

## US Economics Analyst

## Mid-Year Housing Outlook: Two Steps Forward, One Step Back (Walker)

- Residential investment jumped 15% annualized in Q1, but the rebound in interest rates since the start of the year and the prospect that they will remain elevated present headwinds to the economy's most interest rate sensitive sector. In this week's *Analyst*, we review our key forecasts for the housing market for the rest of the year.
- Sustained higher mortgage rates will continue to have their most pronounced impact on housing turnover, and the recent run-up in rates is likely to push existing home sales lower in the coming months. 95% of mortgage borrowers have interest rates below current market rates, and almost 80% have rates 2pp below market rates, strongly disincentivizing them from moving. As a result, we expect the fewest annual existing home sales since the early 1990s at just under 4.1mn.
- Limited available housing supply has kept single-family homebuilding extremely resistant to higher interest rates: despite 3pp higher mortgage rates today, single-family housing permits were 13% above 2019 levels in April. However, the same constraints that led to the housing shortage, including a lack of available plots to build on and a shortage of construction workers, also limit the upside to single-family starts. We expect single-family housing starts to rise only very modestly on net by year-end (to 1.05mn annualized in 2024Q4, +1.5% vs. April).
- We expect housing demand to remain firm, reflecting supportive demographic trends and a healthy labor market. The combination of modestly higher supply growth and firm demand should result in only a modest increase in the homeowner vacancy rate (GS forecast 1.1% for 2025Q4 vs. 1.4% in 2019). Against the backdrop of a still-tight but easing housing market, we expect national home prices to rise 3.9% December-over-December this year.
- While single-family homebuilding will likely remain elevated, multifamily construction is likely to fall further this year and multifamily starts are likely to remain depressed around current levels. The backlog of multifamily units already under construction is 50% greater than in 2019, and the pipeline for new projects has already begun to narrow. As a result of fewer multifamily starts, we expect total housing starts to total 1.38mn in 2024 vs. 1.42mn in 2023.
- We forecast residential fixed investment (RFI) growth of -2% and -4% annualized in 2024Q2-Q3, reflecting declines in existing home sales and multifamily

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homebuilding. Thereafter, we expect activity to rebound and to reach a +2.5% growth pace by mid-2025. This implies RFI growth of +2.1% in 2024 on a Q4/Q4 basis, vs. our previous forecast of +5.6%, and we have lowered our 2024 real GDP growth forecast by 0.1pp to +2.3% on a Q4/Q4 basis (or +2.7% on a full-year basis).

## Mid-Year Housing Outlook: Two Steps Forward, One Step Back

Residential fixed investment (RFI) jumped 15% annualized in Q1, the largest increase since 2020, but the rebound in mortgage rates since the start of the year and the prospect that they will remain elevated present headwinds to the economy's most interest rate sensitive sector. In this week's *Analyst*, we take stock of our key forecasts for the housing market for the rest of the year.

**Exhibit 1: GS Housing Forecasts**

| Indicator                                  | Housing Forecasts |              |              |              |              |              |              |
|--|-------------------|--------------|--------------|--------------|--------------|--------------|--------------|
|  | Annual Average    |              |              | 2024         |              |              |              |
|  | 2023              | 2024         | 2025         | Q1           | Q2           | Q3           | Q4           |
| Real Residential Fixed Investment (QoQ ar) | <b>0.4</b>        | <i>2.1</i>   | <i>2.1</i>   | <b>15.4</b>  | <i>-2.0</i>  | <i>-4.0</i>  | <i>0.0</i>   |
| Housing Starts (Thous. SAAR)               | <b>1,421</b>      | <i>1,383</i> | <i>1,453</i> | <b>1,403</b> | <i>1,382</i> | <i>1,369</i> | <i>1,377</i> |
| <i>Single-family Starts (Thous. SAAR)</i>  | <b>949</b>        | <i>1,043</i> | <i>1,073</i> | <b>1,060</b> | <i>1,031</i> | <i>1,036</i> | <i>1,047</i> |
| <i>Multifamily Starts (Thous. SAAR)</i>    | <b>473</b>        | <i>339</i>   | <i>381</i>   | <b>343</b>   | <i>351</i>   | <i>333</i>   | <i>330</i>   |
| Existing Home Sales (Thous. SAAR)          | <b>4,101</b>      | <i>4,084</i> | <i>4,237</i> | <b>4,200</b> | <i>4,055</i> | <i>3,997</i> | <i>4,084</i> |
| New Home Sales (Thous. SAAR)               | <b>666</b>        | <i>684</i>   | <i>768</i>   | <b>653</b>   | <i>662</i>   | <i>692</i>   | <i>730</i>   |
| Homeowner Vacancy Rate (%)                 | <b>0.8</b>        | <i>0.9</i>   | <i>1.1</i>   | <b>0.8</b>   | <i>0.9</i>   | <i>1.0</i>   | <i>1.0</i>   |
| Case-Shiller Home Price Index (QoQ ar)*    | <b>5.6</b>        | <i>3.9</i>   | <i>4.4</i>   | <b>4.3</b>   | <i>3.7</i>   | <i>2.9</i>   | <i>4.1</i>   |
| Primary Mortgage Rate (% EOP)**            | <b>6.6</b>        | <i>6.6</i>   | <i>6.3</i>   | <b>6.8</b>   | <i>6.9</i>   | <i>6.7</i>   | <i>6.6</i>   |

Note: Published figures in bold. Red, italicized numbers denote GS forecasts.

