

## **Recent Trends in U.S. Home Prices and Mortgage Interest Rates\***

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### Abstract

U.S. home prices accelerated rapidly during the Covid pandemic due to changing household preferences for space, generous federal income support, and significant monetary policy accommodation. Historically low interest rates allowed a large fraction of homeowners with mortgages to refinance their long-term fixed rate loans to free up cash flow and protect them against future interest rate increases. Significant inflationary pressures later emerged and the central bank rapidly tightened monetary policy, which translated into higher mortgage interest rates. Home prices were remarkably resilient to the policy change, owing to continued income growth and reduced supply of homes on the market associated with the higher interest rate environment.

Keywords: Housing, Mortgages, Interest Rates

\* The views expressed are those of the authors and not necessarily those of the Structured Finance Association, the Federal Reserve Bank of Atlanta, or any other entity within the Federal Reserve System.

## **Recent Trends in U.S. Home Prices and Mortgage Interest Rates**

### **1. Introduction**

U.S. home prices increased dramatically during the Covid pandemic as housing preferences were markedly altered, fiscal authorities provided generous income support, and the Federal Reserve provided significant monetary accommodation. Home values grew by approximately 30% nationally over the course of two years (2020-2021), with variation across states and metro areas. Similar dynamics emerged in Australia, Canada, and parts of northern Europe.

As the pandemic receded in the U.S., inflation climbed and became increasingly viewed as persistent. An important contributor to the higher inflation readings was the cost of shelter, as measured by rent and owners' equivalent rent (OER), which tends to lag house price growth. High inflation readings resulted in a sharp pivot in the stance of monetary policy in the U.S. and many other jurisdictions around the world. The Federal Reserve raised its federal funds rate target range from 0-0.25% to 5.00-5.25% over the course of 15 months (March 2022 to June 2023) and began allowing securities to run-off its balance sheet. Similarly, the European Central Bank increased its refinancing operations rate from 0% to 4% and the Bank of England lifted its bank rate from 0.5% to 5% over the same period.

Higher policy rates in general lead to higher mortgage rates, although the relationship varies across jurisdictions owing to differences in mortgage contracts. In the U.S., the predominate mortgage contract is a long-term (15 or 30 years), fixed-rate, fully amortizing loan that is continuously prepayable. Thus, the transmission of U.S. policy rates to mortgage rates is muted as it extends out the yield curve and is influenced by the effect of interest rate volatility on the cost of the prepayment option. By contrast, many other countries have historically had fully adjustable-rate contracts and have only recently seen an increased use of hybrid contracts with fixed rates for 1-5 years. In these places, changes to the stance of monetary policy affect household balance sheets more directly through contemporaneous changes in mortgage payments.

Sharp increases in policy rates and mortgage rates, coupled with recessionary fears, created concern about the outlook for home prices in many jurisdictions for 2023.

While aggregate U.S. home prices fell slightly in late 2022/early 2023, they have since stabilized and have started growing once again. In addition, capitalization rates remain quite low relative to long-term Treasury rates as the growth in rents has not kept pace with home prices. One explanation for this is that existing homeowners have fixed-rate mortgages with interest rates well-below those currently available, which is valuable and reduces their incentive to move. Data on home sales and brokerage listings is consistent with such behavior. On the supply-side, construction activity has also been tepid in the higher interest rate environment.

The next section of the paper provides background on the U.S. mortgage finance system. In Section 3, we explore the Covid housing boom in 2020 and 2021 and discuss its drivers. Section 4 documents the slowdown in the U.S. housing market during 2022 and into 2023 as monetary policy rapidly tightened and mortgage rates significantly increased. Section 5 offers some concluding remarks.

## **2. Background: The U.S Mortgage Finance System**

The most popular mortgage contracts in the U.S. are long-term (30-year and 15-year), fully amortizing loans that embed a continuous prepayment option. Another distinguishing feature of U.S. mortgages is that they are principally financed by capital markets with significant intervention by the federal government.

Mortgage origination is conducted by banks and nonbank financial institutions alike, although banks have a significant funding advantage owing to their ability to finance loans with insured deposits.<sup>1</sup> Hence, banks subsequently choose whether to hold mortgages on-balance sheet or sell them into the secondary market, while mortgage banks transfer all their loan production to the secondary market. The secondary mortgage market principally involves securitization, or the creation of mortgage-backed securities (MBS), although whole loan sales also occur.

The primary mortgage market is segmented into three parts based on borrower and loan characteristics: (i) government, (ii) conventional-conforming, and (iii) conventional nonconforming.

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<sup>1</sup> Nonbanks finance principally their mortgage originations on a short-term basis using warehouse lines of credit from banks.

The “government market” refers to loans carrying mortgage insurance against credit risk from the Federal Housing Administration, Department of Veteran’s Affairs, or Rural Housing Service.<sup>2</sup> These loans are generally targeted toward households with low-to-moderate incomes, low/no down payments, and weak credit histories. Virtually all government-insured mortgages are securitized by lenders through the Government National Mortgage Association (“Ginnie Mae”), which is an agency within the U.S. Department of Housing and Urban Development. Ginnie Mae MBS carry an explicit U.S. government guarantee of the timely payment of all principal and interest. As of 2023:Q2, there were almost \$2.3 trillion of Ginnie Mae securities outstanding, representing about 16.5% of all single-family mortgage debt outstanding.

