

# Economic and Demographic Determinants of Housing Prices in California

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## Abstract

Household income is a fundamental determinant of housing prices, as it directly shapes purchasing power and housing demand across regions. Higher income levels enhance access to housing and expand market participation, while lower income levels restrict affordability and limit opportunities for homeownership. This study uses a balanced panel data set of California counties from 2013 to 2024 and analyzes the impact of economic and financial conditions on housing prices. The findings, based on the fixed-effect model, suggest that economic and demographic factors, such as income growth and population expansion, have a positive and significant effect on housing price growth. This research also considers housing supply factors such as housing permits, construction spending, and vacancy rate and analyzes its impact on housing prices. The empirical approach uses the panel ordinary least squares model with county fixed effect to control for any possible unobserved differences related to space and time. These results are robust regardless of the specification used for the model, strengthening the reliability of the findings. Moreover, the supply of housing is related to the price level of housing,

especially when there are few vacant houses, and there are fewer permits for housing construction. The findings show that the impact is more evident in urban counties compared to rural counties, suggesting greater demand in urban areas.

## Introduction

The housing market contributes to the overall economy through its impact on the wealth of households, housing investments, and labor mobility between regions. Housing markets affect the ability of people to move to new regions for job opportunities, thus connecting the labor markets and economic growth (Molloy et al., 2017; Piazzesi & Schneider, 2016). Housing can be considered a product for consumption in terms of providing shelter and amenities, as well as an investment product, which makes up the bulk of household wealth in advanced economies (Igan et al., 2022). The determining factors of housing prices have been studied in the economic literature in terms of demand-side factors such as income growth, employment conditions, population growth, credit conditions, and supply-side factors such as land supply, construction activity, construction costs, and regulations (Beraldi et al., 2023; Aladangady et al., 2025; Časta, 2025; Louie et al., 2025; Büchler et al., 2025; Potter & Syverson, 2025). Although prior research has provided valuable insights into the behavior of housing prices in response to different factors, most of the prior research has been based on national or metropolitan data sets and has considered a few factors in isolation. Therefore, it has not been able to capture the joint impact of economic, demographic, financial, and social factors in a unified manner (Hassan, 2024; Jin et al., 2024; Rey-Blanco et al., 2024). Moreover, there exists a lack of evidence of the interaction of these factors in a temporal manner at the local level in individual states of the US. This study attempts to fill this information gap by employing an approach in analyzing the dynamics of housing prices. The specific questions are as follows: (1) To what extent do financial conditions (household debt-to-income ratio and mortgage interest rates) and housing supply factors (housing permits, construction spending, and vacancy rate) impact housing prices? (2) What is the impact of demographic factors, particularly population growth, on housing price variation? (3) To what extent do population growth and labor market conditions impact housing price growth in both urban and rural areas?

Housing markets are unique in many aspects compared to other markets because of the relative inelasticity of housing supply in the short to medium term. Unlike other goods that can be easily produced in response to market price movements in the short term, housing supply is often restricted by the availability of land for housing developments, zoning restrictions, environmental concerns, high costs of construction, and the lead time required for new housing developments (Büchler et al., 2025; Herkenhoff et al., 2023;

Potter & Syverson, 2025). This means that demand shocks resulting from income expansion, job growth, demographic changes, or financial stocks are mostly reflected in housing price movements rather than quantity responses (Aladangady et al., 2024; Časta, 2025). This peculiarity of housing markets suggests that housing prices are particularly vulnerable to shocks in the local economy. Moreover, the degree of supply is inelastic and varies substantially across regions that depend on local regulatory environments, geographic constraints, and political economy factors, which implies that similar demand shocks can lead to different price responses across local housing markets (Büchler et al., 2025; Banerjee, 2024; Ren, 2025).

The primary factors driving house prices can be understood through the relationship between the demand for housing and the relatively sluggish response of the supply of housing. For example, when the demand for housing rises due to increased income, job growth, or expansion of access to mortgage credit, the supply of housing does not necessarily keep pace due to the time required for new construction, regulatory constraints on building, the cost of land acquisition, and the cost of construction. The relatively inflexible supply of housing in the short run means that changes in the demand for housing frequently result in rising house prices rather than increases in the construction of new housing. Research on house prices indicates that regions with less flexible supply tend to exhibit larger price responses to changes in the demand for housing, especially when the overall economy grows and when monetary conditions are accommodative (Herkenhoff, Ohanian, & Prescott, 2023; Banerjee, 2024; Büchler et al., 2025). More recently, the housing markets faced during the COVID-19 pandemic and the subsequent recovery period offer another example of the demand for housing driving house price growth when the supply of housing does not keep pace due to accommodative monetary policy, increased savings, and shifting housing demand (Igan et al., 2022).

Apart from the conventional economic fundamentals, recent literature also points out the impact of financial factors on house price movements. Mortgage interest rates, access to credit, and lending standards have impacts on the borrowing capacity of households and hence on housing demand and house price growth (Časta, 2025; Herbst et al., 2025; Consumer Financial Protection Bureau, 2024). Lower interest rates have favorable impacts on borrowing capacity and hence on housing demand and house price growth. Financial liberalizations and low mortgage interest rates are often followed by housing booms, and financial tightening are often followed by housing price corrections and financial instability (Justiniano et al., 2019). In the recent period since the Global Financial Crisis of 2007-2009, the financial conditions for mortgages have become much tighter due to more conservative lending practices of financial institutions, thereby affecting housing demand and thereby delaying the recovery of housing markets. However, in the recent period since the COVID-19 pandemic, low mortgage interest rates have favored housing demand and

thereby house price growth (Igan et al., 2022; Fuster et al., 2021). Thus, the recent literature points out that housing markets are closely linked with financial markets and that house price movements have significant implications for financial markets and households.

The factors that influence house prices are a combination of economic, financial, and social factors, all of which are interlinked at the regional level. Economic factors are at the center of house price movements, particularly at the regional level. When the economy is performing well at the regional level, it boosts the demand for houses, thereby increasing house prices. When the economy is performing badly, it negatively impacts house demand, thereby reducing house prices (Diamond, 2023; Gupta, 2023; Federal Reserve Board, 2024). Besides the above-mentioned economic factors, social factors are also important in influencing house prices at the regional level. Factors such as differences in educational attainment, crime rates, and environmental quality influence house prices through the spatial equilibrium model (Bilal & Rossi-Hansberg, 2021; Couture & Handbury, 2020; Diamond, 2023). Regions with better social environments are associated with higher house prices, while regions with poor social environments are associated with low house demand, even in regions where the economy is performing well (Albouy & Ehrlich, 2018). Although it is evident that both economic and social factors are important in influencing house prices, the literature has focused more on individual factors, thereby providing a fragmented approach to understanding house price movements (Albouy & Ehrlich, 2018; Moffatt et al., 2021). This study attempts to bridge the above-mentioned gap by providing a more holistic approach to understanding house price movements by jointly examining the interlinked factors.

At the same time, demographic factors also assume significant importance in influencing the housing markets and house prices in the respective regions (Igan et al., 2022). Regional demographic factors, such as population growth, migration, and the formation of households, play an important role in determining the housing demand and house prices in the respective regions. Regional areas with high population growth rates or migration may face significant pressure in meeting the housing demand, which may, in turn, increase the house prices in the respective regions, especially if the housing supply does not increase in accordance with the demand (Aladangady, 2024; Bilal & Rossi-Hansberg, 2021; Banerjee, 2024). Besides demographic factors, the social attributes of the people in the respective regions, such as educational levels, crime rates, environmental conditions, and the availability of public amenities, also play an important role in determining the housing demand and the difference in housing prices in the respective regions. People generally take into consideration the neighborhood conditions and the availability of public amenities while choosing the housing locations, which may, in turn, increase the housing prices in the respective regions (Couture & Handbury, 2020; Bilal &

Rossi-Hansberg, 2021; Diamond, 2023). Although the social attributes in the respective regions may change gradually, the long-run effect of the demographic and social attributes is reflected in the difference in housing prices in the respective regions, and the inclusion of demographic and social attributes in the housing price model can help in accounting for the local market heterogeneity, which may not be explained by the economic or financial attributes (Diamond, 2023; Bilal & Rossi-Hansberg, 2021; Couture & Handbury, 2020).

Collectively, existing research indicates that housing prices are influenced by factors related to supply, economic conditions, demographics, and finance. To exemplify this, Diamond (2023) investigates how local labor market growth interacts with local supply constraints in major US metropolitan regions, highlighting how regions with high income growth and local supply constraints have significantly higher price appreciation. Herkenhoff (2023) investigates credit conditions and their impact on housing prices, indicating how easier credit conditions increase housing price volatility, especially in regions with economic expansions. Banerjee (2024) investigates the impact of demographics on housing prices, indicating how migration inflows significantly contribute to housing price appreciation. Although these studies have contributed significantly to our current knowledge regarding housing price determinants, they have largely investigated each determinant independently, as well as their interaction with other factors at the national level, whereas this study aims to investigate their interaction at the local level.