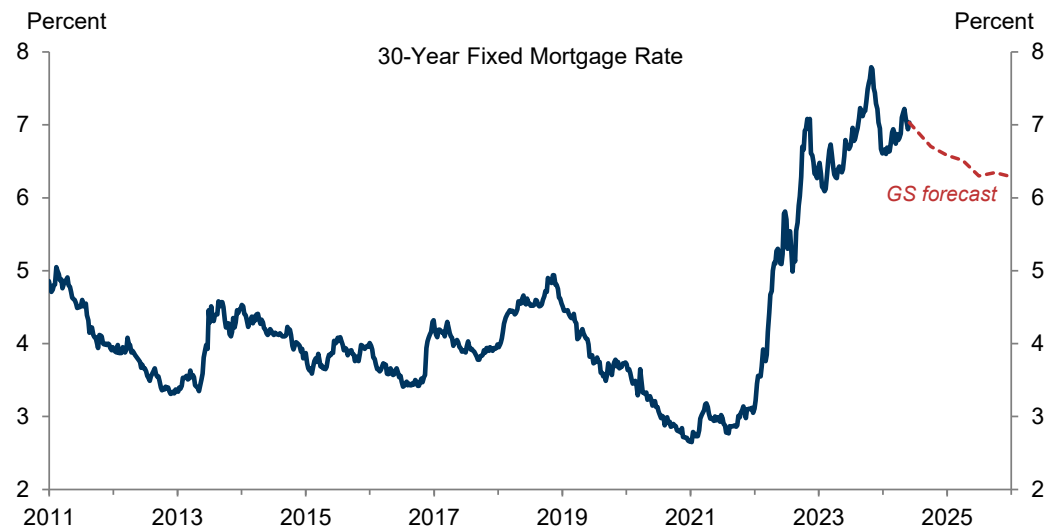
\* Annual values are the seasonally adjusted year-over-year rates for December.

\*\* Annual values are EOP.

Source: Department of Commerce, National Association of Realtors (NAR), Standard and Poor's, Freddie Mac, Goldman Sachs Global Investment Research

### The Year-to-Date Rebound in Rates Will Slow Turnover Modestly Further

The sharp decline in mortgage rates at the end of last year led to a pop in existing home sales at the start of this year. However, the prospect of a later start to the Fed's cutting cycle has pushed interest rates higher across the curve since the start of this year. Exhibit 2 shows that mortgage rates have increased by almost 50bp since their trough in January, and our strategists expect them to remain elevated for the foreseeable future, dipping to just 6.6% at end-2024 and 6.3% at end-2025.

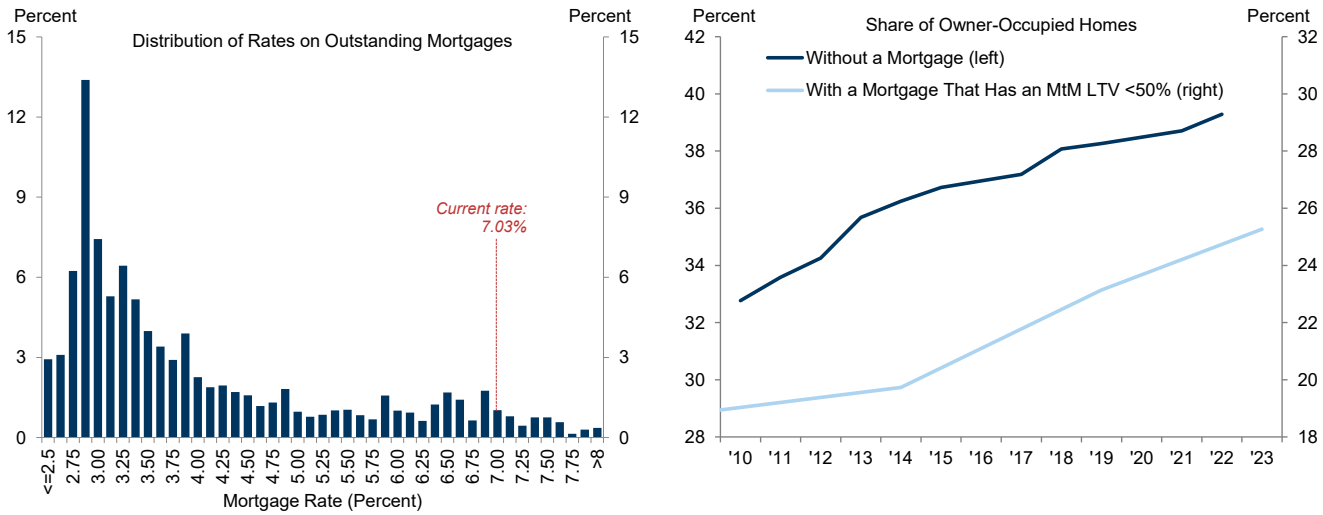
**Exhibit 2: Mortgage Rates Have Rebounded Almost 50bp Since the Start of the Year**

Source: Freddie Mac, Goldman Sachs Global Investment Research

Sustained higher mortgage rates will continue to have their most pronounced impact on housing turnover, and the recent run-up in rates is likely to push existing home sales lower in the coming months. The left panel of Exhibit 3 shows that 95% of mortgage borrowers have interest rates below current market rates, and that almost 80% have rates more than 2pp below market rates. The combination of mortgage borrowers refinancing at low rates en masse and the high current level of mortgage rates has created a significant implicit financial cost to moving, as buying a new home would require them to prepay their current mortgage and take out a new mortgage at a significantly higher rate.

