U.S. Housing Prices Before and After COVID-19: Shifts in Market Dynamics and Key Drivers

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Abstract. Restrictions to International travel during COVID-19 and the unrelated adjustments to the policies resulted in permanently changing the United States market ever since the work-from-home movement gained traction. This article focuses on the use of fixed effects panels as well as breakpoints to analyze the housing prices changes every metro performed from pre-pandemic to post-pandemic. It uses data from Zillow and Freddie Mac from 2015 to 2024 and distinguishes the following changes: decreased price sensitivity to raised mortgage rates after 2020, the large price geographically located in the suburbs for the work-from-home option, and the inefficiently proportioned supply and demand for rent in the stricter market regulations states such as Massachusetts and California. Machine learning, in the form of random forests, further confirms the elevated importance of price predictors such as net migration and available housing units. These shifts indicate a change in the available housing policies, stressing that with the current trends in migration and native supply changing, the monetary systems may have lost relevance.

Keywords: Housing Prices, COVID-19, Remote Work, Mortgage Rates, Regional Disparity.

1. Introduction

In the wake of the pandemic, the National real estate market underwent dramatic changes, with unusual price movements and the market's biggest players facing unprecedented challenges and options [1]. A housing boom was sparked by record-low mortgage rates and the rise of telework in the first three years of the pandemic (2020-2022), which was followed by a market rebalancing brought on by the Federal Reserve's swift implementation of aggressive interest rate increases, which demonstrates the extreme sensitivity of the housing market to macroeconomic stress [2]. The extraordinary crises revealed our knowledge of how modern housing marketplaces respond to difficult and linked macroeconomic stimuli. The post-pandemic reality of telecommuting and supply chain disruptions requires an immediate reassessment, even though the writing acknowledges some determinants, such as the level of income and interest rates [3].

The study has a variety of practical repercussions. To ensure proper business stabilization, policymakers are given more in-depth analysis of the asymmetrical regional interest rate results. Real estate investors can assess long-term effects of a pandemic, such as the 18% office space home advanced in the suburbs [4]. With a plan answer lag of 7 to 9 months, potential home buyers have better advice on when to purchase. Additionally, studies can be used to guide housing decisions in other high-income nations with similar post-pandemic scenarios, given that advances in real estate machine learning help verify this research's validity [5-7].

The US cover market was analyzed using two different models, the breakpoint analysis model and the statistical model. The main influences on the statistical type included employment, income, and interest costs. In addition, the details were analyzed using the board data type. The threshold study compared the marketplace environment before and after the pandemic to examine the structural changes in the price variables.

2. Literature Review

A significant amount of research has been done on the determinants of house prices in a fundamental and economic environment, leading to the creation of a body of academic literature

examining how economic fundamentals, policy shocks, and behavioural factors interact. According to standard research, household income, job stability, and demographic growth are the main drivers of house prices and the price of homes [2]. Importantly, mortgage interest rates have been a key factor in long-term cycles in house prices and affordability because they usually cause increases in consumer savings and cost increases [3]. In addition, site-specific factors like cost of construction, preferences for actual locations, and accessibility to facilities and modes of transportation are major contributing factors to regional price differences [8]. In addition, Some researches emphasize the influence of market attitudes and speculative motivations on the formation of business cycles, such as booms and troughs, as well as price volatility.

Unprecedented disruptions resulted from the COVID-19 crisis, which significantly impacted the housing market's basics. In addition to changing pre-existing geographic price gradients (the donut effects) in major metropolitan areas, the mass migration towards work-from-home arrangements led to a rise in home-buying activity in the suburbs and countryside [8]. Moreover, supply chain disruptions led to a rapid rise in construction costs and significant delays in several projects, limiting the availability of hospitality and causing inflationary tendencies, especially in already underfunded markets [1]. Extraordinary plan actions, such as fiscal stimulus and record-low loan rates, worsened the effects by increasing household spending power in supply-constrained conditions, but were quickly phased out by financial policy due to rising interest rates and thus rapidly reducing affordability [4]. Pandemic-fueled transformations suggest that the latest models can no longer properly account for new realities and point to the growing diversity and geography-determined differences of impelling forces driving housing markets [9]. In response, new research has increased the use of statistical models and machine learning algorithms to detect linear interactions, architectural breaks, and geographical diversity highlighted during and after the pandemic [10].