Although existing research has contributed significantly to our current knowledge regarding housing price determinants, there is limited research that has investigated their interaction at the local level. This study is unique in that it is based on local housing markets, whereas existing research has been based on broader metropolitan and national aggregates. Furthermore, it is unique in that it integrates all factors, allowing for their interaction to be analyzed, whereas existing research has investigated each determinant independently. Finally, it is unique in that it is based on housing price growth, whereas existing research has been based on static relationships. By adopting this holistic approach, this study aims to provide a more holistic approach to understanding housing price determinants, thereby contributing to our current knowledge regarding local housing market analysis.

The rest of the paper is structured as follows. The second section is a review of the extant literature regarding housing price determinants, focusing on the influence of economic circumstances, financing issues, demographic traits, and supply considerations. In this way, the current paper is positioned within the academic discourse and will demonstrate areas of research where gaps remain and should be filled. Section 3 describes the methodology employed and provides information about the creation of the database used in this research. All variables that have been chosen for inclusion in the regression analysis are defined, along with an explanation of how the econometric method

was applied, especially regarding the use of fixed effects. Empirical results and discussion of these findings are provided in Section 4, where the significance of various coefficients is explained and the connection to existing hypotheses is demonstrated. Finally, Section 5 contains the conclusion and suggestions for future work..

## Literature Review

There exists a significant amount of economic literature that seeks to understand the determinants of house prices in the United States. For instance, initial economic theory suggests that house prices should be determined by the interplay of consumption goods and capital assets. Gupta et al. (2023) Herkenhoff et al. (2023) Igan et al. (2022) implies that house prices should be influenced by income growth, demographic expansion, and interest rates. Subsequent studies have built upon this initial theory to include contemporary financial market effects. For instance, Albanesi et al. (2020) found that mortgage credit expansion and leverage have significant effects on house price cycles. Furthermore, Kurlat and Stroebel (2021) found that economic shocks have heterogeneous effects on house prices at the regional level using detailed transaction-level housing data provided by Zillow and credit bureau data in counties in the US, thus proving that local exposure to economic shocks affects house prices differently in different regions. This implies that regional labor markets have significant effects on house prices. Demand effects have also become more complex in the post-pandemic environment. For instance, Howard and Liebersohn (2021) found that remote working has changed the geography of house demand. This implies that house price effects have now become suburban and inland. This is significant for California since regional labor markets differ significantly. For instance, the state contains technology-driven economies and agricultural economies. This implies that regional effects may be significant at the county level.

The issue of supply-side constraints continues to play a crucial role in understanding the rising appreciation in prices in high-cost cities. In their more recent study, Herkenhoff et al. (2023) suggest that in areas with low housing elasticity, the response of housing prices to demand shocks is more pronounced. More recent evidence from the study conducted by Gyourko et al. (2021) confirms that regulatory and zoning constraints on housing development in major metropolitan cities remain, sustaining the high prices in the market. Banerjee (2024) also established that geographic constraints result in low housing supply elasticity, making the response of housing prices to demand shocks more pronounced. Environmental regulations, land-use regulations, and zoning regulations have long been issued in California, and despite the high employment and population growth, the constraints on development remain. Demographic factors have also exacerbated the issue, with Aladangady et al. (2024) suggesting that rapid growth in the population results

in rising housing prices in areas that fail to increase their supply of housing in proportion to the demand. Anenberg and Ringo (2022) established that the national housing shortage has exacerbated the problem in the US market. Migration patterns in California, from the coastal metropolitan areas to the more inland areas, have not alleviated the problem, resulting in widespread housing pressures in the state.

Financial, fiscal, and social issues add a further level of complexity to housing prices. Časta (2025) found that a decrease in interest rates decreases the user cost of housing, thereby stimulating demand and pushing up prices. This effect has been reinforced in the current environment of low interest rates, a feature of the post-COVID-19 recession. The current evidence suggests that changes in mortgage rates have a major influence on housing prices and affordability, particularly in already high-cost markets. Fiscal policies also have a bearing on housing markets. Agrawal et al. (2022) found that property taxes have a bearing on housing demand because they change the cost of housing ownership and influence mobility choices. Davidoff and Leigh (2020) found that households are willing to pay a premium to live in high-quality school districts. The empirical evidence suggests a negative relationship between crime rates and housing prices. The evidence suggests that housing prices are determined by a combination of economic, institutional, demographic, financial, and social issues rather than a single-factor explanation.

There is a growing recognition in the literature of the benefits of employing panel data analysis to examine housing markets. For instance, Wooldridge (2021) and Arellano (2023) have emphasized that panel data models allow for the control of various types of unobservable time-invariant heterogeneities that may affect the results, including geographical variables, legal environment, and economic structures. Gupta et al. (2023) and Herkenhoff et al. (2023) utilized panel data methodologies to address both time and regional variations in housing markets. Regarding the case of California, it should be noted that there exist significant inter-county variations in aspects such as regulations, economic structures, migration rates, and demographic characteristics. From this point of view, the use of a panel data analysis framework for the county level appears to be the most suitable for this analysis. Although there exists a significant number of studies in the broader US housing market literature, there are limited studies that have attempted to incorporate various economic, demographic, financial, fiscal, and social variables within a unified framework at the county level for California over a significant time period. By employing panel data analysis for the time period 2013 to 2024 for California counties, this study attempts to fill this gap in the existing literature and provides a comprehensive analysis of the housing price dynamics for the state.

The existing literature has already established the significance of financial conditions, labor market, demographics, and supply factors in influencing housing price changes. Research by Albanesi et al. (2020) has highlighted the significance of credit expansion and

household leverage in intensifying housing price cycles, whereas Kurlat and Stroebel (2021) have demonstrated how economic shocks have heterogeneous impacts on local house prices. Other studies have investigated the impact of population growth, migration, and supply factors on housing affordability and price appreciation. Although existing literature has already established that these factors are important determinants of housing prices, they have been analyzed individually or at the national and metropolitan levels. In contrast, this paper attempts to incorporate economic, financial, demographic, and supply factors into an integrated framework to assess their combined impact on local housing price appreciation. Unlike other studies, which have analyzed these factors individually or at the national level, this study attempts to focus on local levels, which is more regional.

Overall, the existing literature shows that housing prices depend on a variety of economic, financial, demographic, as well as supply-side factors. For instance, increases in income, credit availability, as well as population growth rates tend to boost demand for housing services, whereas supply-side limitations restrict the ability of the market to respond to changes in demand, thus intensifying the response of housing prices to demand-side factors. However, the majority of the existing research investigates the above-mentioned housing demand determinants individually or at the national or metropolitan levels, thus creating a research gap with regards to the interaction of the above-mentioned factors at the local level.

To fill the research gap, the present study uses an integrated approach to examine the combined effect of the above-mentioned factors on housing prices appreciation at the county level. In accordance with the above integrated framework, the hypotheses set below are tested.

**Hypothesis 1:** Economic, financial, as well as demographic factors such as income growth rates, credit availability, as well as population growth rates have a positive effect on housing prices.

This hypothesis is founded on the basic theory of the housing market, for example, an increase in income levels, credit availability, and the growth of the population results in an increased demand for houses. This is because an increase in income levels means that the purchasing power of the people has increased, hence the ability to purchase more expensive houses. In addition, an increase in the availability of credit will enable more people to take mortgages for houses. This is resulting in an increased demand for houses; therefore, the growth of the population will increase the number of people demanding houses.

**Hypothesis 2:** The influence of demand-side determinants on the price of housing is more pronounced in urban counties compared to rural counties, suggesting a positive interaction effect.

This hypothesis is based on the differences in housing supply conditions in urban versus rural counties. Generally, urban counties experience stricter restrictions regarding the supply of housing due to the lack of space, zoning laws, and the density of the population. Moreover, demand changes resulting from higher incomes and population growth create greater impacts on the price levels of houses in urban counties. On the other hand, rural counties have more space for building homes and less stringent laws governing land use; thus, there are no significant changes in the prices of houses due to the supply of housing in response to the demand. These hypotheses can be tested using a county-level panel dataset to examine the collective effects of demand and supply factors.