Conventional-conforming mortgages are those eligible to be purchased or securitized by either the Federal National Mortgage Association (“Fannie Mae”) or the Federal Home Loan Mortgage Corporation (“Freddie Mac”), which are government-sponsored enterprises created for this purpose.<sup>3</sup> A “conventional” mortgage is simply any non-government mortgage, while “conforming” refers to the loans’ eligibility for sale to Fannie Mae or Freddie Mac (e.g., having a principal balance below the “conforming loan limit”). Like Ginnie Mae, Fannie Mae and Freddie Mac each provide blanket guarantees on their MBS; and their ability to do this successfully rests on their special relationship with the U.S. government. As of mid-year 2023, Fannie Mae and Freddie Mac together financed almost \$6.7 trillion of single-family mortgages (48.4% of outstanding loans). Collectively, the MBS issued and guaranteed by Ginnie Mae, Fannie Mae and Freddie Mac are often referred to in the marketplace as “Agency MBS”.

The conventional nonconforming residential mortgage market was historically composed of loans that simply exceeded the conforming loan limit—referred to as “jumbo mortgages.” Given the absence of government guarantees in the secondary market, a large fraction of jumbo mortgages is held on bank balance sheets. However,

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<sup>2</sup> The Federal Housing Administration (FHA) is part of the U.S. Department of Housing and Urban Development and the Rural Housing Service is part of the U.S. Department of Agriculture.

<sup>3</sup> Fannie Mae and Freddie Mac were each created by the U.S. Congress and their charters include several unique provisions that long created investor perceptions that their obligations are implicitly guaranteed by the U.S. government (e.g., Frame and White 2005). The two institutions failed simultaneously during the 2008 financial crisis and were placed into government conservatorship with a large backstop from the U.S. Treasury, which has effectively made their obligations federally backed (Frame et. al, 2015).

some are securitized privately, with a structure generally like that of other consumer asset-backed securities (i.e., lenders work with an investment bank to create a set of securities backed by a loan pool with cash flows structured and prioritized for different investor classes). Non-government mortgages made to borrowers with difficult to document income, but with balances below the conforming loan limit, are a small part of the market. Virtually all these loans are privately securitized. As of mid-year 2023, non-Agency MBS outstanding stood at \$429 billion, or 3.1% of outstanding loans.

The basis for primary mortgage interest rates paid by homeowners are the secondary-market interest rates paid to Agency MBS investors for Ginnie Mae securities and uniform mortgage-backed securities (UMBS) guaranteed by Fannie Mae or Freddie Mac. Agency MBS are created and traded with coupons (interest payments to investors) in 50-basis-point increments, and the secondary market rate consistent with par value is known as the “current coupon” rate. The difference between the two series—or the “primary–secondary spread”—reflects several factors. First, all conventional conforming mortgage borrowers pay 25 basis points for loan servicing. Second, Fannie Mae and Freddie Mac charge guarantee fees (insurance premia) to ensure timely payment of principal and interest on UMBS. Third, loan originators need to cover their costs, including a return on equity, which may vary over time. Finally, during periods of intense mortgage demand (refinancing waves), the spread tends to widen owing to originator capacity constraints (e.g., Fuster et al., 2017).

### **3. U.S. Home Prices and Mortgage Rates: 2020-2021**

U.S. home prices surged during the pandemic. Figure 1 presents national home price indices from CoreLogic, Federal Housing Finance Agency (FHFA), and Zillow going back to 2015 (January 2015 = 100). Over the two-year period from 2019:YE to 2021:YE (shaded portion of the figure), home prices were estimated to have increased by 27% (Zillow) to 32% (FHFA).

[Figure 1 here.]

Economists have generally attributed the massive run-up in home prices during the pandemic to three demand-side factors: (i) changes in housing preferences; (ii) unprecedented fiscal transfers; and (iii) monetary policy easing.

### *Housing Preferences*

Housing preferences were markedly altered by the pandemic, as households sought to leave crowded urban areas and move to suburban or rural locations in search of space to work from home. This naturally led to a significant flattening of price and rent gradients within metro areas. Gupta et. al (2021) provide evidence that these relative price changes varied across cities depending on the prevalence of work from home, housing market regulation, and housing supply elasticity. Ramani and Bloom (2021) observe that this effect was strongest in the very largest cities, a phenomenon that Liu and Su (2021) refer to as a reduction in the demand for density. D'Lima, Lopez, and Pradhan (2021) provide property-level evidence consistent with a flattening home price gradient within cities during the pandemic. Mondragon and Wieland (2022) estimate that remote work accounted for over one half of the rise in home prices between December 2019 and November 2021.