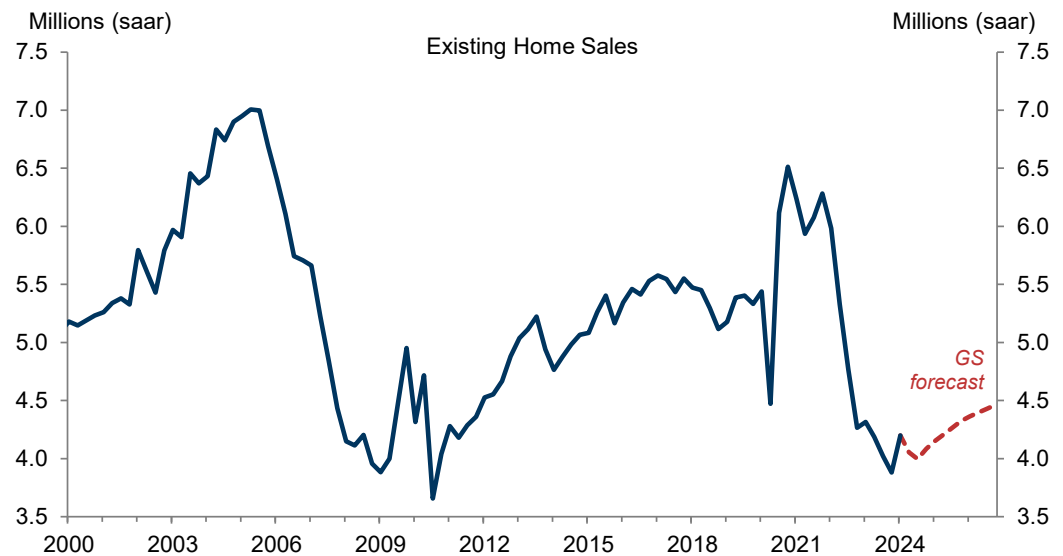
That said, the distribution of rates on outstanding mortgages can overstate the impact of the “lock-in” effect because it only describes a subset of homeowners. The right panel of Exhibit 3 shows that the share of homeowners without a mortgage or with a low remaining balance on their mortgage—both of which lower the financial disincentive to move—has increased meaningfully over the last decade. Nevertheless, we expect the lock-in effect to push existing home sales even lower in the coming months and to limit the magnitude of any rebound in the coming years: we expect existing home sales to total just under 4.1mn in 2024, the lowest level since the early 1990s.

**Exhibit 3: Nearly All Borrowers Have Mortgage Rates Well Below Current Market Rates, Although a Higher Share of Homeowners Without a Mortgage Dampens that Financial Disincentive to Move**



Source: eMBS, Department of Commerce, Black Knight, Goldman Sachs Global Investment Research

**Exhibit 4: We Expect Existing Home Sales to Decline Further in the Coming Months but to Rebound Before Year-End**



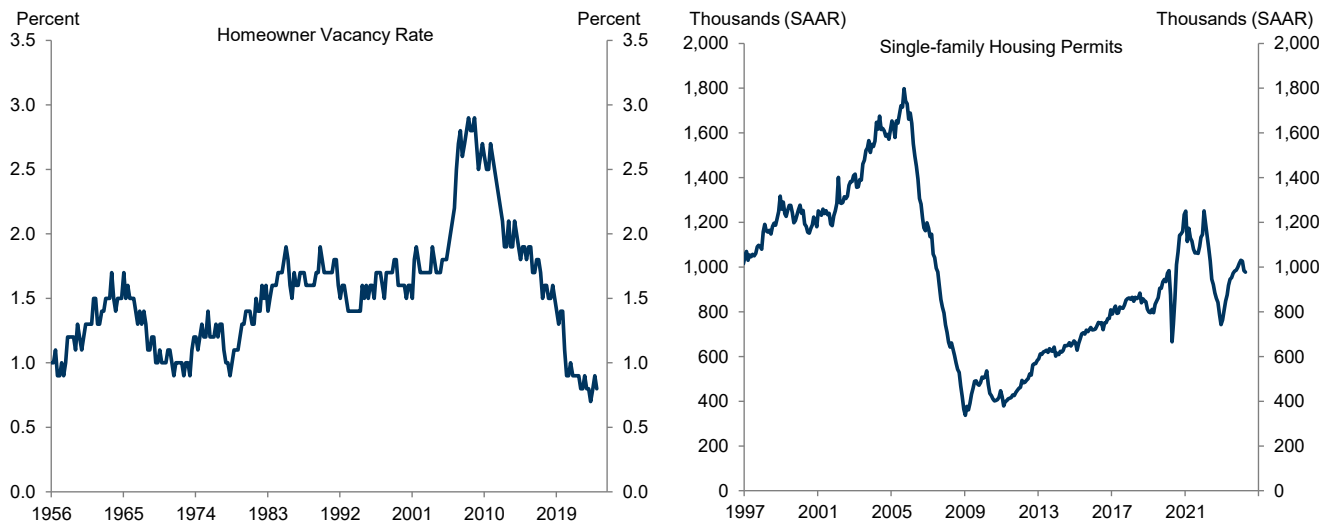
Source: National Association of Realtors (NAR), Goldman Sachs Global Investment Research

While a more moderate pace of existing home sales will weigh sharply on the *gross* supply of available homes, it should have limited implications for *net* housing supply and the longstanding nationwide housing shortage, as households are often simply switching between housing units (i.e. no housing units are being created or destroyed). Still, turnover does have meaningful implications for GDP, as fewer existing homes sales will weigh on residential fixed investment via reduced brokers' commissions (which hold a 16% weight in RFI).

### Single-family Homebuilding: Resilient but Rangebound

Two years ago, we [argued](#) that extreme tightness in the housing market would dampen the hit to housing activity from higher interest rates. Our analysis suggested that when the homeowner vacancy rate is low—as it was then and still is today (Exhibit 5, left panel)—the sensitivity of housing starts to mortgage rates is sharply reduced. Because financing costs are a small share of construction costs, homebuilders normally slow construction when interest rates increase in anticipation of weaker demand, not as a result of higher costs. But when housing supply is tight, like it is today, housing demand is likely to remain strong despite higher interest rates, and homebuilders can keep building because they should have little fear that homes will sit unsold after completion. And indeed, the right panel of Exhibit 5 shows that single-family housing permits were 13% above 2019 levels in April.

