Congressional Budget Office
Nonpartisan Analysis for the U.S. Congress

The Outlook for Housing Starts

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At a Glance

Housing starts, or the commencement of construction of new single-family and multifamily housing units, are an important component of the Congressional Budget Office's forecast of the U.S. economy. This report discusses the outlook for housing starts over the next 30 years. Population growth is the most important driver of that long-run outlook, but several other factors affect it as well.

CBO's assessment of the outlook for housing starts includes the following projections:

- After 2024, housing starts remain fairly strong through the end of the decade. A desire for more living space during and after the coronavirus pandemic created pent-up demand for housing, and a large number of new immigrants sustains household formation. In CBO's projections, housing starts average 1.6 million per year over the next 10 years.
- Housing starts slow considerably during the 2030s and 2040s as population growth wanes. The number of new households declines as the population ages and the number of deaths rises and as the number of new immigrants returns to a level more consistent with historical experience. Housing starts average 1.1 million per year from 2034 to 2043 and 0.8 million per year from 2044 to 2053 in CBO's baseline projections.
- Several factors could cause the number of housing starts to be larger or smaller than projected. For example, if the number of new immigrants differed from that in CBO's projections, outcomes over the 30-year period could differ substantially. Over shorter periods, financial conditions are important sources of uncertainty.

This report also describes the methods that CBO uses to produce the outlook for housing starts and to examine different assumptions that could alter that outlook.

Contents

Notes About This Report

All years referred to in this report are calendar years.

Numbers in the text, tables, and figures may not add up to totals because of rounding.

Some of the figures in this report use shaded vertical bars to indicate periods of recession. (A recession extends from the peak of a business cycle to its trough.)

Summary

Housing construction is an important factor in the economic forecast that the Congressional Budget Office regularly prepares for the Congress. Housing starts—the number of new single-family and multifamily housing units that begin construction in a given period—are the most important driver of housing construction.

What Are CBO's Projections of Housing Starts?

Housing starts moderated in 2023 and 2024 compared with their pace in 2021 and 2022 but are expected to be strong compared with their historical average for most of the next decade. In CBO's projections, housing starts increase to an annual average of 1.68 million from 2025 to 2029 before declining to an annual average of 1.52 million from 2030 to 2033. Over the entire 2024–2033 period, housing starts average 1.59 million per year; they averaged 1.30 million per year over the past 10 years and 1.37 million per year over the past 40 years.

In CBO's projections for the near term, high mortgage rates restrain construction activity. As mortgage rates begin to fall, pent-up demand—created by the desire for more living space during and after the coronavirus pandemic—stimulates more housing starts. Household formation by new immigrants further boosts demand for additional housing units.[1] At the same time, mobile homes satisfy a smaller share of demand for new units than they did in the 1980s and 1990s.

In the longer term, the outlook for housing starts weakens considerably because of slower population growth. As the population ages, the number of deaths rises, causing growth of the adult population to slow. Housing starts are projected to average less than 1.1 million per year from 2034 to 2043 and 0.8 million per year from 2044 to 2053. After 2050, in CBO's projections, net immigration contributes nearly as much to the demand for new housing as domestic population growth does, a significant change from the past.[2]

How Do Housing Starts Affect the Economy?

In CBO's projections, new home construction accounts for more than 2 percent of gross domestic product (GDP) throughout the next decade. Housing construction contributes directly to GDP through residential investment, and the shelter services provided by the housing stock are a large component of consumer spending. (Shelter services measure the flow of services that housing units provide to their occupants.)

What Makes CBO's Projections of Housing Starts Uncertain?

The outlook for housing starts involves much uncertainty. Housing is sensitive to financial and cyclical conditions, so housing starts in any year can differ considerably from the average for the decade. Net immigration is a major source of long-term uncertainty in that outlook. If net immigration was significantly greater than CBO projected, it could eliminate much of the long-term decline in new construction; if net immigration was less than CBO projected, the decline in housing starts could be steeper than expected. The outlook for the number of existing housing units that will need to be replaced is also uncertain.

How Does CBO Project Demand for New Housing Units?

Demand for new housing units consists of two components. The larger one is the underlying demand for new housing units that prevails when financial and cyclical conditions are normal and vacancy rates are consistent with their historical trends. Underlying demand is primarily determined by demographic changes, but it also includes changes in headship rates (the number of households per person), trends in vacant units, and demand for replacement units. To estimate demographic changes,

1. A household consists of all people who occupy the same housing unit as their usual residence, whether one person, a family, or a group of unrelated individuals. Household formation is a change in the number of households.

2. Net immigration is the number of people who enter the United States in a given year minus the number who leave in that year. Domestic population growth is total population growth minus net immigration.

CBO assesses the effects of domestic population growth and net immigration on the number of households. The second component of demand for new housing units is the result of factors that differ from those that are the basis of underlying demand—such as interest rates, lending standards, vacancy rates that differ from the historical trend, and the effect of taxation on the cost of housing.