### *Fiscal Support*

The U.S. Congress passed the CARES Act in March 2020 which supported and expanded household incomes through a variety of measures. For the housing market, the law included a foreclosure moratorium and forbearance on government-guaranteed mortgages to ensure that homeowners could remain in place.<sup>4</sup> The CARES Act also significantly expanded unemployment insurance benefits and provided economic impact payments (stimulus checks) to most households. These benefits were further extended by the 2021 American Rescue Plan. Figure 2 shows that aggregate household personal income spiked following the passage of these two laws and remained well above its pre-pandemic trend into 2023. Moreover, as documented by Dettling and Lambie-Hanson (2021), there was significant variation in per capita

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<sup>4</sup> While the forbearance mandate formally applied only to government-insured mortgages and those backing Agency MBS, servicers of portfolio and privately securitized mortgages also routinely granted forbearance (An et al., 2021; Cherry et al., 2021).

household income growth across states and counties. Lin (2023) exploits this variation and finds that home prices grew significantly faster in metro areas where residents received larger per-capita payments during 2020-2021.

[Figure 2 here.]

### *Accommodative Monetary Policy*

The Federal Reserve quickly responded to significant financial market disruption at the onset of the COVID-19 pandemic in March 2020, by lowering its federal funds rate target at two unscheduled meetings (March 3rd and 15th) from 1.50-1.75% to 0.00-0.25%. The central bank also announced that it would engage in large-scale purchases of U.S. Treasuries and Agency MBS to support core asset market function. The initial announcement was to increase holdings of Treasury securities by at least \$500 billion and Agency MBS holdings by at least \$200 billion plus reinvest all principal payments received. This directive was amended a week later to increase purchases in amounts needed to support the smooth functioning of these markets. The FOMC modified its approach at its June 2020 meeting, increasing Treasury and Agency MBS purchases to \$80 billion and \$40 billion per month plus reinvestments, respectively. While conditions in these markets quickly improved, the central bank continued purchasing long-term assets to foster broadly accommodative financial conditions. A tapering of asset purchases was announced in November 2021 and there were steady reductions in these amounts until purchases ceased in March 2022. From March 2020 through March 2022, the Federal Reserve increased its Treasury holdings from \$2.6 trillion to \$5.8 trillion and Agency MBS holdings from \$1.4 trillion to \$2.7 trillion.

The Federal Reserve's large-scale asset purchases were intended to drive down long-term Treasury yields and tighten the spread between Agency MBS and long-term Treasury bonds. This, in turn, pushed down mortgage interest rates and allowed most homeowners not in forbearance to refinance their loans and reduce their monthly payments. Figure 3 displays the 10-year Treasury rate, as well as the primary mortgage market rate (paid by homeowners) and the secondary-market rate (paid to UMBS investors) for conventional-conforming loans between January 2020 and June 2023.

[Figure 3 here.]

With the onset of the pandemic in March 2020, 10-year U.S. Treasury rates dipped below 1% for the remainder of that year. Secondary market mortgage rates also fell and tightened to the 10-year owing to the Federal Reserve's large-scale asset purchases. While primary mortgage market rates also declined, their spread to secondary market rates widened as most homeowners refinanced their loans and strained the capacity of originators (Fuster et. al, 2021).<sup>5</sup> The primary-secondary spread normalized in 2021, although the secondary spread to 10-year Treasury rates became historically tight due to continued central bank purchases of Agency MBS. See Frame, et. al (2021) for further discussion.

Liu et al. (2021) provide a sense of the role of the decline in mortgage rates on home price appreciation during the pandemic. The authors note that home prices are very sensitive to interest rates in the canonical "user cost" model of house prices (especially when rates are very low) and could explain the Covid-era experience. However, the authors provide macroeconomic evidence suggesting that the sensitivity of home prices to interest rates is much weaker: a 100-basis point decline in mortgage rates is associated with a roughly 2% increase in home prices. Micro evidence from DeFusco and Paciorek (2017), Adelino, Schoar, and Severino (2022), and Chudik and Kumar (2023) are all in-line with this estimate.

#### **4. U.S. Home Prices and Mortgage Rates: 2022-2023:H1**

Shelter inflation, primarily comprised of growth in rent of primary residence and OER, is an important component of aggregate inflation measures. This is especially true for the consumer price index (CPI) for which 34.4% is attributed to shelter.<sup>6</sup> As noted by Bolhuis, Cramer, and Summers (2022), the way that housing inflation is measured – as the average price growth across all housing occupants and not the average price increase faced by someone looking for housing today – means that past housing market

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<sup>5</sup> Fuster et al (2021) attribute this to a shortage of qualified workers and operational frictions, such as how to complete appraisals and closings while maintaining social distancing.

<sup>6</sup> In the CPI, owners' equivalent rent of primary residence is 24.0% and rent of primary residence 7.5%. The remaining 2.9% is attributed to other shelter components. See: <https://www.bls.gov/cpi/factsheets/owners-equivalent-rent-and-rent.htm>.



developments are driving today's housing inflation. Zhou and Dolmas (2021) similarly discuss how house price growth is a useful predictor of shelter inflation, albeit with a significant lag. Figure 4 shows this by plotting CoreLogic house price growth and CPI growth in rent of primary residence and OER between January 2015 and June 2023. As home prices soared in 2020 and 2021, shelter inflation was muted. However, this changed in 2022 when rents grew rapidly.