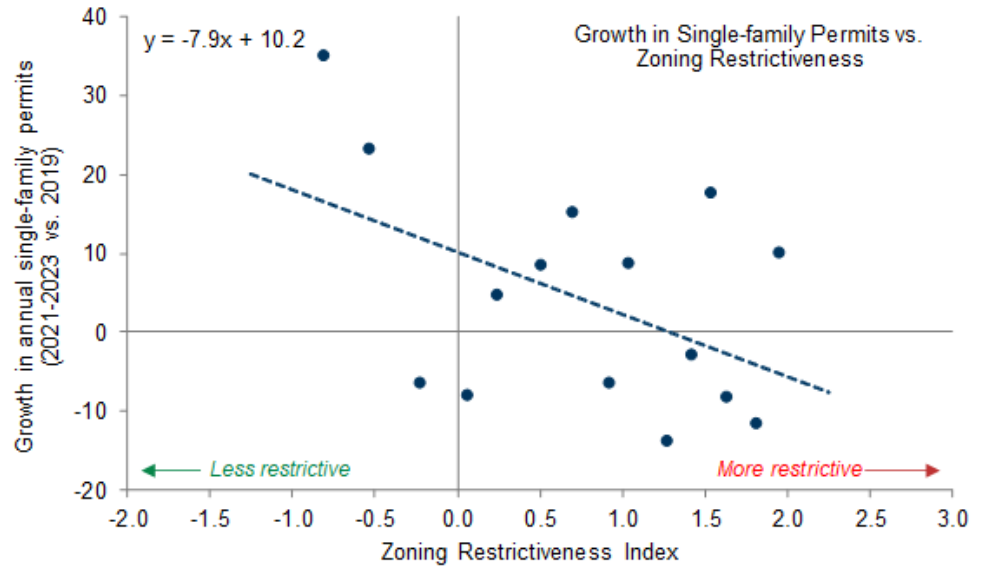
**Exhibit 5: The National Housing Shortage Has Kept Single-family Housing Permits 13% Above 2019 Levels Despite Much Higher Mortgage Rates**



Source: Department of Commerce, Goldman Sachs Global Investment Research

However, the same constraints on homebuilding that led to the housing shortage and reduced its sensitivity to rates also limit the upside to single-family starts. Homebuilders continue to face a shortage of available plots to build on—in part due to stringent [land-use regulations](#)—and a [shortage of construction workers](#). Exhibit 6 shows that homebuilding has risen the least over the last four years in the metro areas with the most restrictive land-use regulations, a relationship that holds even after accounting for home price growth. Exhibit 7 shows that the number of residential construction workers remains extremely low relative to the number of ongoing construction projects. The shortage of construction workers and continued—albeit less extreme—supply chain disruptions have contributed to sharply longer build times (Exhibit 8).

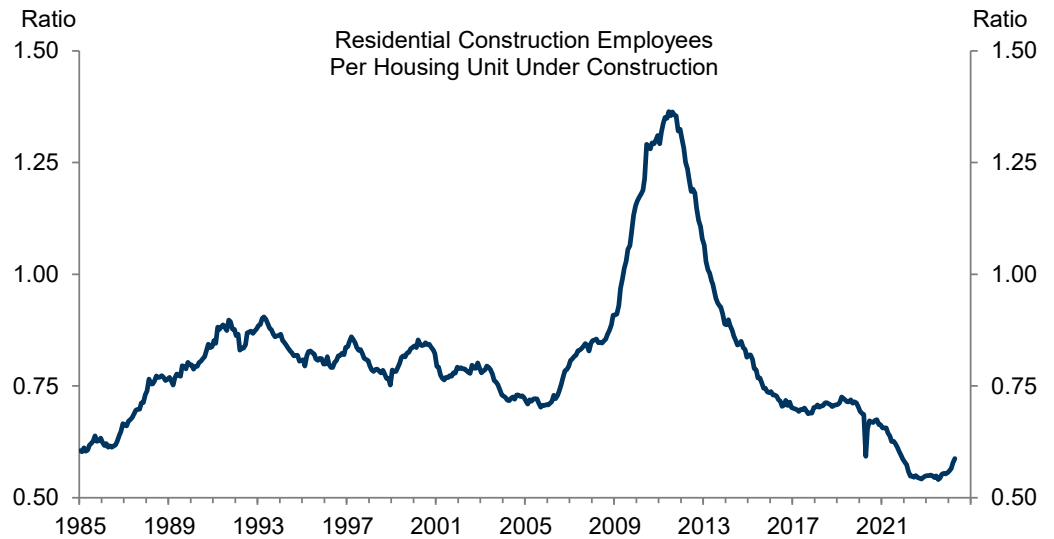
**Exhibit 6: Homebuilding Activity Has Increased Less in Recent Years in Metros with More Stringent Land-Use Regulations**



Includes metros that authorize 50+ single-family units per year, but results are similar across different cutoffs. Results are qualitatively similar when controlling for changes in home prices. Scatter is binned, regression line based on the full dataset.

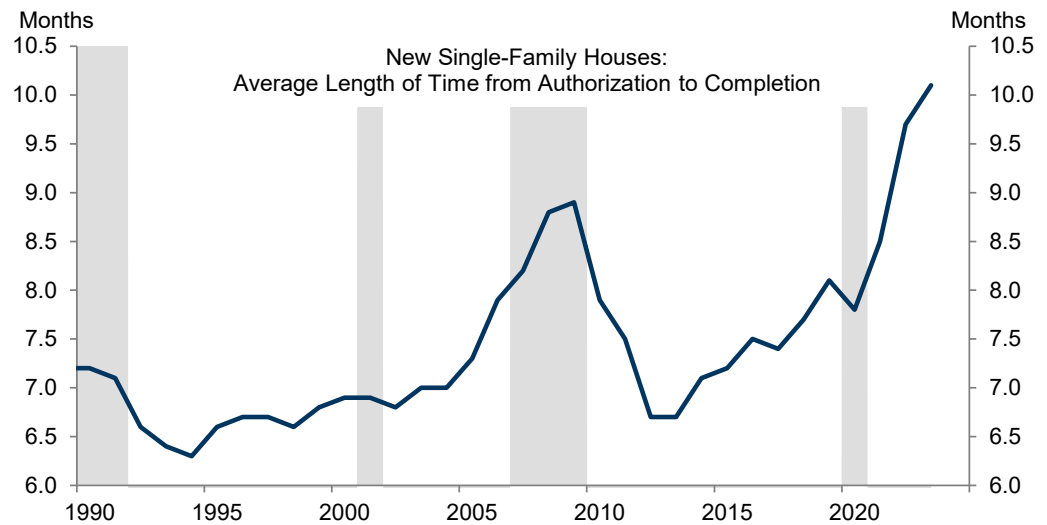
Source: National Zoning and Land Use Database, Department of Commerce, Goldman Sachs Global Investment Research

**Exhibit 7: Most Construction Projects Remain Understaffed**



Source: Department of Commerce, Department of Labor, Goldman Sachs Global Investment Research