## Housing Market Overview

### California Housing Market Overview

California's housing market is characterized by affordability challenges, particularly due to the high demand for housing coupled with supply constraints, which makes the market less elastic, causing prices to rise with an increase in demand (Glaeser & Gyourko, 2018). Housing prices in California's counties have increased over the last decade at a higher rate than the increase in income levels, making the state's housing market less affordable (Albouy & Ehrlich, 2018; Gabriel & Painter, 2020). Housing prices, which have long been higher in California's metropolitan cities such as Los Angeles, San Diego, and the San Francisco Bay Area, have also increased in the state's inland counties (Albouy & Ehrlich, 2018). Research indicates that the limited supply of housing due to construction costs, environmental regulations, and opposition to new construction contributes to the state's housing affordability issue (Herkenhoff, Ohanian, & Prescott, 2023; Büchler, Götze, Hauck, & Stalder, 2025). Housing prices are highly influenced by regional demand pressures, which indicates the importance of examining the trends of housing price changes at the county level (Albouy & Ehrlich, 2018; Gabriel & Painter, 2020). The trends of housing price changes at the county level can help in understanding the economic conditions and changes in the state's housing markets.

California housing prices have exhibited a long-run upward trend punctuated by periods of significant volatility. Since the 1960s, real home prices in California have risen substantially faster than the national average, particularly in coastal metropolitan areas where land-use restrictions and geographic constraints limit housing supply elasticity

(Glaeser & Gyourko, 2018). The 1980s experienced rapid price growth driven by population expansion and strong economic performance, followed by a correction in the early 1990s during California's recession and defense industry contraction. The most pronounced cycle occurred during the early 2000s housing boom, when expanded mortgage credit, low interest rates, and speculative demand contributed to sharp price increases. However, the 2007–2009 Global Financial Crisis led to a dramatic housing market collapse, with California experiencing some of the largest price declines in the United States due to high leverage and subprime exposure (Herkenhoff et al., 2023). Following the crisis, housing prices gradually recovered throughout the 2010s, supported by economic growth, low mortgage rates, and persistent supply constraints. More recently, the COVID-19 pandemic initially caused economic uncertainty but was followed by rapid housing price appreciation driven by historically low interest rates, remote work migration, and continued housing shortages. Overall, California's historical housing price trends reflect the interaction between demand shocks, financial conditions, and structural supply limitations, reinforcing the importance of analyzing these factors at the county level.

It is important to understand the factors that determine housing price to make appropriate decisions, as well as for development programs. Failure to understand the importance of factors such as employment, new construction, population, crime rate, and unemployment within a region can result in poor development and housing policies. For instance, areas that experience a high rate of population increase but lack new constructions can experience a high rate of housing unaffordability, overcrowding, or even displacement (Herkenhoff, Ohanian, & Prescott, 2023; Banerjee, 2024). On the other hand, areas that experience high employment statistics and a low rate of population increase require different housing policies. California is a unique case study within the USA due to its vast geography, economic patterns, and demographic characteristics that range from the tech-oriented coastal counties to the farm- and production-oriented inland counties. The rising cost of housing affects labor mobility, and the long-term productivity of the economy as low and medium-income earners are driven out of the economic hubs (Hsieh & Moretti, 2019; Diamond, 2023). Proposition 13 in California has a unique feature in creating variations in property taxes, thereby creating a level of distortion in mobility choices compared to other states in the US. Social issues have a bearing on housing prices. It is essential for policymakers to have adequate information and research to inform policies that address both short-term and long-term housing market issues. This work is significant to provide information for policies that address short-term as well as longer-term issues within the housing market.

## Analytical Framework about Housing Demand and Supply

Housing prices are influenced by the relationship between demand and supply conditions in the regional market. According to theoretical models of urban and housing economics, equilibrium prices in the housing market are influenced by household income, labor market conditions, demographic factors, and financial conditions, as well as the supply side of the market (Bilal & Rossi-Hansberg, 2021; Banerjee, 2024). Housing supply responds relatively slowly in the short and medium terms, and thus, fluctuations in demand are mainly manifested in prices rather than increases in construction (Herkenhoff, Ohanian, & Prescott, 2023; Banerjee, 2024; Büchler, Götze, Hauck, & Stalder, 2025). The demand and supply framework is, therefore, the theoretical basis of this study, which examines the dynamics of housing prices in California counties.

Housing demand is influenced by various economic and demographic variables. Household income, which is represented by median household income, is a measure of purchasing power and is, therefore, positively correlated with housing prices, as higher incomes enable households to purchase homes (Diamond, 2023; Bilal & Rossi-Hansberg, 2021). Employment conditions, which are represented by employment rates, influence demand, as employment stability and security are critical in determining demand (Diamond, 2023; Gupta, Mittal, & Van Nieuwerburgh, 2023). Household demand is also influenced by population growth and net migration, which represent the impact of demographics on demand and prices. An increase in population or net migration into a given area increases demand and, consequently, prices, especially when supply fails to respond proportionately (Molloy, Smith, & Wozniak, 2017; Igan et al., 2022). Financial conditions, which are represented by debt-to-income ratios, also influence demand, as fluctuations in this ratio impact the ability of households to purchase homes (Gupta, Mittal, & Van Nieuwerburgh, 2023; Federal Reserve Board, 2024).

These conditions of housing supply can be represented using variables such as construction activities and the availability of housing units. Housing permits and construction spending can be used as indicators of the responsiveness of the housing supply to the demands for housing. The vacancy rate for housing units can be used as an indicator of the tightness of the housing market, where the level of the vacancy rate indicates the relative strength of the demand for housing versus the supply of housing. The homeownership rate and other property-related variables can be used as indicators of the structural characteristics of the local housing markets, which can affect the demand for housing and the price of housing. Socioeconomic variables such as educational attainment, crime rates, poverty rates, and the median age can be used as indicators of the differences in the quality of neighborhoods and the long-run regional development

patterns, which affect the demand for housing (Couture & Handbury, 2020; Bilal & Rossi-Hansberg, 2021; Diamond, 2023).

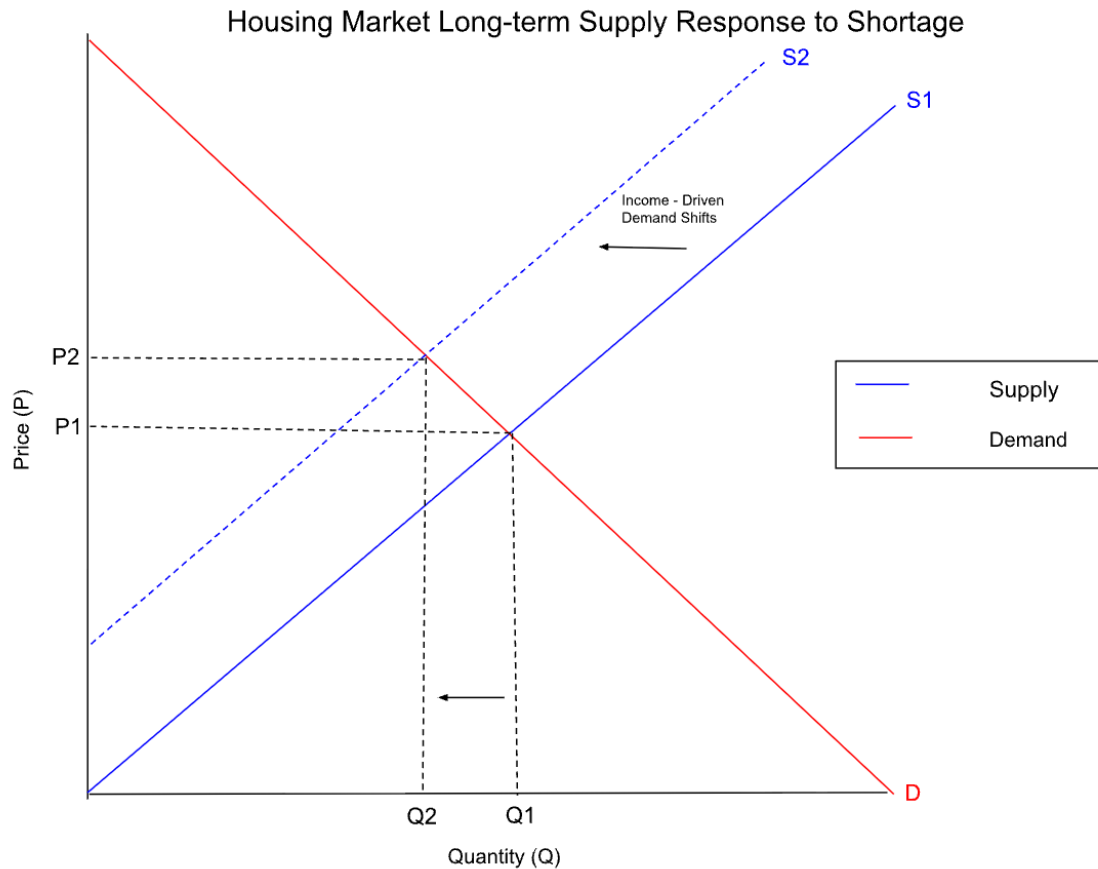
Based on the theoretical framework presented above, the housing prices can be represented as a function of economic conditions, changes in the population demographics, financial conditions, and the conditions of housing supply. The functional form of the housing demand and supply equations are as follows:

$$\text{Demand of Housing} = f(\text{Median Income}, \text{Employment}, \text{Population}, \text{Mortgage rate}, \dots) \quad (1)$$

$$\text{Supply of Housing} = f(\text{Housing Permits}, \text{Construction Spending}, \text{Vacancy Rate}, \dots) \quad (2)$$

Equation 1 explains housing demand which is affected by economic and demographic determinants, which include median income, employment rate, population, interest rates on mortgages, and so on. High income, high employment rate, and an increase in population will have a positive effect on the demand for housing, while a high interest rate on mortgages may lower the demand due to increased costs. In equation 2, some determinants of housing supply include permits issued for housing construction, spending on construction, vacancy rates, and so on. Higher spending on housing construction results in more housing being supplied, while high vacancy rates indicate the availability of housing units.