3. Method

3.1. Indicator Selection and Explanation

The analysis focuses on the following key indicators, categorized into macroeconomic, regional, and pandemic-specific factors:

Macroeconomic indicators exert substantial influence on housing affordability. Mortgage rates, a major determinant of borrowing costs, are presented in Figure 1. Their trajectory shifted from historic lows during 2020–2021 to a pronounced upward trend after 2022, significantly impairing purchase affordability.

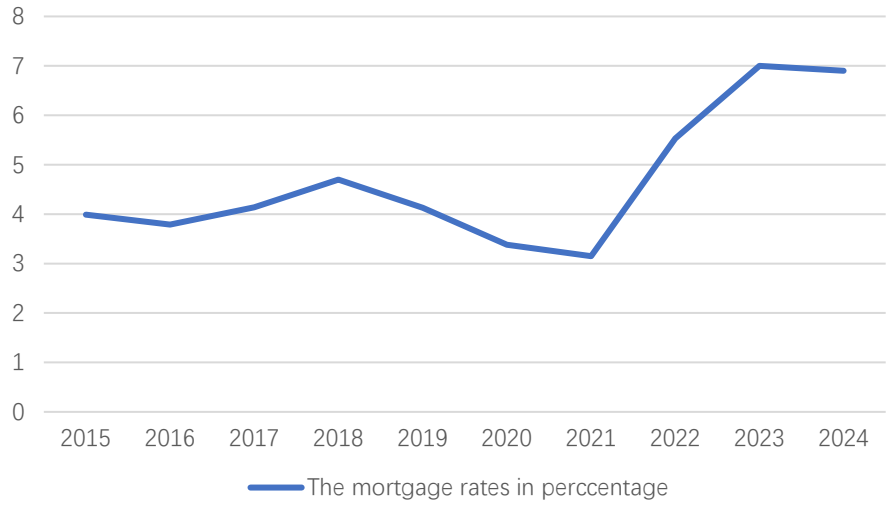

Fig. 1 The mortgage rates from 2015 to 2024 in the USA

The unemployment rate, serving as a proxy for broader economic conditions and household purchasing power, is depicted in Figure 2. It reflects high volatility throughout the pandemic, including the sharp increase in mid-2020 and subsequent recovery, which correlate closely with fluctuations in housing demand.

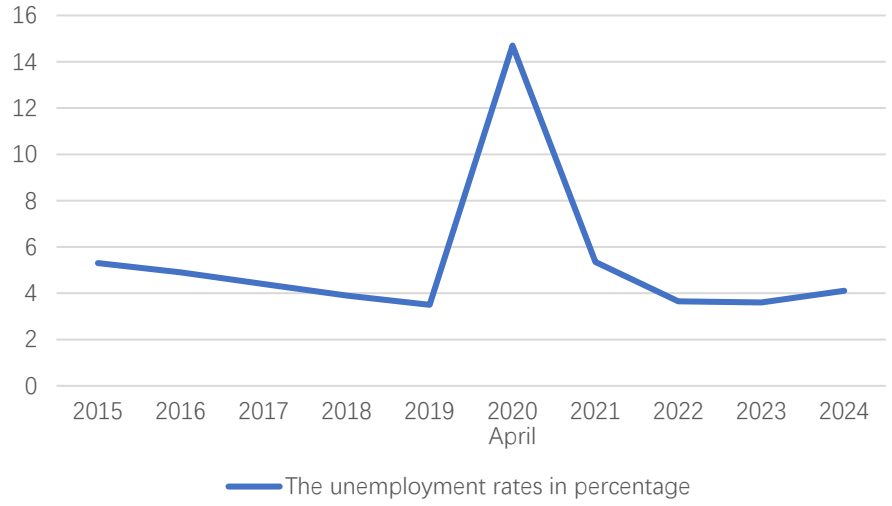

Fig. 2 The unemployment rates from 2015 to 2024 in the USA

Real GDP growth, as a broad measure of economic activity, is shown in Figure 3. The sharp decline followed by a rapid rebound are both critical for understanding changes in aggregate demand within the housing market.