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**Exhibit 8: Build Times Are 25% Longer Than in 2019**

Source: Department of Commerce, Goldman Sachs Global Investment Research

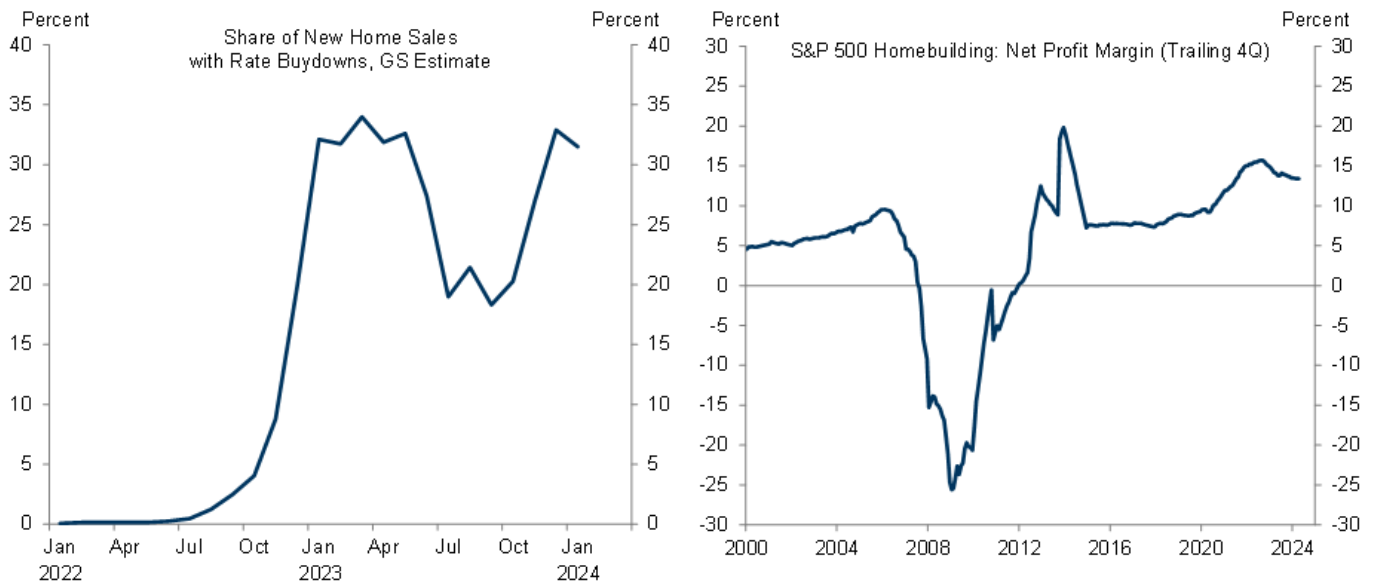
The increased use of [mortgage rate buydowns](#)—temporary interest rate reductions offered alongside the purchase of a new home to ease borrowers into the full mortgage payment for the beginning of a loan term<sup>1</sup>— could signal weakening homebuying demand amidst strained affordability. While there is limited information about the prevalence of rate buydowns, [loan-level information from Ginnie Mae](#) suggests that roughly a third of new home sales feature a rate buydown (Exhibit 9, left panel).

We're not too concerned by the prevalence of rate buydowns for two reasons. First, homebuyers receiving a buydown must qualify for the full interest rate, meaning that the buyers would still be able to afford the home without the buydown. Second, even though homebuilders bear the cost of the buydowns, the right panel of Exhibit 9 shows that homebuilder margins are still quite elevated, which suggests that they have room to lower prices if demand softened. As a result, buydowns appear to be more of a marketing tool to offset the salience of high mortgage rates than an infusion of affordability in response to weaker demand.

<sup>1</sup> Temporary mortgage rate buydowns tend to last up to three years, and the mortgage rate to the borrower rises over that period. Generally speaking, they follow a structure named "2-1" or "3-2-1". In the case of a "2-1" as an example, the interest rate paid by the borrower is lowered by 2pp for the first year and 1pp in the second year and then rises to the full interest rate. The borrower is underwritten to the fully-indexed rate. The remaining interest not paid by the borrower is usually fully-funded into a custodial account at closing by a home builder, seller, or lender of the home. The "3-2-1" temporary buydown is the maximum allowed for conventional loans in the GSEs' selling guides.



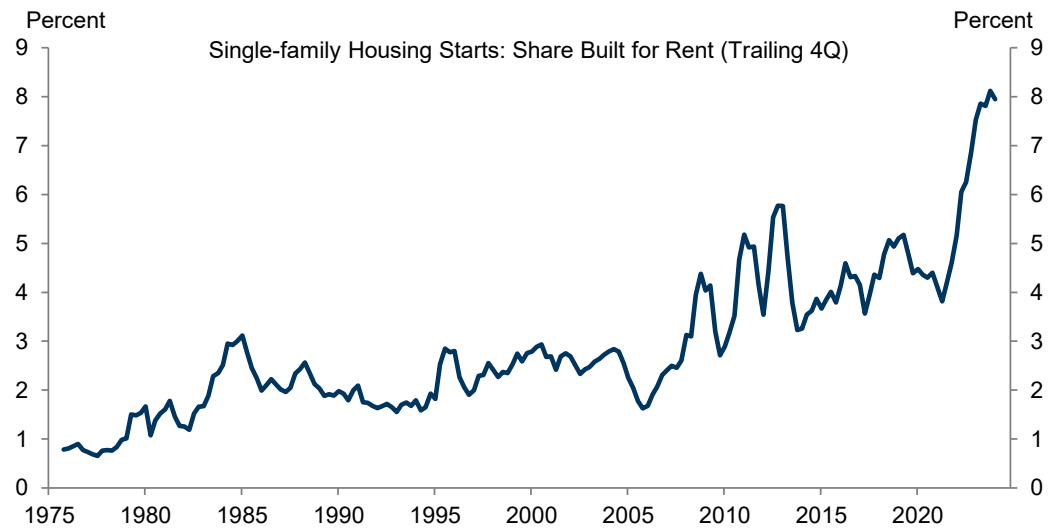
**Exhibit 9: A Third of New Home Sales Utilize Rate Buydowns; but with Homebuilder Margins Double Their Pre-Pandemic Levels, We Don't View Buydowns as a Sign of Softening Demand**