Figure 1 represents a conventional supply and demand curve for the housing market and demonstrates the changes in price levels over a period due to a shortage. In this case, it can be assumed that initially the real estate industry was in equilibrium at a given price level where the supply and demand curves intersected. However, with an increase in demand due to higher income levels and an increase in population, the demand curve shifts outward. This results in a shortage at a given price level because the quantity demanded exceeds the quantity supplied. This leads to an increase in price levels in the short run. However, with an increase in price levels, builders are encouraged to invest more in constructing buildings and houses, which causes a shift outward in the supply curve over a period of time. This leads to a new equilibrium in the real estate industry with a higher quantity and a more stable price level compared to the initial price level.



**Figure 1.** Housing Market Long-Term Supply Response to Shortage

## Data, Variables, and Method

### Data Sources and Variables

The dataset for this study contains information on the housing market, economic conditions, and demographic data for all counties in California. The source for the housing price data is the Zillow Home Value Index (ZHVI) from 2013 to 2024. It is used as a proxy for the county-level median home value. The ZHVI is a seasonally adjusted estimate of typical home values for single-family homes within geographic regions. Zillow Home Value Index is employed as an indicator of housing price levels, yet it would have been helpful to give a better rationale for using this indicator compared to other indicators such as ACS median house values. The ZHVI is derived from market-based valuation methods (Zillow Research, 2023; Igan et al., 2022). ZHVI is based on the observed home value transactions and uses various valuation modeling techniques. It is a consistent and reliable proxy for home value across counties and over time. The sample's average home value is \$519,559. It is the

average of all the county-year home value data. This average is based on the observed high level of housing prices in California.

These explanatory variables are obtained from various public sources to incorporate the demand-side, supply-side, and socioeconomic factors that affect housing prices. For example, the median income of households and population growth are obtained from the American Community Survey (ACS), while labor market conditions are obtained from the Bureau of Labor Statistics (BLS). The median household income is used as an explanatory variable, as higher median household income allows households the purchasing power to acquire homes (Diamond, 2023; Gupta, Mittal, & Van Nieuwerburgh, 2023). Demographic characteristics are obtained from the California Department of Finance. For example, the mean of the median income of households in the dataset is 69,605 dollars, which is an average income level in counties and years included in the dataset. When estimating the regression model, this value is used to understand the marginal effect of income on housing prices. The employment or unemployment rate is used as an explanatory variable related to the labor market, which is essential in explaining housing prices in the state of California (Diamond, 2023; Gupta, Mittal, & Van Nieuwerburgh, 2023). The population growth rate is used as an explanatory variable related to the demand side of the housing market, as an increase in the population puts pressure on the housing market (Molloy, Smith, & Wozniak, 2017; Igan et al., 2022). For example, the employment rate in counties included in the dataset is 93.14 percent on average, indicating that most people in counties are employed. The population growth rate is 2.5 percent on average annually.

For the supply-side variables in the housing market, the number of building permits issued in counties is used as a proxy variable in the regression model, as in previous studies (Herkenhoff, Ohanian, & Prescott, 2023; Banerjee, 2024). This is an estimate of the responsiveness of the supply of new homes to the demand for homes. This is because the number of building permits issued for new homes reflects the number of new homes that can be constructed (Herkenhoff, Ohanian, & Prescott, 2023; Banerjee, 2024). The mean number of housing permits issued in counties included in the dataset is 2,084 on average, calculated as the average issuance of housing permits in counties and years included in the dataset. For example, construction spending in counties included in the dataset is 1,389.61 million dollars on average, calculated as the average investment in housing development in counties and years included in the dataset.

Additional socioeconomic variables are included to control for other influences on the housing market. The average percentage of the population with at least a bachelor's degree is 28.57 percent. The average violent crime rate is 400.7 crimes per 100,000 people. The vacancy rate has an average of 14.03 percent. This is the percentage of housing units that are vacant. The average homeownership rate is 62.98 percent. The average county-level median age is 39.7 years. The net domestic migration rate has an average of -1.69

percent. This suggests counties have a net out-migration. The average debt-to-income ratio for households is 31.31 percent. This is a measure of financial leverage. The average poverty rate is 13.59 percent. Real GDP, adjusted for inflation, is a measure of the overall output of the economy and is used as a proxy for overall economic activity. The mean real GDP, as calculated over the county-year data, is \$47,398,041.44. The mortgage rate, defined as the average interest rate charged on residential home loans, has a mean value of 4.53 percent over the sample period, representing average interest expenses that directly impact housing demand and affordability.

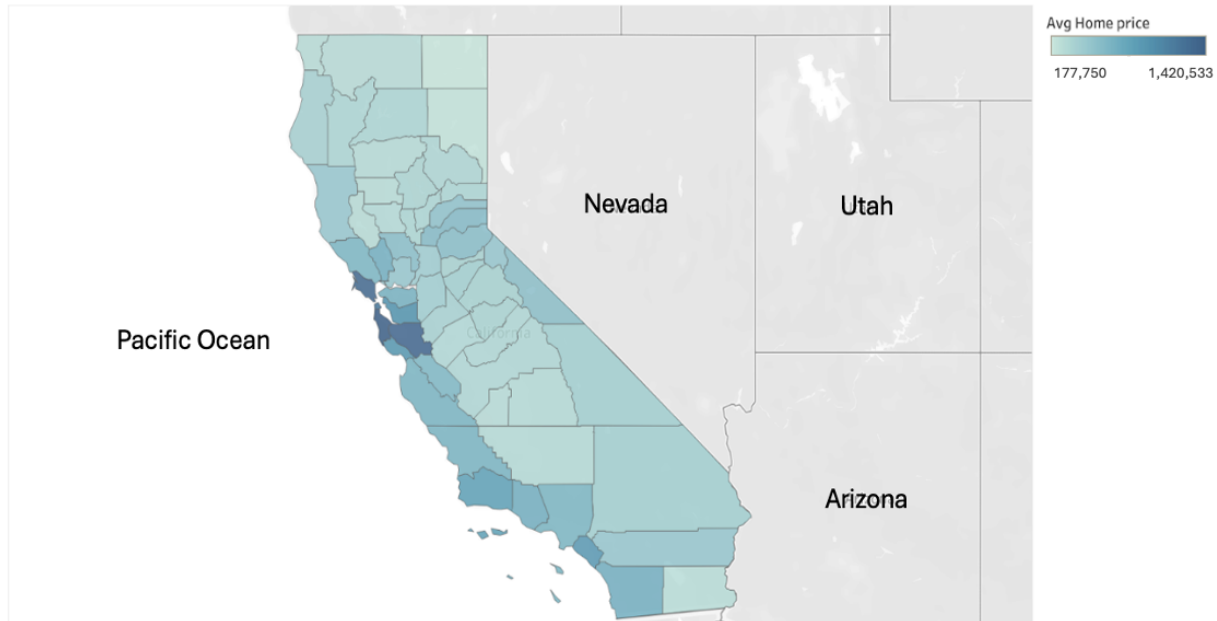
The summary statistics in Table 01 show significant differences in terms of housing prices and socioeconomic characteristics across different California counties. For example, the average home price in California is approximately \$519,559, with a significant range of prices from \$115,000 to nearly \$2 million. The mentioned data illustrate the existence of significant disparities between home prices in different parts of the state. For instance, coastal metropolitan counties are likely to experience higher prices compared to less urbanized counties. As for median household income, its average value equals \$69,605. However, at the same time, there exists considerable variation among California counties in terms of income level. High employment rates are also observed among Californian counties on average, they equal 93.1%, which means the high level of job availability. Nevertheless, there are still certain disparities regarding this indicator among states, which also suggests differences in employment situations across regions of California. Similarly, median household income in California is approximately \$69,605, indicating significant differences in terms of income across different counties. Employment rates in California are also satisfactory, with an average of 93.1%. However, a significant gap in terms of employment rates is also evident in different counties.