[Figure 4 here.]

In response to high and persistent inflation, the Federal Reserve began tightening monetary policy in March 2022 and raised its policy target from 0.00-0.25% to 4.25-4.50% by year-end. (Additional tightening during the first half of 2023 brought the target range up to 5.00-5.25%.) The central bank also started reducing the size of its balance sheet in June 2022 by reinvesting principal payments on maturing holdings only to the extent that they exceed \$30 billion for Treasuries and \$17.5 billion for Agency MBS. These caps rose to \$60 billion and \$35 billion, respectively, in September 2022.

The response of long-term interest rates to this tightening cycle was less pronounced than the rise in the policy rate. Returning to Figure 3, the 10-year Treasury rate started 2022 at about 1.5%, peaked at around 4.2% in late October, and stood at about 3.9% percent at year-end (and June 2023). So, while the federal funds rate target went up 500 basis points the benchmark long-term Treasury rate moved up only 240 basis points.

The average 30-year fixed-rate mortgage began 2022 at 3.1%, peaked in late October of 2022 at 7.1%, and stood at 6.7% at the end of June 2023. While both 10-year Treasury yields and mortgage rates increased during the tightening cycle, their difference was 160 basis points at the start of 2022, widened to as much as 320 basis points in October of 2022, and stood at 290 basis points at mid-year 2023. This widening was driven by secondary market yields which were influenced by the end of the Federal

Reserve's Agency MBS purchases as well as interest rate volatility, which increases the cost of the prepayment option embedded in U.S. mortgages.<sup>7</sup> See Frame and McCormick (2023) for further discussion about increased U.S. interest rate volatility and mortgage rates during 2022.

The rise in primary mortgage rates during 2022 cooled the housing market, with national prices remaining roughly flat during the second half of the year (Figure 1). Prices then started to increase again during the first half of 2023. The resiliency of the housing market is a bit surprising if one leverages past estimates that a 100-basis point move in mortgage rates is negatively associated with a 2% move in home values. In other words, one might have expected that the 360-basis point move in primary mortgage rates between January 2022 and June 2023 would have been accompanied by a roughly 7.2% decline in home prices, other things being equal. One possibility is that the full adjustment has not yet occurred. As show in Figure 5, the spread between capitalization rates (annual rent-to-price ratios) for housing as measured using Zillow data and 10-year Treasury rates stood at 330 basis points as of June 2023 (versus an average of 570 basis points during the five years prior to the pandemic). This is one indication of an overvaluation of housing.

[Figure 5 here.]

Analysts have pointed to some possible reasons for the stickiness in home prices. One is that homeowners with mortgages are paying interest rates that are well below the current market rate, causing what has been referred to as a "lock-in" effect. Figure 6 presents the distribution of 30-year fixed rate mortgage interest rates outstanding as of December 2019 and June 2023. Before the onset of the pandemic in December 2019, the modal mortgage rate was in the range of 3.75-4.00% with much of the mass between that point and 5.00%. As a result of sales and refinancing activity, the distribution moved

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<sup>7</sup> Conceptually, one can think of secondary-market rates as reflecting the sum of a long-term risk-free rate plus the cost of a call option that allows borrowers to prepay their mortgages at any time without penalty. Option values increase with the volatility of the underlying asset value, as greater volatility increases the likelihood that the price of an asset will reach a level that renders the option valuable.

lower. As of June 2023, the modal mortgage rate was in the range of 2.75-3.00% with much of the mass between that point and 4.00%.

[Figure 6 here.]

Holding a long-term fixed rate mortgage with an interest rate well below that currently available is valuable to existing homeowners and reduces their interest in moving. Consistent with this, Figure 7 shows that transactions volumes for existing homes have declined significantly. The figure also provides the “months of supply” of brokerage listings, which is also relatively low by historical standards.<sup>8</sup>

[Figure 7 here.]

A natural market response to the higher home price levels is the construction of new housing units. Figure 8 presents quarterly data for housing permits and starts 2015:Q1 through 2023:Q2. One can clearly see the significant decline in construction activity that occurred with the onset of the pandemic. However, housing supply activity quickly rebounded and accelerated into 2022:Q1, before falling off to pre-pandemic trends. Anecdotally, builders report activity slowing as costs increased for land, labor, and materials owing to inflation plus higher project financing costs.

[Figure 8 here.]

Taken together, U.S. home prices seem to have held up owing to stronger than expected demand due, in part, to continued household income growth and reduced supply of homes on the market associated with the higher interest rate environment.