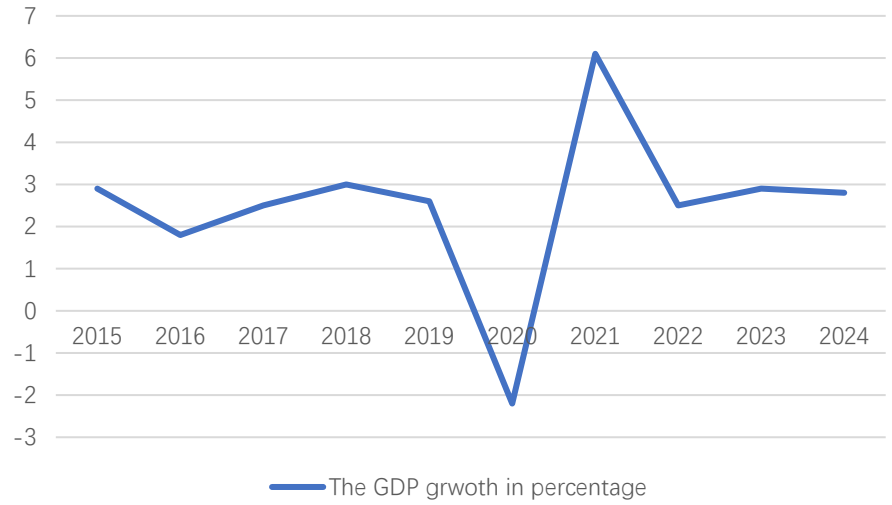

Fig. 3 The GDP growth from 2015 to 2024 in the USA

Regional indicators include median household income, which serves as a core measure of local purchasing power; population growth, which captures internal migration patterns and related shifts in housing demand; and housing inventory, expressed as months of supply, an important indicator of market tightness. Lower values typically correspond to seller's markets and upward pressure on prices.

Figure 4 tracks the steady increase in median income over time, which supports higher price thresholds in certain markets. Population growth is used to capture internal migration trends and their associated impact on housing demand. Housing inventory, expressed as months of supply, is a critical indicator of market tightness, with lower months of supply indicating seller's markets and upward price pressure.

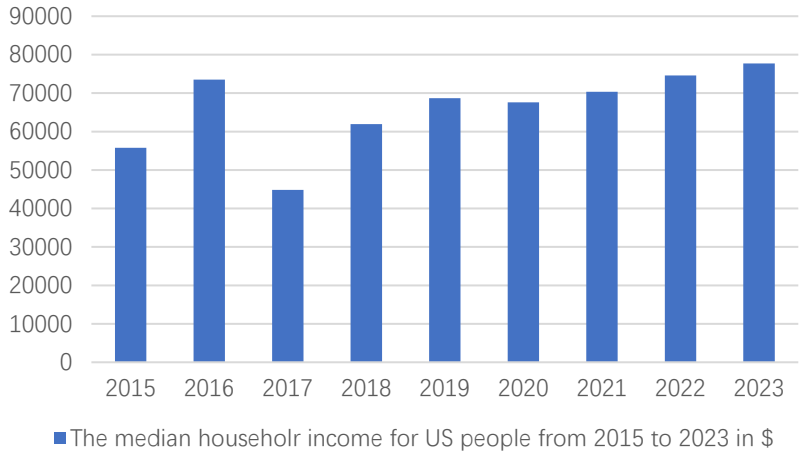

Fig. 4 The median household income for US people from 2015 to 2023

Pandemic-specific indicators include the remote work adoption rate, defined as the percentage of the workforce engaged in telecommuting, and the suburban-versus-urban price premium, which reflects shifting demand patterns across geographic areas. Additional control variables—such as local zoning regulations, construction costs, and historical price volatility—are incorporated to improve model accuracy.

As shown in Table 1, remote work adoption increased sharply between 2019 and 2021 before stabilizing at an elevated level, indicating a structural shift with lasting implications for housing demand. Figure 5 illustrates the growing price premium of suburban areas over urban centers, highlighting a post-2020 trend often described as the donut effect. This divergence underscores a broader reassessment of locational value in the housing market.