Demographic, Social and Infrastructure Characteristics Besides the socio-economic characteristics described above, certain disparities between counties in terms of education also exist in California. The proportion of citizens who have attained college degrees in California equals 28.6%. However, the lowest proportion of educated people in the state equals only 12.5%, while the maximum one 61%. The level of educational attainment is an important factor because it influences home prices counties where most people have attained college degrees usually demonstrate higher levels of employment and home prices as well. Besides, the level of employment and home prices depends on crime and vacancy rates. For example, counties with low vacancy rates have a higher level of home prices because the number of housing units exceeds the number of potential consumers of housing. Indicators of home supply are also different across counties, which means differences in the level of home supply.

**Table 1.** Summary Statistics

<b>Variable</b>	<b>Description</b>	<b>Mean</b>
Home Price	Median home price by California County-year (thousands \$)	519.5 6
Median Income	Median household income (thousands \$)	69.61
Population Growth	Annual county population growth rate (%)	2.5
Rural Population Growth	Annual population growth rate (%) in rural counties	-1.1
Urban Population Growth	Annual population growth rate (%) in urban counties	5.4
Employment Rate	Share of working-age population employed (%)	93.14
College Education	Population with bachelor's degree or higher (%)	28.57
Crime Rate	Violent crimes per 100,000 residents	400.7
Housing Permits	Residential building permits issued	2,084
Vacancy Rate	Share of housing units vacant (%)	14.03
Homeownership Rate	Owner-occupied housing units (%)	62.98
Median Age	Median age of population (years)	39.7
Net Migration Rate	Net domestic migration rate (%)	-1.69
Debt-to-Income Ratio	Household debt as % of median income	31.31
Construction Spending	County construction spending (billions \$)	1.39
Poverty Rate	Population below federal poverty line (%)	13.59
Real GDP	Inflation-adjusted county GDP (millions \$)	47.40
Mortgage Rate	Average mortgage interest rate (%)	4.53
Urban Counties	Counties with high population density and economic activity	32
Rural Counties	Counties with low population density and less economic activity	26

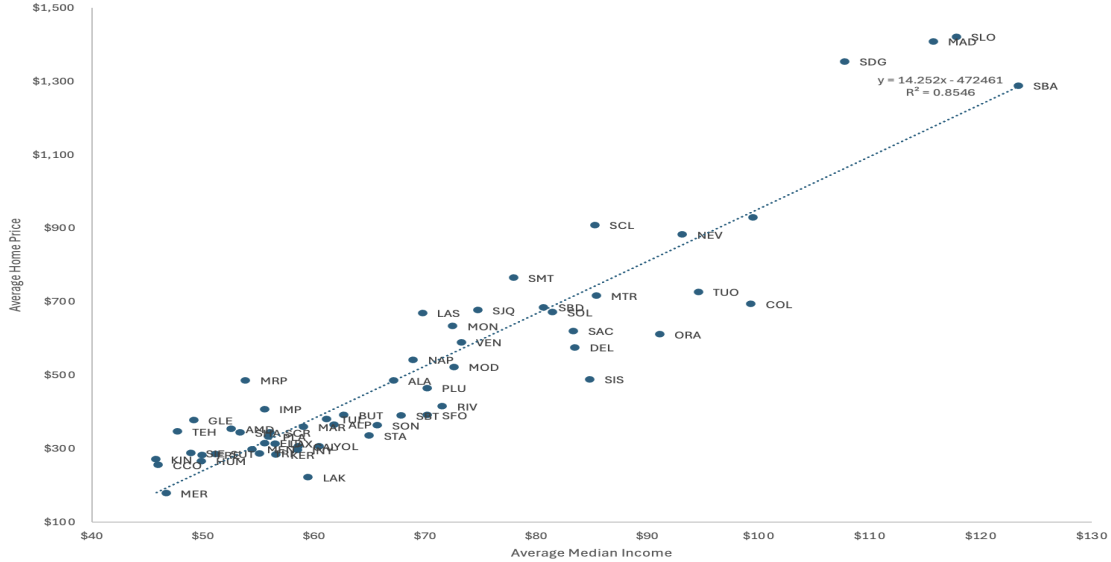
The other indicators influencing home prices are those related to the financial condition of Californian counties. For instance, the average debt-to-income ratio is about 31.3%. It means that on average households do not owe too much money, but their debt level varies across counties. Besides, construction spending in counties differs from \$1,375,551 thousand to \$1,411,836 thousand, which is another indicator influencing the level of home prices. Migration rate in California also differs between 1.1% and 1.85%, which means differences in population growth. Last but not the least, poverty rates in California are about 13.6%, and their variation ranges from 4.1% to 28.4%. High poverty rates usually lead to low home prices because poor individuals cannot afford expensive homes.



**Figure 2.** Map of Average Home Price (2013-2024)

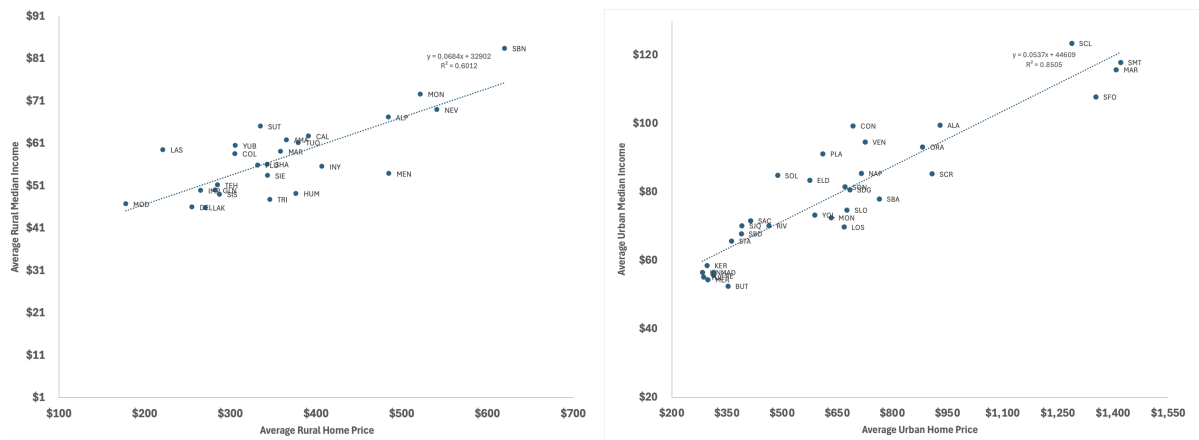
The geographic distribution of average home prices during the years between 2013 and 2024 in California is depicted on Figure 2. As can be seen from the map, a noticeable spatial pattern can be observed, which is defined by the higher average home prices for the coastal counties, especially those located in the area of San Francisco and parts of Southern California. At that, the dark-colored counties are those which feature the highest price levels in the state, including San Francisco and Los Angeles counties, while the counties that are farther away feature less intensive coloring and therefore relatively lower home prices. Consequently, the prices are directly related to the geographical location of a specific county and to the availability of jobs and other favorable economic and geographic conditions in it.

As follows from the above discussion, the average home prices in California exhibit great geographical unevenness, being largely concentrated in high demand regions. The persistent high prices in these coastal and urbanized counties for more than a decade indicate the presence of some stable drivers of their behavior and not just some temporary effects. Due to limited supply, the high demand for housing fueled by income growth, increased population density, and other factors causes prices to continue rising in high-demand areas. On the contrary, in other inland counties, lower prices might be accounted for by relatively lower demand, lack of high-paying jobs, and lower supply constraints.



**Figure 3.** California Housing Affordability: Average Home Price vs. Average Median Income (Thousands \$)

The higher-income counties in this plot have home prices higher than \$700,000. The SLO, MAD, SBA, and SDG counties have median household incomes higher than \$110,000 and home prices higher than \$1.3 million. The inland and rural areas have home prices between \$250,000 and \$400,000, with median household incomes between \$45,000 and \$65,000. This demonstrates a positive relationship between median household income and home prices in California. The basic relationship in this plot is positive; however, there is considerable variation in home prices in this plot. This demonstrates that median household income is not the only determinant of home prices in California. There are many other factors that determine home prices in California.