## **5. Conclusion**

U.S. home prices accelerated rapidly during the Covid pandemic -- climbing about 30% during 2020-2021 -- due to changing household preferences for space,

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<sup>8</sup> The “month’s supply” figure produced by the National Association of Realtors is the number of months it would take for the current inventory of homes on the market to sell given the current sales pace. While often noted in the press as a measure of housing supply, it also reflects demand-side influences.

generous federal income support, and significant monetary accommodation from the Federal Reserve. Historically low interest rates allowed a large fraction of homeowners with mortgages to refinance their long-term fixed rate loans, which freed up additional cash flow and protects them against future interest rate increases. Significant inflationary pressures subsequently emerged and the central bank rapidly tightened monetary policy by raising its target overnight interest rate by 500 basis points during 2022 and the first half of 2023. Despite the associated increase in mortgage interest rates, home prices were remarkably resilient. This seems to be the result of continued income growth and reduced supply of homes on the market associated with the higher interest rate environment.

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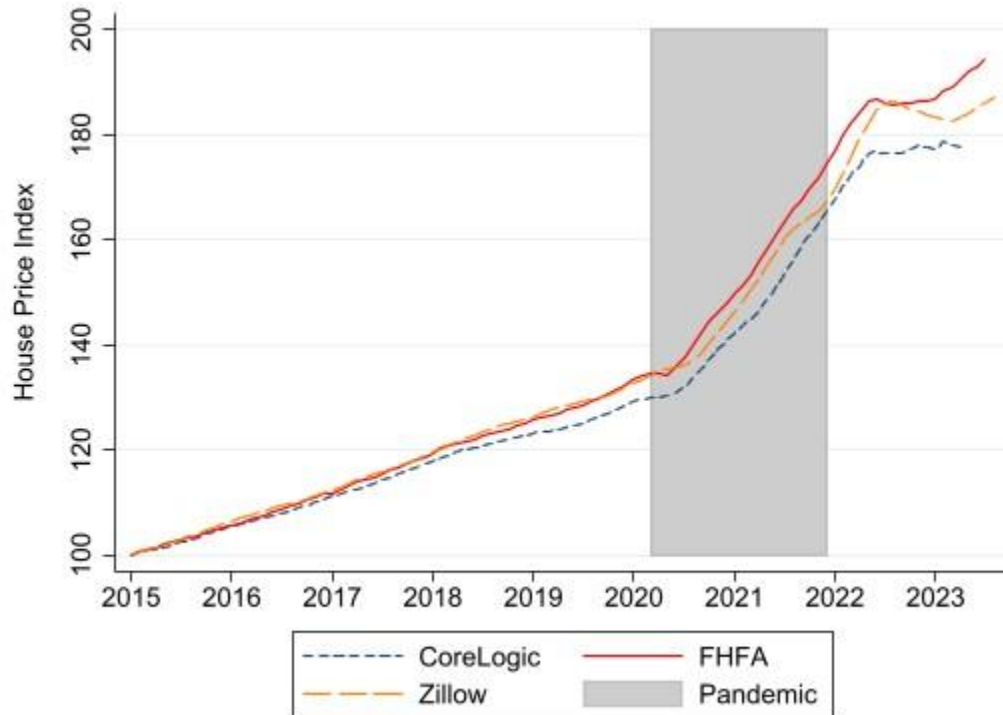
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**Figure 1  
U.S. Home Prices:  
January 2015 through June 2023**

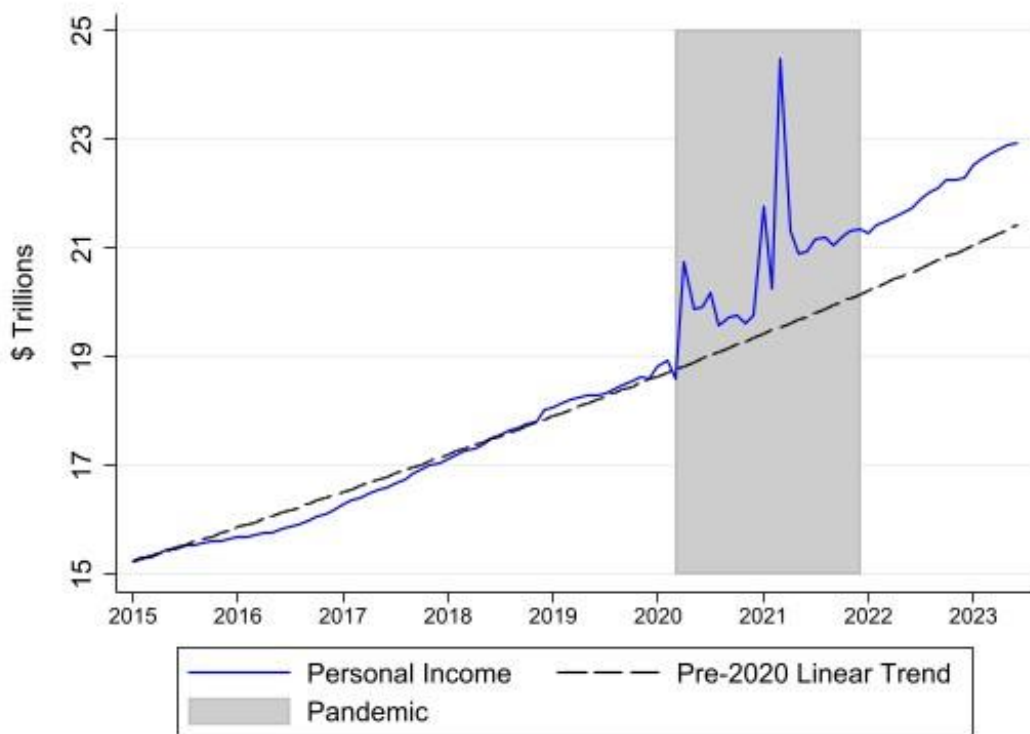
This figure presents monthly U.S. home prices from January 2015 through June 2023 as measured by CoreLogic, Federal Housing Finance Agency (FHFA), and Zillow. Each index is normalized to 100 at the start of the period. The shaded area represents the pandemic period, 2020 and 2021.





