US Housing Outlook:
A housing recovery has started, driven by low supply and pent-up demand boosted by falling mortgage rates

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A housing recovery has started driven by:

1. Low housing supply
2. Pent-up demand boosted by falling mortgage rates
3. Decent job growth
4. Robust wage growth
5. Still some excess savings left

Source: Apollo Chief Economist
Leading indicators of the housing market
Home price inflation rebounding

Source: Haver Analytics, BLS, S&P, Apollo Chief Economist
Rent inflation rising in small cities and elevated in large cities

Source: BLS, Haver Analytics, Apollo Chief Economist
Rebound coming in housing inflation

Source: BLS, S&P Case-Shiller, Zillow, Haver Analytics, Apollo Chief Economist
100 largest US cities: Share of cities with positive rent growth is rising

Source: Apartmentlist.com, Apollo Chief Economist
Mortgage purchase applications have started to recover
Residential new listings starting to rebound

The Fed starts raising rates

Source: Redfin, Haver Analytics, Apollo Chief Economist.
The jump in housing starts points to a jump in new home sales.

Source: Census Bureau, Haver Analytics, Apollo Chief Economist
Traffic of prospective homebuyers bottoming out

Source: National Association of Homebuilders, Bloomberg, Apollo Chief Economist
New home sales steady
Home price inflation solid because of low inventory of homes for sale

Source: American Enterprise Institute, Haver, Apollo Chief Economist
Home price inflation solid because of low inventory of homes for sale

Source: NAR, Haver, Apollo Chief Economist
Homebuyer and homebuilder confidence bottoming
If homebuilder confidence rebounds over the coming months because of the Fed pivot, residential investment will also rebound.
Very low inventory of homes for sale

Source: Realtor.com, Apollo Chief Economist
Investors account for 16% of all home purchases, down from 20% in 2022.

Source: Redfin, Apollo Chief Economist. Definition of Investor market share: the percentage of total home sales in which an investor was the buyer.
ARM share of total mortgage applications has declined recently.
Existing housing inventory starting to rise

Source: NAR, Apollo Chief Economist
Total housing inventory per person continues to decline

Source: Census Bureau, FRED, Apollo Chief Economist
Almost 40% of US homes don’t have a mortgage
Low inventory boosting housing starts despite low affordability

Source: Bloomberg, Apollo Chief Economist
Distribution of interest rates on outstanding mortgages

Distribution of mortgages outstanding, by interest rates

Q2 2021  Q2 2022  Q2 2023  Q3 2023

<table>
<thead>
<tr>
<th>Interest Rate Range</th>
<th>Q2 2021</th>
<th>Q2 2022</th>
<th>Q2 2023</th>
<th>Q3 2023</th>
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<tr>
<td>Below 3%</td>
<td>19</td>
<td>23</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>3 to 4%</td>
<td>40</td>
<td>39</td>
<td>36</td>
<td>28</td>
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<tr>
<td>4 to 5%</td>
<td>25</td>
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<td>5 to 6%</td>
<td>10</td>
<td>9</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Above 6%</td>
<td>6</td>
<td>6</td>
<td>9</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: FHFA, Apollo Chief Economist
Effective outstanding mortgage rate is 3.8%

Source: Freddie Mac, BEA, Bloomberg, Apollo Chief Economist. The effective interest rate (%) reflects the amortization of initial fees and charges over a 10-year period, which is the historical assumption of the average life of a mortgage loan.
Monthly mortgage payment on a new mortgage has risen recently

Source: Bloomberg L.P., Apollo Chief Economist (Note: Calculation of monthly payment using the 30-year purchase loan application size and the 30-yr effective rate.)
Record-low number of homeowners are refinancing their mortgage at the moment.
Structural decline in the share of the US population moving to a new address

Source: Census CPS, Apollo Chief economist
A very low share of households are planning to move

Source: FRB of NY, Haver Analytics, Apollo Chief Economist
US has an estimated deficit of 2.5mn homes
New versus existing homes
House prices for new homes and existing homes

Source: Census, Apollo Chief Economist
New privately owned housing units under construction starting to peak