**Figure 4.** (Left) Rural Counties in California: Average Home Price vs. Average Median Income (Thousands \$)

**Figure 5.** (Right) Urban Counties in California: Average Home Price vs. Average Median Income (Thousands \$)

The figure 4 shows the same relationship for rural counties, with a weaker, though still positive, relationship between median income and housing prices, with an  $R^2$  of approximately 0.60. In comparison with the previous figure, it is evident that the data points are more spread out from the trend line, indicating greater variability or inconsistency with regard to the relationship between income and housing prices. Though some counties, such as San Bernardino (SBN) and Mono (MON), show relatively higher prices, other rural counties show lower income without a corresponding increase in housing prices. This indicates that other factors, not necessarily related to income, play an important role with regard to housing prices. The second figure shows the relationship between average urban home prices and average urban median income for counties in California. The scatterplot shows a strong positive relationship, as confirmed by the upward trend line, indicating a high  $R^2$  value of approximately 0.85. This shows that a high percentage of the variance in urban housing prices is related to variance in income levels, implying that income is an important factor in demand for urban housing. The high-priced counties, such as Santa Clara (SCL), San Mateo (SMT), and Marin (MAR), are concentrated in the upper right, indicating high incomes and high housing prices. On the other hand, lower-income counties, such as Butte (BUT) and Kern (KER), are in the lower left, indicating significantly lower housing prices. The high clustering of the points along the trend line indicates a strong and predictable relationship between income and housing prices in urban areas, supporting the hypothesis that income growth is a major factor in the appreciation of housing prices when demand is high. A comparison between the two figures indicates that income is a stronger indicator regarding housing prices in urban counties than it is in rural counties, further supporting the view that demand-side effects are intensified in densely populated, supply-constrained environments.

The Figure 5 below shows how average home prices and median income in urban California counties correlate positively. A perfectly fitted straight line shows there is a very strong positive correlation between the two variables, and the  $R^2$  value is 0.8505, which shows that the variability is significantly explained by the regression model. The slope shows that the change in income for urban California counties is highly dependent on the housing prices. From the above information, one would expect high income levels in high housing costs counties because people buy homes using money earned through their sources of income. Therefore, there is a possibility of seeing high median income levels in areas where there is high cost of housing prices in urban California. Santa Clara, San Mateo, Marin and San Francisco counties represent the highest points in income and housing prices as seen on the graph. This implies that areas with high housing prices also experience high income levels since people will want to acquire homes through their income levels. Counties with lower housing costs represent lower median income levels. This implies that affordability is determined by income levels in urban California counties.

This graph confirms results shown by regression analysis because one of the most significant determinants of housing prices is income in urban California counties.

## Methodology

This research uses panel data analysis to examine the dynamics of housing prices in California counties over time. Panel data analysis combines cross-sectional data (counties) with time-series data (years). This enables the analysis to capture both differences in housing markets across counties in California and dynamics in the same markets over time. The analysis captures the dynamics of housing prices in response to fluctuations in economic conditions, demographic factors, and housing supply in California. Panel data analysis has been widely used in applied economic research due to its ability to control for unobserved heterogeneity in observational units that may persist over time, such as geographical constraints, financial regulations, or long-term growth patterns (Wooldridge, 2021; Arellano, 2023; Stock & Watson, 2023).

The empirical model used for this study takes the form of a panel data regression analysis where housing price is explained as a function of various determinants such as economic factors, demographic factors, financial factors, and housing supply factors. Panel data analysis offers greater variability in terms of greater degrees of freedom with fewer issues of multi-collinearity in variables (Wooldridge, 2021). Panel data analysis is particularly advantageous in that it minimizes issues of omitted variable bias by factoring in variables that cannot be directly measured but that may affect housing prices (Wooldridge, 2021; Arellano, 2023). While the analysis is presented under the assumption that this is a fixed effects regression, the article could have benefited from providing an explicit regression formula along with a more detailed description of the variables used in the analysis. For example, while discussing the findings, the authors have used the terms “percentage change” or “effect” several times, which is not entirely consistent with how the model has been presented. Additionally, panel data analysis has been widely used in empirical research to examine the dynamics of housing markets in terms of their responses to economic conditions, demographic factors, and housing supply (Gupta et al., 2023; Herkenhoff et al., 2023).

$$\ln(\text{HomePrice}_{it}) = \beta_0 + \beta_1 \text{Median Income}_{it} + X'_{it}\beta + \mu_i + \lambda_t + \varepsilon_{it} \quad (3)$$

The equation 3 is a fixed effects panel data model that enables the analysis to investigate the relative impacts of the demand for housing, the supply of housing, financial conditions, and socioeconomic conditions on the housing price dynamics for the counties of California. The use of the multiple determinants of housing prices will enable the analysis to present a more comprehensive understanding of the housing price dynamics for the counties of California.

## Results and Discussion

Empirical findings reveal that the housing prices in different California counties are influenced significantly by a range of economic, labor market, and housing market determinants. The median income turns out to be a significant determinant in all regression models, indicating the importance of income as one of the main driving forces of housing prices because higher incomes make individuals more capable of buying houses. Furthermore, favorable labor market conditions, which are captured through the employment rate, have a positive impact on housing prices since they increase the number of people earning money. Population growth is also a determinant that helps increase housing prices because it boosts housing demand gradually. In addition to demand drivers, supply factors also play a part in the development of housing prices. High housing supply, as is indicated by high vacancy rates and housing permits, reduces housing prices, showing the moderating effect of supply on the development of housing prices. Moreover, although the regression tables contain a lot of data, some of them are crowded and would need to be explained a little more clearly regarding the economic significance of the significant coefficients that were used in them. Finally, it will be helpful to discuss further the methods of preparing the data, like how outliers are dealt with, or any transformations performed on them, such as logarithmic transformation of income/housing prices. Social factors like poverty rates have a negative impact on the increase in housing prices since poverty rates prevent households from buying houses. On the contrary, increased availability of financing, which is indicated by the debt-to-income ratio, has a positive effect on housing prices due to higher housing demand. Regional differences in coefficients can be justified by regional characteristics of counties not taken into account (Albanesi et al., 2020; Kurlat & Stroebel, 2021; Albouy & Ehrlich, 2018; Couture et al., 2019; Couture & Handbury, 2020).

From the results provided in Table 2, it can be concluded that economic fundamentals play a dominant and statistically significant role in determining housing prices within California counties. The first variable, median income, plays the main role among other independent variables because it is statistically significant in all the models: the pooled ordinary least squares regression model, the fixed effects model, and the random effects model. As stated above, median income positively correlates with housing prices because higher household income results in increased spending capability of the potential purchasers, and they become more motivated to purchase housing. From the coefficient analysis, the conclusion can be drawn that a 1% rise in the median income results in the increase in housing prices, which shows that income elasticity plays a significant role in determining the housing price elasticity. The second independent variable, the employment rate, also plays a positive role, as its increase indicates better employment

**Table 2.** Regression Results of Housing Price

Variable	Pooled OLS	Fixed Effects	Random Effects
Median Income	0.6718*** (0.1327)	0.6795*** (0.1105)	0.9682*** (0.0996)
Population Growth	8.5326*** (2.0524)	0.2563 (0.5069)	1.1645* (0.6840)
Employment Rate	2.0836*** (0.4181)	0.3674** (0.1737)	0.7855*** (0.2783)
College Education	1.4210*** (0.2510)	-0.4127*** (0.1439)	0.5291*** (0.1454)
Crime Rate	-0.00006 (0.00009)	-0.00009 (0.00006)	-0.00022*** (0.00005)
Housing Permits	0.000008 (0.000010)	0.000005 (0.000004)	— —
Vacancy Rate	0.3793*** (0.1280)	-0.1949 (0.3764)	-1.1735 (1.2096)
Homeownership	-1.4402*** (0.3599)	-0.4722 (0.3699)	-0.9183** (0.4194)
Median Age	0.0080* (0.0041)	-0.0116** (0.0050)	0.0040 (0.0044)
Net Migration	-0.0017 (0.0032)	0.0004 (0.0013)	-0.0011 (0.0014)
Debt-to-Income	0.0091*** (0.0022)	-0.0008 (0.0011)	-0.0006 (0.0013)
Construction Spending	-0.000048*** (0.000009)	0.000006 (0.000009)	-0.000015*** (0.000007)
Poverty Rate	-0.0133*** (0.0045)	-0.0036** (0.0014)	-0.0069*** (0.0015)
Real GDP	1.12e-10 (3.38e-10)	-7.15e-10 (5.44e-10)	-1.24e-10 (1.75e-10)
Constant	3.5411 (1.3944)	5.8483* (1.2583)	1.8392* (1.0712)
Observations	627	627	627
Hausman Test			1448.09***
R <sup>2</sup>	0.9649	0.9880	0.9107

opportunities and thus leads to higher incomes. Moreover, population growth positively affects the housing prices because increases in population levels mean higher demand for

housing and contribute to price increase. These findings support the idea that higher income growth rates, employment, and demographic pressures stimulate housing price growth, especially in cases when supply is relatively limited (Albanesi et al., 2020; Kurlat & Stroebel, 2021; Mian & Sufi, 2009).