Source: eMBS, Department of Commerce, Company data, Goldman Sachs Global Investment Research

We continue to expect housing demand to remain resilient in the face of higher rates for two reasons. First, tight supply is likely to continue to make housing demand less sensitive to higher rates, as it has been so far. Second, because even if affordability were weighing on household demand for newly built single-family homes, “build-to-rent” housing—which typically involves a partnership between single-family rental companies and homebuilders to construct durable rental homes—would likely provide an alternative source of end-demand. While build-to-rent demand represents only a modest share of homebuilding, Exhibit 10 shows that that share has increased sharply in recent years, and the continued outperformance of single-family rent growth could raise it further.

**Exhibit 10: The Rise of Build-to-Rent Likely Further Reduces the Sensitivity of Single-family Homebuilding to Rates**



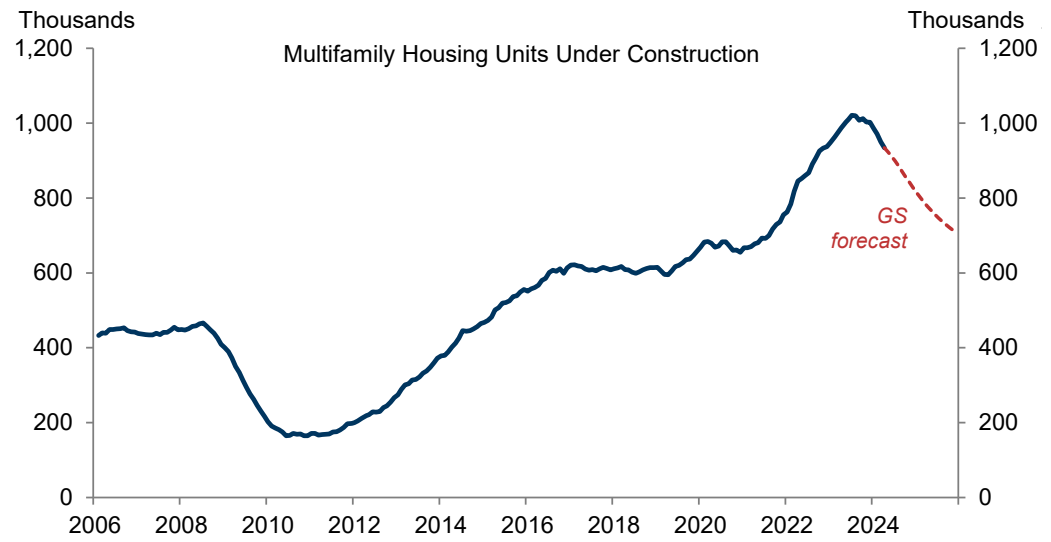
Source: Department of Commerce, Goldman Sachs Global Investment Research

We expect only modest progress toward solving the national housing shortage over the next year. We expect single-family housing starts to rise only very modestly by year-end (to 1.05mn annualized in 2024Q4, +1.5% vs. April), which alongside firm demand due to supportive demographic trends and a healthy labor market, will lead to only modest upward pressure on the homeowner vacancy rate. We expect the homeowner vacancy rate to rise to 1.1%—below the 2019 average of 1.4%—by the end of next year. As a result, we expect national home prices to rise 3.9% this year (December-over-December).

**A Large Backlog of Units Under Construction and Poor Absorption Will Weigh on Multifamily Starts but Will Not Slow the Pace of Progress on Shelter Inflation**

While single-family homebuilding activity is likely to remain elevated, multifamily construction is likely to fall further this year and multifamily starts are likely to remain depressed around current levels. Exhibit 11 shows that the backlog of multifamily units already under construction has already declined 9% after peaking 64% above 2019 levels, as the pace of completions remains near multi-decade highs and the pipeline for new projects has already begun to narrow. With poor absorption rates pushing up the rental vacancy rate from 5.6% to a still-low 6.6%, we expect multifamily developers to continue to focus on clearing that large backlog before breaking new ground. We forecast that multifamily starts will total 0.34mn in 2024 vs. 0.47mn in 2023. As a result, we expect total housing starts to decline modestly year-over-year, totaling 1.38mn in 2024 vs. 1.42mn in 2023.

**Exhibit 11: Even with Falling Starts and High Completions, It Will Likely Take More Than a Year for the Backlog of Multifamily Units Under Construction to Normalize**



Source: Department of Commerce, Goldman Sachs Global Investment Research

Should we worry that fewer multifamily housing starts could slow the normalization in rent inflation? We think not. Even though multifamily *starts* will remain depressed, completions are likely to continue running near their multi-decade high pace, which should help clear the construction backlog, contribute to further increases in the rental vacancy rate, and put downward pressure on market rent growth.