**Figure 2**  
**U.S. Household Personal Income:**  
**January 2015 through June 2023**

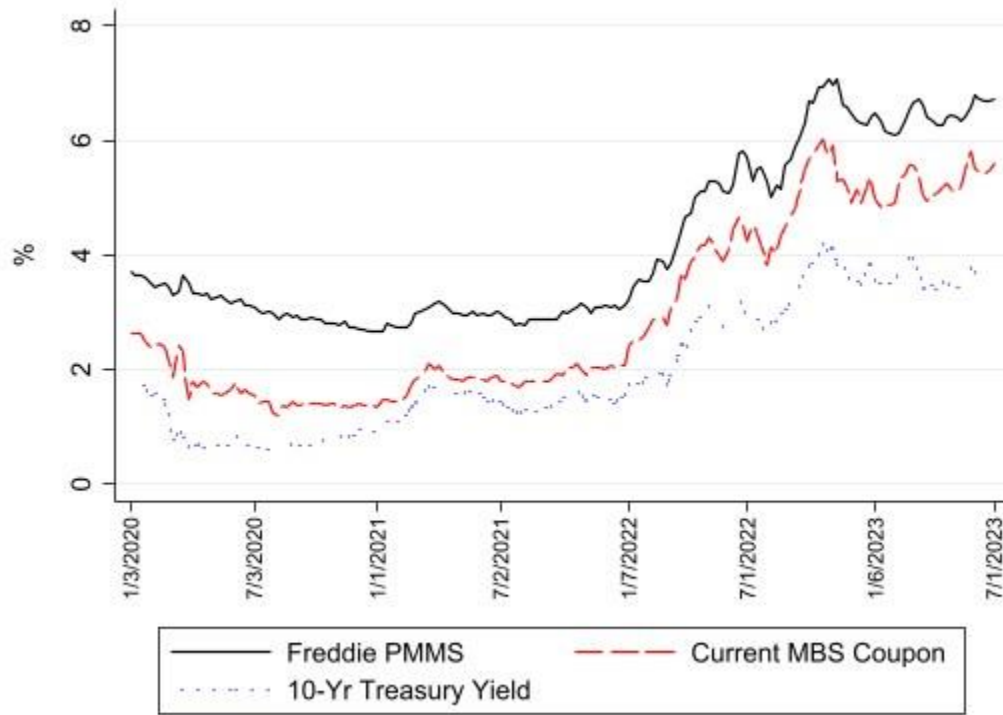
This figure presents monthly U.S. household personal income from January 2015 through June 2023, in trillions of dollars, as measured by the Bureau of Economic Analysis. A linear time trend based on monthly average pre-pandemic income is also provided. The shaded area represents the pandemic period, 2020 and 2021.





**Figure 3**  
**U.S. Primary and Secondary Mortgage Rates Relative to 10-Year Treasuries:**  
**January 2020 through June 2023**