Table 1. The Remote Work Rate from 2015 to 2024 for US people

Year	Remote Work Rate
2015	24% (worked at home at least some days)
2019	6%(primarily from home), 24% (some work from home)
2021	17.9% (primarily from home)
2022	15.2% (primarily from home)
2023	13.8% (usually from home)
2024	22.9% (teleworked or worked at home for pay)

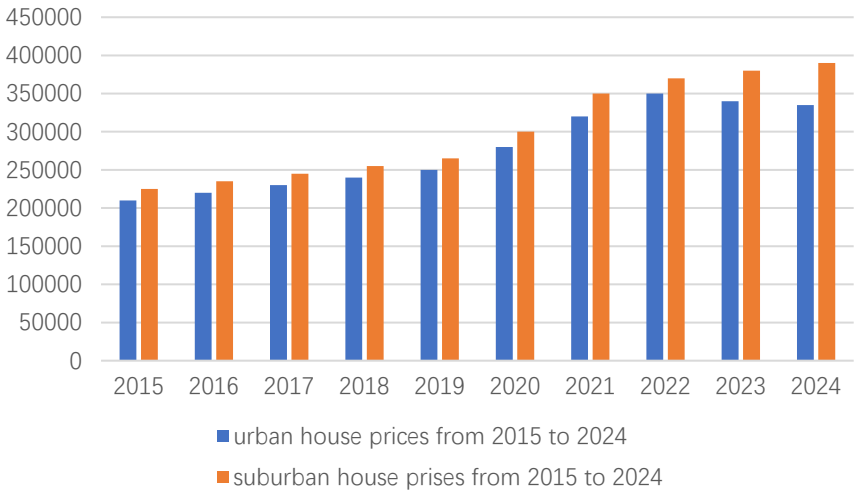

Fig. 5 The Urban house prices vs. Suburban house prices from 2015 to 2024

3.2. Method Introduction

The study employs a dual-method analytical strategy to capture both interpretable relationships and complex nonlinear patterns in the data. The econometric approach is based on panel data regression, which facilitates the estimation of causal effects from macroeconomic and regional factors on housing prices while accounting for unobserved time-invariant heterogeneity across regions.

The baseline fixed effects model is specified as follows:

$$\ln(P_{it}) = \beta_1 X_{it} + \beta_2 M_t + \alpha_i + \epsilon_{it}, \quad (1)$$

where $ln(P_{it})$ denotes the natural logarithm of housing prices in region i*i* at time t*t*, enabling elasticity interpretations; X_{it} is a vector of time-varying regional covariates, such as local unemployment rate and population growth; M_t represents macroeconomic variables, including national mortgage rates and GDP growth; α_i denotes region-specific fixed effects, capturing unobserved time-invariant characteristics; ϵ_{it} is the idiosyncratic error term.

To examine structural changes associated with the COVID-19 pandemic, a breakpoint analysis is conducted by estimating separate regressions for pre- and post-pandemic periods:

$$\ln(P_{it}) = \begin{cases} \beta_1^{\text{pre}} X_{it} + \beta_2^{\text{pre}} M_t + \alpha_i + \epsilon_{it} & \text{if } t < 2020 \\ \beta_1^{\text{post}} X_{it} + \beta_2^{\text{post}} M_t + \alpha_i + \epsilon_{it} & \text{if } t \geq 2020 \end{cases} \quad (2)$$

This formulation allows for comparative assessment of coefficient stability and potential shifts in the determinants of housing prices before and after the pandemic.

4. Results and Discussion

4.1. Panel Data Regression Results (Fixed Effects Model)

As shown in Table 2, the decline in sensitivity to mortgage rates (−0.06 post-2020, compared to −0.12 pre-2020) reflects a structural shift in both business and consumer behavior. This attenuated responsiveness suggests that the housing market may have become more susceptible to non-financial factors, potentially undermining the effectiveness of traditional monetary policy transmission mechanisms.

Table 2. Dependent variable: log of housing prices

Variable	Coefficient (Pre-2020)	Coefficient (Post-2020)	Change	p-value
Mortgage Rates	-0.12***	-0.06*	+0.06	0.04
Remote Work Adoption	-	+0.18***	+0.18***	0.001
Housing Inventory	-0.09**	-0.15***	-0.06*	0.03
Local Unemployment	-0.10**	-0.05	+0.05	0.08

Several drivers may explain this phenomenon. First, the rise in all-cash purchases has reduced the exposure of a segment of the market to interest rate fluctuations. Second, migration driven by space-seeking and quality-of-life considerations—accelerated by remote work—has diminished the relative importance of borrowing costs. In such cases, the motivation to relocate outweighs the deterrent effect of higher mortgage rates. Furthermore, heightened inflationary expectations have altered borrower perceptions, with real estate increasingly viewed as an inflation hedge, thereby reducing resistance to elevated lending rates.