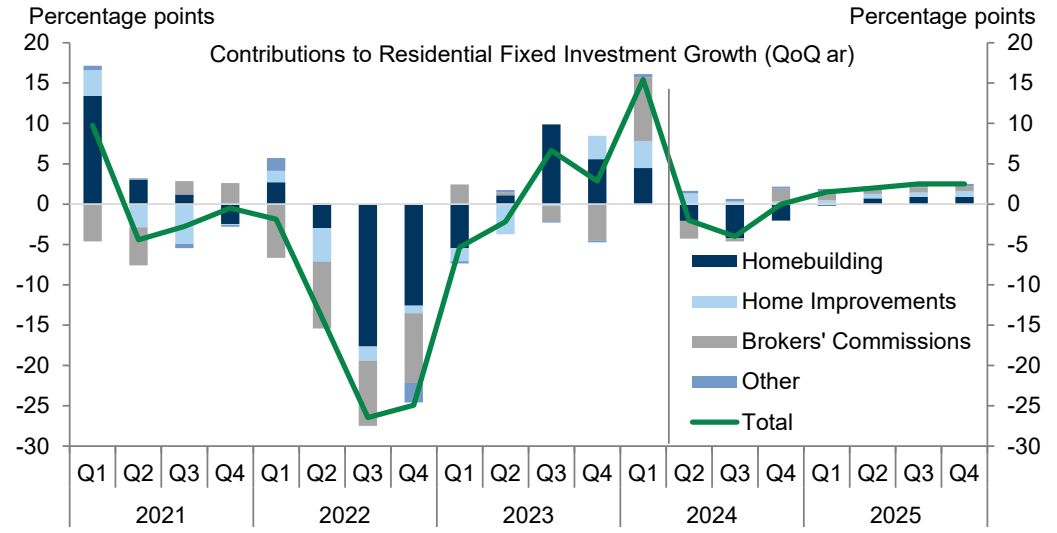
Market rent growth has slowed from an annualized pace of +9% in 2021-2022 to +2% over the last year. Our model of market rent growth projects a similarly modest pace of 2-3% annualized over the next couple of years, slightly below the pre-pandemic rate but above the recent pace. While we expect the rental vacancy rate to reach 7% around the end of next year because of strong completions, the healthy labor market and continued above-trend immigration are likely to support demand.

As we discussed in greater detail here, we expect PCE shelter inflation to slow gradually this year and next as the gap between market rents, or the rents paid by new tenants, and rents paid by existing tenants closes. We expect shelter inflation to slow from a monthly pace of +0.41% in April to +0.34% by December 2024 (implying a year-over-year rate of +4.9% in December vs. +5.6% in March) and +0.28% by December 2025 (+3.7% year-over-year).

**Two Quarters of Modest Declines in Residential Fixed Investment**

Taken together, we forecast residential fixed investment (RFI) growth of -2% and -4% annualized in 2024Q2-Q3, reflecting declines in existing home sales and multifamily homebuilding. Thereafter, we expect RFI to rebound and to reach a +2.5% growth pace by mid-2025. Our forecasts imply RFI growth of +2.1% in 2024 on a Q4/Q4 basis, vs. our forecast of +5.6% previously. As a result, we have lowered our 2024 real GDP growth forecast by 0.1pp to +2.3% on a Q4/Q4 basis (or +2.7% on a full-year basis).

**Exhibit 12: We Expect Contracting Multifamily Construction and Lower Existing Home Sales to Weigh on Residential Fixed Investment in Q2 and Q3**



Source: Department of Commerce, Goldman Sachs Global Investment Research

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# The US Economic and Financial Outlook

## THE US ECONOMIC AND FINANCIAL OUTLOOK

(% change on previous period, annualized, except where noted)