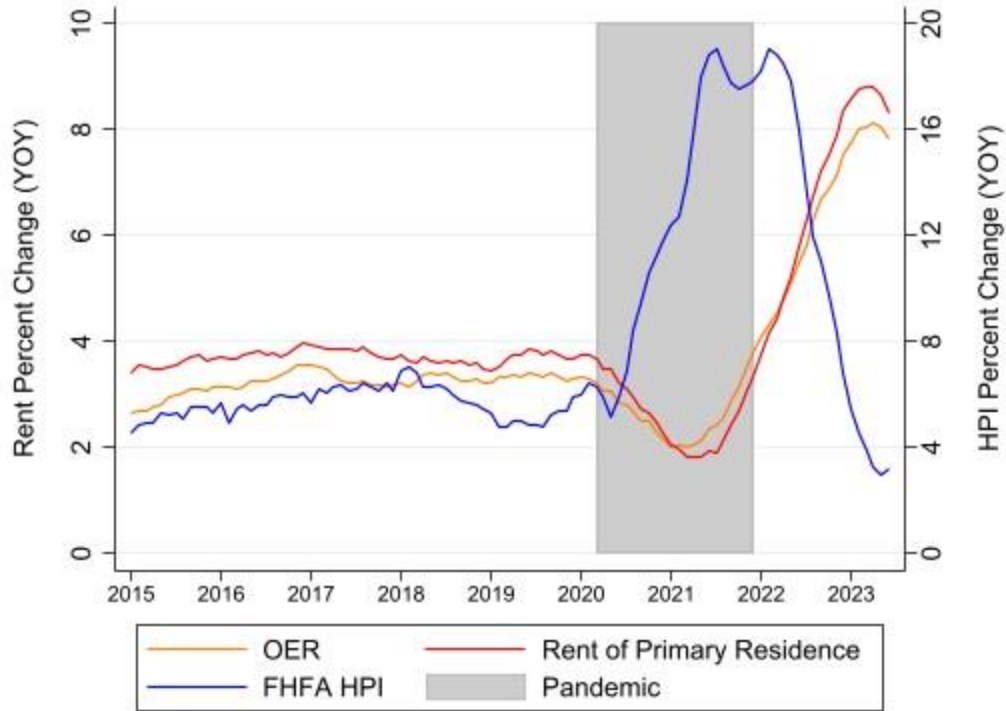
This figure presents weekly data for primary and secondary market mortgage interest rates and 10-year Treasury bonds from January 2020 through June 2023. Primary mortgage rates are from Freddie Mac's Primary Mortgage Market Survey (PMMS); secondary mortgage market rates (current coupon rates) and 10-year Treasury rates are from Bloomberg.





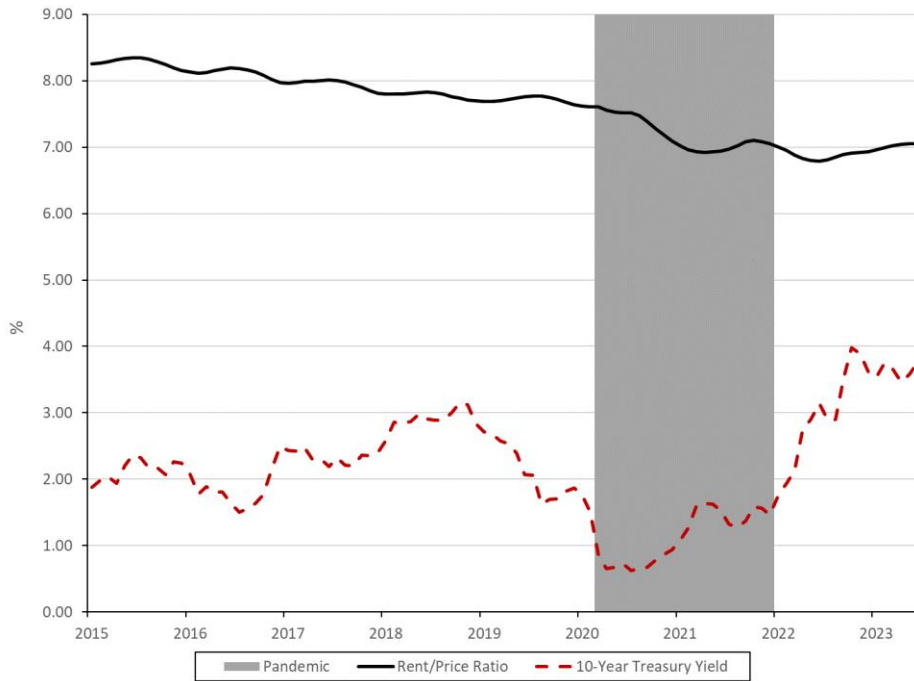
**Figure 4**  
**U.S. Home Price Growth and Shelter Inflation:**  
**January 2015 through June 2023**

This figure presents annualized monthly U.S. home price growth as measured by the Federal Housing Finance Agency (FHFA) and shelter inflation (rent of primary residence and owners' equivalent rent, or OER) from consumer price index from January 2015 through June 2023.