Source: Census Bureau, Haver Analytics, Apollo Chief Economist
Consensus is forecasting a modest rebound in home sales

Source: Census Bureau, NAR, Haver, Apollo Chief Economist; Forecast is Bloomberg consensus
Our US house price model
US house price model: Declining mortgage rates pushing home prices higher. Low inventory pushing home prices higher.

\[ \text{US home price (YoY, t)} = 25.49 - 3\times\text{mortgage rates (12 m change, t-12)} - 5.2\times\text{Existing home sales inventory (t)} - 1.6\times\text{Unemployment rate (t)} \]
1) Housing Demand: Higher mortgage rates and high home prices slowing demand
Home buying plans declined amid high mortgage rates
Monthly mortgage payments on new mortgages have doubled since 2021

Source: NAR, Haver Analytics, Apollo Chief Economist
Availability of mortgage credit at tight levels

Source: Mortgage Bankers Association, Bloomberg, Apollo Chief Economist
Mortgage originations back at pre-pandemic levels

Source: NY Fed, Bloomberg, Apollo Chief Economist
Mortgage originations normalizing for households with high credit scores

Source: NY Fed, Bloomberg, Apollo Chief Economist
Demographics are a tailwind to housing demand

Source: Census Bureau, Apollo Chief Economist
Rebounding household formation is a tailwind to housing

Source: Census Bureau, Haver, Apollo Chief Economist
Decline in the number of renters recently

Source: Census Bureau, Haver, Apollo Chief Economist
Homeownership rate moving sideways

Source: Bloomberg, Apollo Chief Economist
Low unemployment is a tailwind to housing demand

Source: BLS, Haver Analytics, Apollo Chief Economist
Very few delinquent mortgages

Source: Bloomberg, Apollo Chief Economist
First time homebuyers are feeling pinch of high interest rates

Source: American Enterprise Institute, Haver Analytics, Apollo Chief Economist (Note: The First-time Buyer Mortgage Default Rate (FBMDR) is calculated using the same methodology as for the National Mortgage Default Rate (NMDR). The only difference is that the set of included loans is restricted to first-time buyers. It uses the default experience of loans originated in 2007 as a benchmark to quantify how new mortgage loans would perform if they were hit with a market collapse on par with the recent crisis. The index classifies loans as low-risk, medium-risk, and high-risk.)
Investor share of single-family has trended lower as mortgage rates have increased.
Migration out of California and migration into Florida during the pandemic

States by net domestic & international migration (April 1, 2020 - July 1, 2023)

Thousands of residents

Source: Census Bureau, Apollo Chief Economist
Share of mortgages outstanding by interest rate

Share of mortgages outstanding by interest rate at origination by count, 2023 Q3

- Below 3%: 24
- 3 to 4%: 19
- 4 to 5%: 12
- 5 to 6%: 17
- Above 6%: 28

Source: FHFA, Apollo Chief Economist
Despite high mortgage rates, 31% of homes sold above their list price
Housing affordability near record lows

Source: Bloomberg, Apollo Chief Economist
Homebuyer sentiment

Current Conditions for Buying Houses: Bad: High Prices

Source: University of Michigan, Apollo Chief Economist
63% of consumers are saying that this is a bad time to buy a house because of high mortgage rates and tight credit.
2) Housing Supply: Housing supply is low, construction coming down from record-high levels
Listings starting to rise

Weekly active listings

Source: Realtor.com, Apollo Chief Economist
Homeowner and rental vacancy rates at very low levels
Residential construction spending starting to rise again

Source: Census, Apollo Chief Economist
New housing units authorized but not started

Source: FRED, Apollo Chief Economist
The biggest increase in non-residential construction has been in manufacturing.
Newly listed homes very low

Source: Realtor.com, Apollo Chief Economist
Vacant housing units held off market coming down
Decline in the number of new houses for sale under construction

Number of new houses for sale

- New single family houses for sale at end of period
- Under construction
- Not started
- Completed units

Source: Census Bureau, Apollo Chief Economist
Intent of housing starts

Source: US Census Bureau, Apollo Chief Economist
Some disconnect between housing under construction and new homes sold.
Multifamily delinquencies rising

Source: Bloomberg, Apollo Chief Economist
Residential investment as a share of real GDP declined to 3.3% from 9% in 1964.