|  | 2022     | 2023     | 2024   | 2025   | 2026     | 2027     | 2023   |        |          |          | 2024     |          |        |        |
|--|----------|----------|--------|--------|----------|----------|--------|--------|----------|----------|----------|----------|--------|--------|
|  |          | (f)      | (f)    | (f)    | (f)      | (f)      | Q1     | Q2     | Q3       | Q4       | Q1       | Q2       | Q3     | Q4     |
| <b>OUTPUT AND SPENDING</b>             |          |          |        |        |          |          |        |        |          |          |          |          |        |        |
| Real GDP                               | 1.9      | 2.5      | 2.7    | 2.2    | 2.0      | 2.0      | 2.2    | 2.1    | 4.9      | 3.4      | 1.2      | 3.2      | 2.3    | 2.3    |
| Real GDP (annual=Q4/Q4, quarterly=yoy) | 0.7      | 3.1      | 2.3    | 2.0    | 1.9      | 2.0      | 1.7    | 2.4    | 2.9      | 3.1      | 2.9      | 3.2      | 2.5    | 2.3    |
| Consumer Expenditures                  | 2.5      | 2.2      | 2.5    | 2.3    | 2.0      | 2.0      | 3.8    | 0.8    | 3.1      | 3.3      | 2.0      | 2.8      | 2.5    | 2.5    |
| Residential Fixed Investment           | -9.0     | -10.6    | 4.0    | 0.6    | 2.8      | 2.4      | -5.3   | -2.2   | 6.7      | 2.8      | 15.4     | -2.0     | -4.0   | 0.0    |
| Business Fixed Investment              | 5.2      | 4.5      | 3.4    | 3.7    | 3.8      | 3.7      | 5.7    | 7.4    | 1.5      | 3.8      | 3.3      | 3.0      | 3.2    | 3.6    |
| Structures                             | -2.1     | 13.2     | 3.8    | -0.2   | 2.9      | 3.0      | 30.3   | 16.1   | 11.2     | 10.9     | 0.4      | -0.5     | -2.0   | -3.0   |
| Equipment                              | 5.2      | -0.3     | 1.7    | 5.7    | 3.8      | 3.2      | -4.1   | 7.7    | -4.4     | -1.1     | 0.3      | 4.6      | 5.5    | 7.0    |
| Intellectual Property Products         | 9.1      | 4.5      | 4.6    | 4.1    | 4.3      | 4.5      | 3.8    | 2.7    | 1.8      | 4.3      | 7.9      | 3.5      | 4.3    | 4.5    |
| Federal Government                     | -2.8     | 4.2      | 1.3    | 0.0    | 0.0      | 0.0      | 5.2    | 1.1    | 7.1      | 2.4      | -0.7     | 0.5      | 0.0    | 0.0    |
| State & Local Government               | 0.2      | 4.0      | 3.4    | 1.1    | 1.0      | 1.0      | 4.6    | 4.7    | 5.0      | 6.0      | 2.6      | 2.8      | 1.0    | 1.0    |
| Net Exports (\$bn, '17)                | -1,051   | -928     | -995   | -1,030 | -1,047   | -1,039   | -935   | -928   | -931     | -919     | -975     | -1,000   | -999   | -1,002 |
| Inventory Investment (\$bn, '17)       | 128      | 44       | 70     | 80     | 60       | 60       | 27     | 15     | 78       | 55       | 28       | 80       | 87     | 87     |
| Nominal GDP                            | 9.1      | 6.3      | 5.4    | 4.4    | 3.9      | 4.1      | 6.3    | 3.8    | 8.3      | 5.1      | 4.3      | 6.6      | 4.4    | 4.0    |
| Industrial Production, Mfg.            | 2.7      | -0.6     | 1.1    | 3.5    | 3.3      | 3.3      | -0.3   | 0.4    | -0.5     | -1.2     | -0.1     | 4.0      | 3.6    | 3.7    |
| <b>HOUSING MARKET</b>                  |          |          |        |        |          |          |        |        |          |          |          |          |        |        |
| Housing Starts (units, thous)          | 1,552    | 1,421    | 1,383  | 1,453  | 1,529    | 1,545    | 1,369  | 1,455  | 1,380    | 1,481    | 1,403    | 1,382    | 1,369  | 1,377  |
| New Home Sales (units, thous)          | 637      | 666      | 684    | 768    | 776      | 810      | 636    | 698    | 682      | 646      | 653      | 662      | 692    | 730    |
| Existing Home Sales (units, thous)     | 5,087    | 4,101    | 4,084  | 4,237  | 4,290    | 4,546    | 4,317  | 4,187  | 4,020    | 3,880    | 4,200    | 4,055    | 3,997  | 4,084  |
| Case-Shiller Home Prices (%yoy)*       | 7.5      | 5.1      | 3.8    | 4.4    | 4.9      | 4.9      | 2.3    | -0.2   | 2.5      | 5.1      | 6.4      | 5.8      | 4.3    | 3.8    |
| <b>INFLATION (% ch, yr/yr)</b>         |          |          |        |        |          |          |        |        |          |          |          |          |        |        |
| Consumer Price Index (CPI)**           | 6.4      | 3.3      | 3.2    | 2.6    | 2.3      | 2.2      | 5.7    | 4.0    | 3.6      | 3.2      | 3.2      | 3.4      | 3.2    | 3.2    |
| Core CPI **                            | 5.7      | 3.9      | 3.5    | 2.7    | 2.3      | 2.3      | 5.5    | 5.2    | 4.4      | 4.0      | 3.8      | 3.6      | 3.7    | 3.5    |
| Core PCE** †                           | 4.9      | 2.9      | 2.8    | 2.1    | 2.0      | 2.0      | 4.8    | 4.6    | 3.8      | 3.2      | 2.8      | 2.7      | 2.8    | 2.7    |
| <b>LABOR MARKET</b>                    |          |          |        |        |          |          |        |        |          |          |          |          |        |        |
| Unemployment Rate (%)^                 | 3.5      | 3.7      | 3.8    | 3.7    | 3.6      | 3.6      | 3.5    | 3.6    | 3.8      | 3.7      | 3.8      | 3.8      | 3.8    | 3.8    |
| U6 Underemployment Rate (%)^           | 6.5      | 7.1      | 7.3    | 7.0    | 6.9      | 6.9      | 6.7    | 6.9    | 7.0      | 7.1      | 7.3      | 7.3      | 7.3    | 7.3    |
| Payrolls (thous, monthly rate)         | 377      | 251      | 186    | 94     | 75       | 75       | 305    | 274    | 213      | 212      | 269      | 175      | 150    | 150    |
| Employment-Population Ratio (%)^       | 60.1     | 60.1     | 60.2   | 60.1   | 59.9     | 59.8     | 60.4   | 60.3   | 60.4     | 60.1     | 60.3     | 60.3     | 60.2   | 60.2   |
| Labor Force Participation Rate (%)^    | 62.3     | 62.5     | 62.6   | 62.4   | 62.2     | 62.0     | 62.6   | 62.6   | 62.8     | 62.5     | 62.7     | 62.7     | 62.6   | 62.6   |
| Average Hourly Earnings (%yoy)         | 5.4      | 4.5      | 3.9    | 3.4    | 3.2      | 3.2      | 4.6    | 4.6    | 4.5      | 4.3      | 4.2      | 4.0      | 3.8    | 3.7    |
| <b>GOVERNMENT FINANCE</b>              |          |          |        |        |          |          |        |        |          |          |          |          |        |        |
| Federal Budget (FY, \$bn)              | -1,376   | -1,695   | -1,800 | -1,900 | -1,900   | -2,050   | --     | --     | --       | --       | --       | --       | --     | --     |
| <b>FINANCIAL INDICATORS</b>            |          |          |        |        |          |          |        |        |          |          |          |          |        |        |
| FF Target Range (Bottom-Top, %)^       | 4.25-4.5 | 5.25-5.5 | 4.75-5 | 3.75-4 | 3.25-3.5 | 3.25-3.5 | 4.75-5 | 5-5.25 | 5.25-5.5 | 5.25-5.5 | 5.25-5.5 | 5.25-5.5 | 5-5.25 | 4.75-5 |
| 10-Year Treasury Note^                 | 3.88     | 3.88     | 4.25   | 4.10   | 4.10     | 4.10     | 3.48   | 3.81   | 4.59     | 3.88     | 4.20     | 4.30     | 4.25   | 4.25   |
| Euro (€/€)^                            | 1.07     | 1.11     | 1.05   | 1.15   | 1.15     | 1.15     | 1.09   | 1.09   | 1.06     | 1.11     | 1.08     | 1.07     | 1.05   | 1.05   |
| Yen (\$/¥)^                            | 132      | 141      | 154    | 130    | 125      | 120      | 133    | 144    | 149      | 141      | 151      | 156      | 155    | 154    |

\* Weighted average of metro-level HPIs for 381 metro cities where the weights are dollar values of housing stock reported in the American Community Survey. Annual numbers are Q4/Q4.

\*\* Annual inflation numbers are December year-on-year values. Quarterly values are Q4/Q4.

† PCE = Personal consumption expenditures. ^ Denotes end of period.

Note: Published figures in bold.

Source: Goldman Sachs Global Investment Research

# Disclosure Appendix

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We, Jan Hatzius, Alec Phillips, David Mericle, Spencer Hill, CFA, Ronnie Walker, Manuel Abecasis, Tim Krupa, Elsie Peng and Jessica Rindels, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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