The findings of the analysis conducted using median household income against the housing prices in California counties are presented in Table 02 below. It is evident that the coefficient of median income is positive and highly significant at 1 percent level in all three regression models (OLS pooled regression, fixed effect model, and random effect model). The estimated coefficients of the variables lie within the range of 0.6718 to 0.9682, which indicates that any increase in median household income causes a huge increase in house prices. Additionally, apart from the mentioned economic variables, some other housing market and financial variables were analyzed. In particular, two supply-side variables, the vacancy rate and housing permits also have a positive effect on housing price changes because they show the availability of housing and its supply level. The negative effect was observed in the case of another supply-side indicator, the ownership rate: its increase indicates lower competition in the housing market and thus reduces the housing prices. Furthermore, the negative coefficient in the random effects model suggests that the debt-to-income ratio has a positive effect on housing prices: the higher the level of debt-to-income ratios, the higher the housing prices because of higher access to borrowing funds. At the same time, the poverty rate has a negative effect since high levels of poverty negatively affect purchasing capabilities and thus decrease housing prices. Thus, the findings support existing research related to the roles of credit expansion, financial constraints, and supply rigidities in housing price variations (Couture et al., 2019; Couture & Handbury, 2020).

These findings are further strengthened by their consistency in the context of pooled OLS regression, fixed effects model, and random effects model. The signs and statistical significance of the coefficients for the majority of independent variables are similar in all three regressions models; thus, the findings' validity is supported by their reproducibility. The R2 value obtained for each model is high, which means that most of the changes in housing prices are explained by the chosen variables. The high statistical significance of the Hausman test ( $p < 0.01$ ) allows rejecting the null hypothesis about no differences between fixed effects and random effects models and thus accepting the hypothesis stating that the fixed effects model is the most appropriate for the study because unobserved characteristics of each county are included into the model.

From the results presented in Table 3, it can be observed that even though other control variables were included, the key factors influencing changes in the price of houses do not vary. First, the median income is significant across all model specifications and has a positive coefficient with values ranging between 0.00000273 and 0.00000483. Although

the numbers might be quite minute, the results suggest that higher levels of income correspond with increased housing prices since increased purchasing power would imply increase demand for houses. Moreover, similar conclusions can be made regarding employment rates since, across all models, they are positive and statistically significant. Coefficients range between 0.563 and 0.913, which implies that an improved labor market environment leads to higher prices since it creates more housing demands. Finally, mortgage rates are positive and significant across all models, having values ranging between 21.894 and 24.822. On the contrary, the real GDP is statistically insignificant in relation to the house price changes.

Finally, as more demographic and housing market controls are added to Models (2)-(4), the structural nature of the drivers of housing price changes becomes evident. First, college education is negative and statistically significant and, thus, potentially reflects sorting mechanisms. Moreover, median age and household debt-to-income ratio have a negative and significant relationship with housing prices. This could be indicative of financial constraints and demographics as determinants of demand. Housing permits and expenditures have negligible influence on housing prices in all model specifications, suggesting supply constraints and rigidity. At the same time, housing vacancy rate and homeownership rate both have negative effects on house prices as would be expected from the notion of excess supply reducing price pressures. Finally, the poverty rate is strongly negative and significant in the full specification. This result is consistent with recent literature showing that housing prices can be jointly determined by demand, supply constraints, and demographics (Diamond et al., 2019; Howard & Liebersohn, 2021; Favilukis et al., 2023).

Table 4 provides information about the role of economic fundamentals in explaining variation in housing prices within rural counties. Income and employment conditions prove to be important factors, but the effect of these variables varies from one regression model to another. The variable median income proves positive and statistically significant in both pooled OLS and random effects models, having coefficient estimates of 0.8744 and 0.4884, respectively. The implication is that high income levels create purchasing power that drives the demand for homes in the rural areas under consideration. However, the fixed effects model suggests that the influence of income on housing prices decreases significantly because of the reduced effect to 0.4211. Similar trends apply to employment conditions in the rural regions. Employment rate shows a positive and statistically significant relationship with housing prices in the pooled OLS and random effects models with coefficient values of 2.3766 and 0.3445, respectively. However, the effect of employment rate drops significantly in the fixed effects model (0.2653) to lose statistical significance. The implication is that employment conditions across rural counties have a stronger impact than short-term fluctuations in income levels. The findings concur with

previous studies showing that housing prices depend largely on economic fundamentals such as income growth and employment conditions (Albanesi et al., 2020; Kurlat & Stroebel, 2021).

**Table 4.** Determinants of Housing Prices in Rural Counties

Variable	Pooled OLS	Fixed Effects	Random Effects
Median Income	0.8744*** (0.2485)	0.4211*** (0.1290)	0.4884*** (0.1275)
Population Growth	12.1986*** (2.9896)	0.6564 (0.5042)	0.6662 (0.4824)
Employment Rate	2.3766*** (0.7074)	0.2653 (0.1739)	0.3445* (0.1849)
College Education	1.4498*** (0.3981)	-0.3898** (0.1417)	-0.2220* (0.1178)
Crime Rate	0.000088 (0.000209)	-0.000051 (0.000069)	-0.000088 (0.000062)
Housing Permits	-0.0000369* (0.000019)	0.000199** (0.000081)	0.0001805** (0.0000825)
Vacancy Rate	0.3941** (0.1828)	0.6865* (0.3518)	0.5650*** (0.1844)
Homeownership	-1.4908** (0.7203)	-0.2674 (0.2735)	-0.1164 (0.2194)
Median Age	0.0100 (0.0066)	-0.0132** (0.0059)	-0.0067 (0.0044)
Net Migration	0.0152 (0.0106)	0.0010 (0.0013)	0.0012 (0.0013)
Debt-to-Income	0.0093 (0.0057)	0.0019 (0.0018)	0.0006 (0.0019)
Construction Spending	0.0000253 (0.000027)	3.2e-07 (0.000191)	-0.0000191 (0.000163)
Poverty Rate	-0.0118 (0.0073)	-0.0038** (0.0017)	-0.0040** (0.0017)
Real GDP	2.97e-08* (1.62e-08)	-3.75e-08** (1.43e-08)	-1.58e-08 (1.19e-08)
Constant	0.9408 (2.6681)	— —	7.1430*** (1.2952)
Observations	275	275	275
R <sup>2</sup>	0.9076	0.9933	0.6073

**Notes:** Standard errors in parentheses \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1 Clustered at county level.

In addition to economic fundamentals, other housing-related characteristics and socioeconomic features in rural counties play a major role in housing price formation. The median income continues to be one of the most influential factors determining the cost of housing since it has a positive value and is statistically significant at the 1% level for all the

models. Coefficient values range from 0.4211 in the fixed effects model to 0.8744 in the pooled ordinary least square model. Higher income levels translate to more buying power and subsequently more housing prices. Nevertheless, the relatively small coefficient in the fixed effects model can be attributed to the presence of some unknown factors within each county. Apart from income, vacancy rates have a positive and statistically significant influence on housing prices in rural counties. Pooled OLS and fixed effects regression models reveal a positive and statistically significant influence of vacancy rates with coefficient estimates of 0.3941 and 0.6865, respectively. This observation indicates that

**Table 5.** Determinants of Housing Prices in Urban Counties

Variable	Pooled OLS	Fixed Effects	Random Effects
Median Income	0.9359*** (0.1366)	1.0482*** (0.1663)	1.1652*** (0.1594)
Population Growth	3.6067** (1.7319)	-0.7352 (0.8919)	0.3283 (1.2307)
Employment Rate	1.6705** (0.7328)	0.7465* (0.3344)	1.6565*** (0.6423)
College Education	1.2924*** (0.2087)	-0.6413 (0.4124)	0.7064*** (0.2737)
Crime Rate	-0.00014* (0.000067)	-0.00009 (0.000097)	-0.00017*** (0.000052)
Housing Permits	0.000013 (0.0000084)	0.0000035 (0.0000035)	0.000005 (0.0000043)
Vacancy Rate	1.3912*** (0.3316)	-0.8591 (0.7032)	-0.4293 (0.4562)
Homeownership	-1.4597*** (0.2132)	-0.9062 (0.5630)	-1.7720*** (0.3156)
Median Age	0.0035 (0.0053)	-0.0055 (0.0148)	0.0163** (0.0065)
Net Migration	-0.0020 (0.0025)	0.0004 (0.0015)	-0.0015 (0.0017)
Debt-to-Income	0.0097*** (0.0017)	-0.0024 (0.0016)	0.0001 (0.0016)
Construction Spending	-0.000043*** (0.0000078)	-0.0000065 (0.0000065)	-0.000002 (0.0000056)
Poverty Rate	-0.0048 (0.0033)	-0.0019 (0.0018)	-0.0067*** (0.0019)
Real GDP	-7.01e-11 (2.80e-10)	-6.04e-10** (2.31e-10)	-1.02e-10 (1.90e-10)
Constant	1.2020 (1.5959)	1.7279 (1.9919)	-1.0883 (1.7375)
Hausman Test			187.00***
Observations	352	352	352
R <sup>2</sup>	0.9864 (0.0066)	0.5737 (0.0059)	0.9669 (0.0044)