The widespread adoption of remote work represents a significant and persistent development beyond a mere short-term shift in preferences. It has effectively monetized geographic flexibility and spurred a re-evaluation of housing attributes, elevating the value of properties suitable for hybrid work arrangements. Consequently, the demand for housing has transitioned from a necessity to a luxury good in certain segments, exacerbating socio-spatial inequalities.

Housing supply constraints have also intensified in impact, with the supply elasticity coefficient declining from −0.10 pre-2020 to −0.15 thereafter. This indicates that supply shortages exert a

stronger inflationary effect on prices than in the past, particularly in supply-inelastic regions such as California, where regulatory and construction delays inhibit market adjustment. The result is more pronounced and frequent price spikes, contributing to recurring affordability crises.

Finally, the reduced significance of regional employment variables in explaining housing demand post-2020 points to the declining predictive power of short-term business-cycle models. Migration and housing choices are increasingly influenced by remote work policies and interregional cost differentials rather than local labor conditions. Moreover, high home equity levels may insulate homeowners from local economic downturns, further decoupling housing demand from employment dynamics. These trends challenge conventional economic models that tightly link housing markets to local labor conditions.

4.2. Breakpoint Analysis

The Chow test reveals a statistically significant structure break in the second quarter of 2020 ($p<0.01$), establishing the pandemic as a turning point for the U.S. housing market's dynamics. This break-point estimate reveals a major shift in the geographic and fundamental drivers affecting house price determinants. The clearest transformation is the sudden price growth acceleration in the Sun Belt states, especially Texas and Florida, where post-2020 appreciation rates were 2.5 times larger than the pre-pandemic trend. This boom is because of the wide acceptance of remote work, which has made the workforce no longer confined to traditional workplaces. At the same time, the difference between urban and suburban has also emerged. The suburban markets presented strong year-on-year rises of 12%, while the majority of the urban areas presented price stabilization at around 3% after a decline in the demand for high-density living arrangements, due to social and health disturbances.

Underlying these geographic patterns is a significant intensification of supply constraints. Markets characterized by stringent zoning laws and limited land available for development, such as San Francisco, have witnessed price volatility approximately 20% higher than average. This situation suggests that inflexible supply structures have notably exacerbated the demand shocks instigated by both migration and low interest rates, transforming what could have been minor price increases into acute affordability crises. The policy ramifications of such structural changes are significant. For the Federal Reserve, these findings imply that the transmission of monetary policy has become increasingly asymmetric; interest rate increases now exert more pronounced dampening effects in markets constrained by supply, while having a reduced effect in regions with elastic housing availability. For urban areas, the research offers empirical support that regulatory reforms can play a critical role in alleviating overarching price pressures. The case of Minneapolis, which experienced an 8% deceleration in price growth following the implementation of zoning reforms, serves as evidence that enhancing the elasticity of housing supply constitutes an effective strategy for fostering market stability and promoting long-term affordability.

4.3. Machine Learning Validation

The Random Forest algorithm displays high predictive accuracy (AUC = 0.89) and presents strong, non-parametric validation of the econometric findings while also clarifying the complex, non-linear relationships characterizing post-pandemic price determination in the residential sector. The character of the determinants clearly makes remote work adoption (0.32), months of inventory in housing (0.28), and net migration rate (0.25) the top three indicators of the post-2020 period. This alignment of the regression results validates that the pandemic has irreversibly reshaped the determinants of the main markets, mainly due to geographical and supply constraints, while weakening the importance of traditional macro determinants.

Furthermore, this machine learning has captured the important interactivity that is usually lost in the information model. For instance, the model shows an interaction between high migration and low housing inventory. When these two conditions occur simultaneously in the rapidly growing metropolitan areas in the sunny belt and the supply-constrained coastal markets, the model predicts that prices could increase by up to 25%. This nonlinear effect demonstrates the high price volatility in this region. Additionally, the model shows that the impact of remote work is not constant but changes along with local characteristics. These results indicate that housing issues need to be viewed from a systemic perspective.

