rent costs.

However, the study did not find a statistically significant link between IR and RP, contrary to predictions. This conclusion contradicts Thornberg et al.'s [1] claim that inflationary pressures can have an effect on rent pricing. The disparity might be linked to the uniqueness of California's economic environment and housing market dynamics, stressing the importance of regional research. Similarly, no significant association was found between VR and RP. This finding contradicts Chakrabarti and Zhang's [5] claim that housing affordability is related to employment growth, with

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increasing VR potentially leading to lower rent prices. The distinct elements impacting California's housing market could contribute to this disparity. Moreover, P demonstrated no statistically significant relationship with RP. This finding contradicts Anthony's [4] exploration of housing affordability and economic growth, which suggests that addressing population growth is essential for maintaining housing affordability. Again, the distinct characteristics of California's housing landscape may contribute to these differences.

The relationship established relationship between GDP and RP in this study underscores the importance of economic factors in shaping California's housing market. Policymakers should consider strategies to balance economic growth with housing affordability, ensuring that the benefits of prosperity are accessible to a broad spectrum of the population. While the study provides valuable insights, the nuanced nature of the housing market calls for ongoing research to refine understanding and inform targeted policy interventions.

5. Conclusion

The quantitative study sheds light on the complex relationship between economic variables and rent prices in twenty-first-century California. The findings highlight the strong impact of GDP on rent prices, highlighting the interdependence between economic growth and housing dynamics. The lack of statistically significant correlations between the Inflation Rate (IR), Vacancy Rate (VR), and Population Growth (P) and rent prices, on the other hand, emphasizes the complexities of California's housing market, which may depart from broader economic trends. These findings highlight the importance of regional housing policy solutions that take into account the state's distinct economic situation. Further research on the delicate interplay of elements impacting home affordability is encouraged to ensure that California's citizens may prosper in an ever-changing economic environment.

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Appendices

Appendix 1: Output of Stata Program

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      1.  Unicode is supported; see help unicode_advice.

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. summarize RP IR GDP VR P

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
          RP |         24      1313.5    280.1254         960       1812
          IR |         24    2.875553    1.526885  -.6230243   7.563887
         GDP |         24     2171934    388450.4    1574306    2885627
          VR |         24    4.714583    .9503728       3.31        6.6
           P |         24    3.72e+07     1957115   3.31e+07   3.95e+07

. regress RP IR GDP VR P

      Source |       SS           df       MS      Number of obs   =        24
-------------+----------------------------------   F(4, 19)        =     93.33
       Model |  1717405.66         4  429351.416   Prob > F        =    0.0000
    Residual |  87410.3369        19  4600.54405   R-squared       =    0.9516
-------------+----------------------------------   Adj R-squared   =    0.9414
       Total |    1804816        23  78470.2609   Root MSE        =    67.827

------------------------------------------------------------------------------
          RP |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          IR |   -25.2985    14.5122    -1.74   0.097    -55.67288    5.075881
         GDP |   .0006648   .0001455     4.57   0.000     .0003604    .0009693
          VR |  -15.43787   17.74381    -0.87   0.395    -52.57609    21.70034
           P |   7.62e-06   .0000276     0.28   0.785    -.0000501    .0000654
       _cons |  -268.4156    775.382    -0.35   0.733    -1891.309    1354.478
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