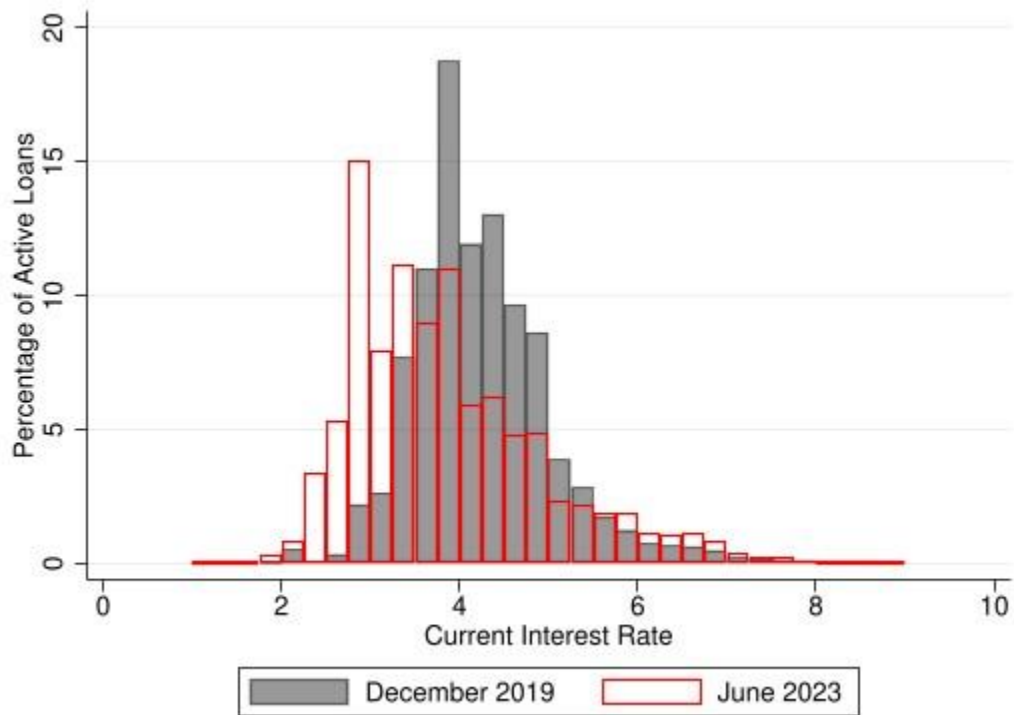
**Figure 5**  
**U.S. Housing Capitalization Rates and 10-Year Treasury Rates:**  
**January 2015 through June 2023**

This figure presents monthly U.S. housing capitalizations rates as measured by Zillow House Price and Rent Series<sup>1</sup> and U.S. Treasury rates from January 2015 through June 2023. The shaded area represents the pandemic period, 2020 and 2021.



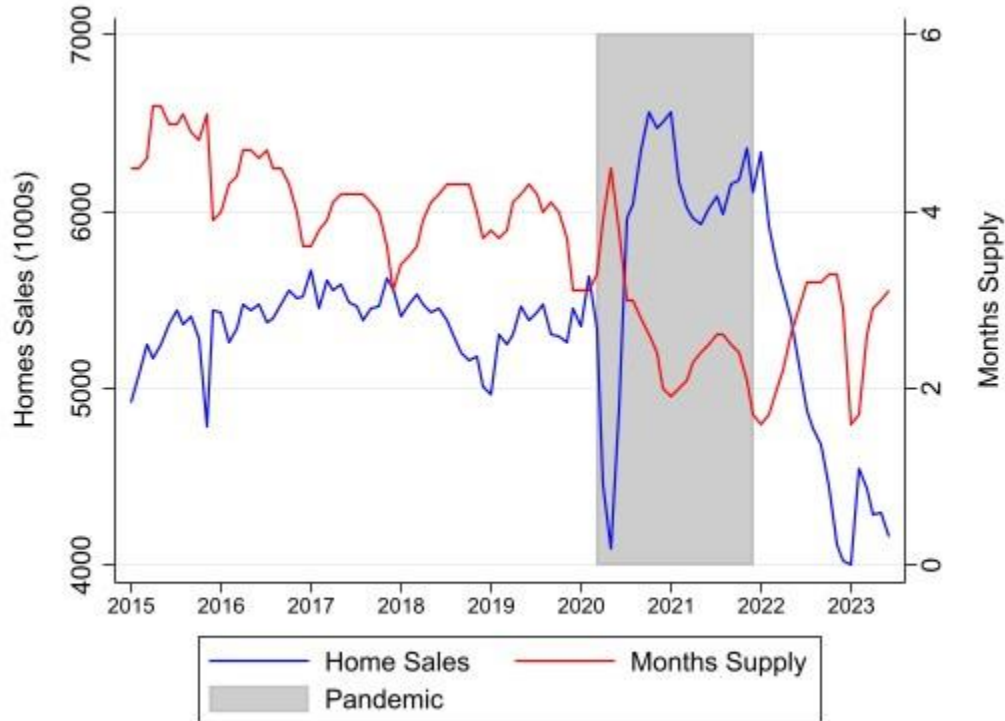
**Figure 6**  
**Distribution of U.S. Fixed-Rate Mortgage Borrower Interest Rates:**  
**December 2019 and June 2023**

This figure presents the distribution of fixed-rate mortgage borrower interest rates as of December 2019 and June 2023. Data is based on loan-level servicing information from McDash Analytics.



**Figure 7**  
**U.S. Existing Home Sales and Months of Supply of Home for Sale:**  
**January 2015 through June 2023**

This figure presents monthly data from the National Association of Realtors on U.S. existing home sales and months of supply of homes for sale from January 2015 through June 2023. Months' supply refers to the number of months it would take for the current inventory of homes on the market to sell given the current sales pace.



**Figure 8  
U.S. Housing Permits and Starts:  
January 2015 through June 2023**

This figure presents monthly U.S. housing permits and starts, in thousands, from January 2015 through June 2023 as measured by the Bureau of Census. The shaded area represents the pandemic period, 2020 and 2021.