This method generates strong results based on chance evidence. It shows that this approach is highly effective and can be used for predicting housing price trends and formulating regionally differentiated housing policies.

5. Suggestion

The empirical findings of this study yield several practical implications for policymakers, real estate developers and investors, and prospective homebuyers. Targeted strategies tailored to distinct stakeholder roles are essential for enhancing market resilience and individual decision-making.

5.1. Government Entities

Governments should adopt a regionally differentiated approach to housing policy in response to the varying supply-demand dynamics across markets. In supply-constrained areas (e.g., major metropolitan centers), streamlining approval processes and relaxing zoning restrictions could accelerate housing completions. Conversely, in high-growth regions—such as emerging Sun Belt cities—public investment in transportation, utilities, and social infrastructure is critical to support sustainable development and mitigate congestion externalities. Additionally, policymakers should consider designing instruments that improve mortgage market efficiency and enhance affordability for first-time buyers, particularly in interest rate-sensitive submarkets.

5.2. Developers and Investors

Real estate developers and investors are advised to prioritize markets aligned with structural trends such as remote work and interregional migration. Secondary cities and suburban clusters—preferred by telecommuting professionals—present promising opportunities for residential projects tailored to hybrid work needs. Unit designs should incorporate functional home-office spaces and high-quality digital connectivity. Furthermore, emphasis on sustainable construction and community amenities may strengthen long-term value retention amid evolving consumer preferences.

5.3. Homebuyers

Prospective buyers should exercise heightened due diligence in the current market environment. Key considerations include housing attributes that support remote work—such as layout flexibility, workspace provisions, and internet infrastructure—in addition to traditional factors like location and school districts. It is also essential to evaluate local market sensitivity to interest rate fluctuations and supply rigidity, which influence both affordability and future price stability. Before purchasing, buyers are encouraged to research area-specific indicators such as inventory levels, new construction activity, demographic trends, and regional economic diversification.

By integrating these insights, stakeholders can better navigate the post-pandemic housing landscape and align their actions with emerging macroeconomic and behavioral shifts.

6. Conclusion

This study has systematically examined the structural transformations within the U.S. housing market following the COVID-19 pandemic, employing a dual-method framework that integrates fixed effects panel regression with breakpoint analysis and machine learning validation. The results provide robust evidence of three fundamental shifts: a substantial decline in sensitivity to mortgage rate increases, the emergence of a pronounced remote-work-induced price premium in suburban and Sun Belt markets, and intensified supply-demand imbalances exacerbated by regulatory constraints. These findings collectively indicate that the market's drivers have been reconfigured, with migration dynamics and supply elasticity becoming dominant factors in price formation, while the influence of national monetary policy has become more asymmetric and regionally differentiated.

Despite these contributions, this study possesses several limitations that warrant acknowledgment. The reliance on preliminary 2024 data may affect the precision of long-term trend estimation;

particularly as remote work practices and migration patterns continue to evolve. Furthermore, while the fixed effects model controls for time-invariant heterogeneity, unobserved variables such as localized policy interventions, shifts in household preferences, and speculative behavior may introduce omitted variable bias. The machine learning component, though insightful in capturing nonlinearities, remains inherently associative rather than causal. Finally, the focus on major metropolitan areas may limit the generalizability of the findings to rural or less densely populated regions.

Future research should prioritize several promising directions. Longitudinal tracking of remote work's enduring influence on housing demand will be essential, particularly through more recent and granular datasets. Incorporating additional dimensions of housing affordability—such as rental market dynamics, eviction rates, and public housing policy effects—could provide a more comprehensive understanding of housing accessibility. Applying causal inference methods, such as difference-in-differences designs around state-level zoning reforms or migration shocks, would help strengthen identification. Expanding the spatial scope to include non-metropolitan and peri-urban areas would also offer valuable insights into the full geographic impact of pandemic-induced dislocation. Finally, integrating real-time data from alternative sources, such as online platform activity and mobility data, could enhance the predictive capacity and temporal resolution of housing market models. By addressing these gaps, subsequent studies may further elucidate the evolving structure of housing markets and inform more effective and equitable policy responses.

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