Source: BEA, Haver Analytics, Apollo Chief Economist
63% of all mortgages outstanding were issued after 2018

Share of active US mortgages by issue date

Source: Bloomberg, Apollo Chief Economist. Note: Data comes from MTGS <GO> screen on Bloomberg
Fewer bidding wars recently

Source: NAR, Apollo Chief Economist
Seasonal increase in the inventory of homes for sale
Disconnect between mortgage rates and home prices

Source: Bloomberg, Apollo Chief Economist
It currently takes 8 months on average to build a single-family house.
3) House Prices: Home price inflation not yet impacted by higher mortgage rates
Median home sales price now $413.2K

Source: Census Bureau, Apollo Chief Economist
House price inflation stabilizing across price tiers

Source: American Enterprise Institute, Haver, Apollo Chief Economist
Home price to rent ratio significantly above 2006 levels

Source: FHFA, BLS, Apollo Chief Economist. Note: the series is indexed ratio of FHFA monthly purchase only house price index divided by the OER component of the CPI.
Consumers’ expectations of home price inflation

Source: University of Michigan, Haver Analytics, Apollo Chief Economist
Median sales price well above last year’s levels

Source: Redfin, Haver Analytics, Apollo Chief Economist
4) Housing Outlook: High mortgage rates, high home prices, strong supply pipeline, and high building costs are risks to this housing cycle
Housing construction costs are high

Source: Bureau of Labor Statistics, Apollo Chief Economist
Inflation in input costs for home builders rising

Source: Bureau of Labor Statistics, Apollo Chief Economist
Manhattan median rent declined to $4009 in December 2023
Manhattan rent growth slowing

Source: Elliman, Apollo Chief Economist
Manhattan rents still above pre-pandemic levels

Source: Elliman, Apollo Chief Economist
Rising mortgage rates generally associated with lower home price inflation

Source: FRED, Apollo Chief Economist
New foreclosures, by age of homeowner

Source: FRBNY Consumer Credit Panel, Equifax, Haver Analytics, Apollo Chief Economist
Median distance between the home that recent buyers purchased and the home they moved from at 50 miles in 2022.

Source: NAR, Apollo Chief Economist
Home improvement spending remains at high levels
Areas that need to build more houses to keep up with the increased demand.

Source: NAR, Apollo Chief Economist
Comparing the current housing slowdown to previous housing slowdowns
The current decline in existing home sales is in line with previous housing slowdowns.
The current rise in mortgage rates is similar to what we saw during the Volcker disinflation.
The current decline in housing starts follows the pattern of previous slowdowns.
This is the fastest Fed-driven housing slowdown on record

Change in existing single-family home sales during Fed tightening cycles

Source: NAR, Haver Analytics, Apollo Chief Economist
Homebuyers are getting older

Source: NAR, Apollo Chief Economist
The median age of all homebuyers is now 49 years old, up from 31 in 1981

Source: NAR, Apollo Chief Economist
Apartment vacancies are back above pre-pandemic levels

Source: Apartmentlist.com, Apollo Chief Economist
When the Fed raised interest rates employment in retail trade declined.
US apartment supply increasing

Source: US Census Bureau, Haver Analytics, Apollo Chief Economist
The average family size in the US has declined from 3.3 in 1960 to 2.5 by 2023.

Source: Census Bureau, Apollo Chief Economist.
Torsten Slok joined Apollo in August 2020 as Chief Economist and he leads Apollo's macroeconomic and market analysis across the platform.

Prior to joining, Mr. Slok worked for 15 years as Chief Economist at Deutsche Bank where his team was top ranked in the annual Institutional Investor survey for a decade. Prior to joining Deutsche Bank Mr. Slok worked at the IMF in Washington, DC and at the OECD in Paris.

Mr. Slok has a Ph.D in Economics and has studied at the University of Copenhagen and Princeton University.