**Notes:** Standard errors in parentheses \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1 Clustered at county level

low housing stock has an upward effect on housing prices in rural counties. Similarly, homeownership rates have a negative influence on housing prices in the pooled OLS model (-1.4908). This observation suggests that high homeownership rates may limit

competition, making it difficult to increase housing prices further. Poverty rate also shows a negative influence on housing prices in the fixed and random effects models (-0.0038 and -0.0040, respectively). This result implies that weak purchasing power among poor residents lowers the probability of increasing housing prices. These observations agree with past studies emphasizing the role of housing market characteristics and socioeconomic features in determining housing price variation in rural areas (Albouy & Ehrlich, 2018; Couture & Handbury, 2020).

Information regarding the effect of different variables on housing prices in urban counties can be obtained from Table 05. Median income serves as one of the main drivers of housing prices. It is positive and statistically significant in all three model specifications, having the coefficient of 0.9359 in the pooled OLS, 1.0482 in the fixed effects, and 1.1652 in the random effects models. As such, each percentage change in median income results in a respective 0.94%, 1.05%, and 1.17% change in housing prices, confirming the significance of purchasing power as one of the major drivers of demand. Population growth is another variable that exhibits some level of inconsistency, showing a positive and statistically significant effect in the pooled OLS model only (coefficient = 3.6067). When analyzing other two model specifications, population growth turns out to be statistically insignificant, indicating that its effect is mainly determined by cross-sectional differences rather than variations within countries. Similar behavior can be observed regarding the employment rate. This variable shows a positive and statistically significant effect in pooled OLS (coefficient = 1.6705) and random effects (coefficient = 1.6565) but is positively weakly statistically significant only in the fixed effects model (coefficient = 0.7465).

Other important drivers of housing prices in urban areas include several housing market and financial indicators. The effect of vacancy rates is positive and statistically significant only in the pooled OLS model. Similarly, housing permits exhibit a positive but statistically insignificant effect in all models considered. On the contrary, homeownership rate demonstrates a strongly negative and statistically significant effect in the pooled OLS (coefficient = -1.4597) and random effects (coefficient = -1.7720) models, implying that housing demand in urban areas can be limited through reducing competitive pressure in the housing market. Poverty rates demonstrate the presence of statistically significant effect only in the random effects model. At the same time, lower purchasing power associated with higher poverty rates negatively affects housing prices. Finally, the coefficient of debt-to-income ratio is positive and statistically significant only in the pooled OLS model. Real GDP appears to affect housing prices inconsistently but weakly in all model specifications. Thus, the difference between coefficients of different variables shows the importance of considering unobserved heterogeneity in the analysis of housing prices. The fact that the  $R^2$  value is relatively high in the case of the fixed effects model

suggests that local factors remain important when considering housing prices in urban areas. Statistical insignificance of the Hausman test implies that the fixed effects model represents a better specification.

## Conclusion and Policy Implications

This paper explores the determinants of housing prices in California counties in relation to a variety of economic, financial, demographic, and housing supply variables. The empirical results obtained indicate that demand factors are the most important drivers of housing price changes. First, median income is shown to have a large and significant impact on housing price formation in virtually all regression models tested. Rising income leads is associated with housing demand and higher prices because of an intensified competition in the local housing market. These conclusions are in line with previous studies that emphasize the importance of income growth for explaining housing price appreciation, particularly in tight housing markets (Albanesi et al., 2020; Kurlat & Stroebel, 2021). Moreover, labor market conditions support this finding by increasing household income stability and making people eligible for mortgages. Taken together, these findings suggest that housing price changes are mostly explained by economic capacity of localities where housing markets operate. Nevertheless, owing to the framework of the empirical model, the findings must be treated with caution. Although the model shows considerable relationships among various variables and house prices, the findings are merely associations and not causal effects.

On the other hand, the analysis draws attention to the important role of housing supply in moderating demand effects on housing price levels. From the results, housing permits, housing vacancy, and ownership rates are important determinants of housing price dynamics. Specifically, the negative correlation between housing permits and housing price levels indicates that more building permits may have a moderating effect on prices through increasing the supply of housing. On the other hand, in most areas of California, housing supply is very restricted due to zoning laws, land use constraints, and geographical limitations. Therefore, as a response to increased demand in the market, the increase in prices is inevitable since housing supply will remain restricted in these areas. Several variables that form part of the model, like income, employment, and house prices, can be influenced simultaneously; hence, there is a problem of separating out causality. This situation is well explained in the literature, where it is stated that the supply of houses is inelastic because of zoning laws, resulting in a high level of housing prices. Thus, the dynamics of housing prices should be explained by the interaction of high demand for housing and low responsiveness of supply.

Moreover, the results highlight that housing markets are heterogeneous in nature across different locations, meaning that regional variables have significant importance to affect housing price changes. Although the fundamental drivers of housing prices in terms of income, finances, and housing supply are common across all counties, their impact on housing prices varies from place to place depending on regional attributes like population density, structure of economies, and local amenities. In other words, the disparity among the results of different model estimations, especially the contrast in pooled OLS estimates and fixed effects, indicates the role of unobservable time-invariant county attributes in housing price changes. This observation is in line with current literature on housing markets that focuses on spatial heterogeneity in the context of housing price variation based on regional factors like migration trends and local economic prospects.

In conclusion, employing the panel OLS model with fixed effects, the study manages to establish significant associations between economic indicators and house prices in California counties. Among demand-side factors and financial factors, such variables as income and employment are especially important, as they can be interpreted as major determinants of demand for housing, since a household's purchasing power largely determines its capacity to participate in the housing market competition. As for the effect of financial factors on demand for housing, one can speak about the impact of credit conditions, namely mortgage rate and availability of mortgages which affect borrowing opportunities. However, at the same time, it is necessary to point out that despite the fact that these results prove correlation of income, employment, and mortgage rate with housing prices, it is incorrect to claim causation of these variables because the model used in the study is empirical, and some of the variables might have simultaneous impacts. In addition, these findings also show the relevance of spatial heterogeneity of housing price dynamics. In particular, the effect of income, employment, and other factors on housing prices is heterogeneous between counties because of differences in economic conditions and geography in California counties.

Another interesting finding of the study is the existence of supply constraints for housing in high-income and economically developed counties in California, which contribute to increased prices for housing. Supply elasticity in this case becomes a determining factor that defines whether higher prices are caused by supply constraints or demand-side factors, including economic development and income. Based on the results of the study, it is possible to say that in terms of policy implications, it would be necessary to combine approaches which involve supply and demand management. Namely, to decrease prices for housing, it is recommended to encourage supply by relaxing building restrictions and implementing other initiatives. Overall, the evidence indicates that without tackling the issue of supply limitations, higher levels of income and demand will continue to contribute to the rise in house prices.

## Study Limitations

Even though there was a thorough analysis made in the study, its scope is still quite broad. Considering both factors related to the supply side and factors associated with the demand side might restrict the focus of the paper because of the lack of research questions. One more potential weakness of this type of analysis relates to the use of the traditional supply and demand approach as the theoretical framework. Even though it might be considered as a good basis, it does not reflect the real-world situation entirely. Firstly, it should be stated that there is a significant gap between the properties as they have different locations, sizes, qualities, etc. That is why using a similar approach to analyze houses in two different counties is likely to lead to biased results. Thus, a better option might be a hedonic pricing model that considers characteristics of houses and their locations. Nevertheless, this paper does not follow it due to the absence of data at property level and, therefore, had to make the analysis at the county level. Thus, the model is based on macroeconomic factors, but not on housing-specific parameters.

At the same time, the paper contains a few issues with the relation between the theoretical approaches and the results of empirical studies. It should be mentioned that variables like the growth of population and income shift the demand curve, while the model analyzes the impact of those factors on prices directly. Moreover, the paper lacks the consideration of the factors related to the spatial aspects of houses and their prices. Such characteristics as the quality of neighborhoods, the proximity to job markets, schools and local amenities are crucial for the housing price formation

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