How Does CBO Project Housing Starts?

Housing starts are the principal channel through which demand for new housing units is satisfied. The underlying supply of new housing units, which CBO defines as being equal to underlying demand, consists of underlying completions of started units and shipments of mobile homes. Thus, underlying housing starts—the number of starts that occur when financial and cyclical conditions and vacancy rates are normal—are roughly equal to underlying demand for new units minus underlying shipments of mobile homes. Demand for new housing units stemming from other factors can cause housing starts to differ from underlying levels.

Chapter 1: CBO's Projections of Housing Starts

In the Congressional Budget Office's projections, housing starts are strong over the next decade, averaging 1.59 million per year—well above their average of 1.37 million per year over the past 40 years. They then decline sharply over the subsequent two decades as growth of the adult population slows significantly (see Figure 1-1). Household formation follows a similar pattern. As the population ages, households headed by people age 75 or older account for more than half of the total increase in the number of households. The outlook for housing starts has important implications for the economy. However, that outlook is highly uncertain and could be affected by many factors.

The Baseline Forecast of Housing Starts

CBO's baseline forecast of housing starts over the next 30 years is closely linked to its forecast of underlying housing starts over that period. (CBO's baseline budget and economic forecasts are constructed under the assumption that current laws governing revenues and spending will generally stay the same.) Underlying housing starts refers to the number of starts that occur when financial and cyclical conditions and vacancy rates are normal. By CBO's estimate, underlying housing starts rise over the next decade but then drop by more than 50 percent over the following 20 years (see Table 1-1). Much of the projected increase during the next decade compared with the past 20 years stems from increased immigration. In addition, the demand for replacements rises as the existing housing stock grows and ages.

In CBO's forecast, pent-up demand for housing units supplements underlying demand over the next decade.[1] Pent-up demand rose sharply during 2021 and 2022 as a desire for more living space stimulated household formation in excess of construction (see Figure 1-2). Lingering pent-up demand holds housing starts above underlying levels in the 2030s and 2040s. Differences in education and work experience between people who arrived during the recent surge in immigration and the overall population hold household formation below the rate that would normally be expected from net immigration, offsetting some of the boost from pent-up demand.[2]

An accelerating decline in domestic population growth is the main driver of weaker underlying housing starts after 2033. That decline is not due to fewer people reaching the age at which they first form households; the number of people in their 20s is projected to fluctuate within a narrow range of roughly 44 million to 48 million over the next 30 years. Rather, CBO estimates, domestic population growth will slow as a result of an increase in the number of deaths as the population ages; the number of people age 75 or older is expected to increase by almost 80 percent over the next 30 years.

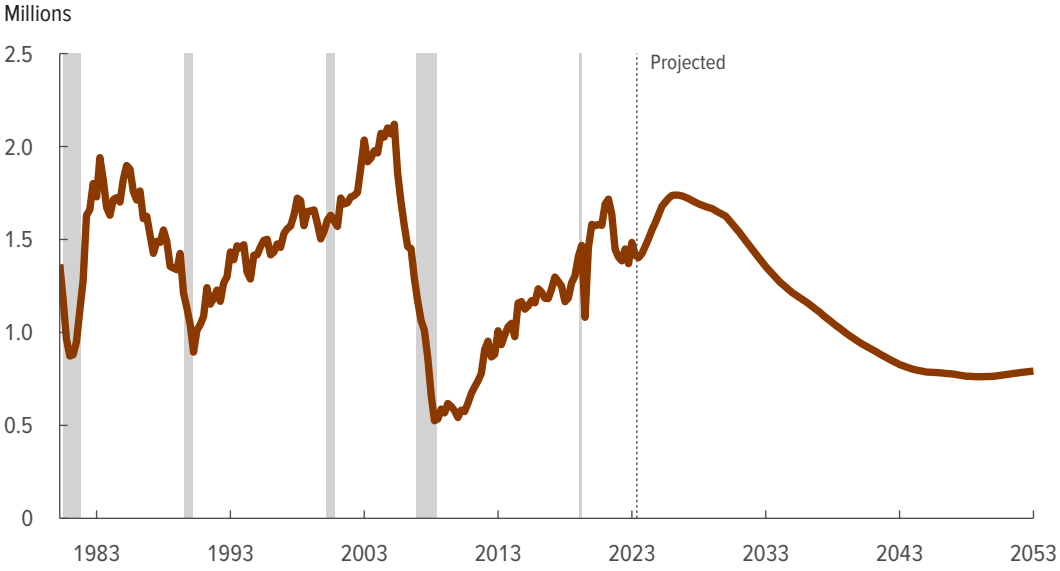
Household formation from domestic population growth slows over the next 30 years as the number of deaths rises, and housing starts slow with household formation (see Figure 1-3 on page 7). The return of immigration rates more typical of historical experience than the rates over the 2024–2033 period also contributes to weaker underlying housing starts after 2033. A continued increase in the number of housing units needing to be replaced slightly mitigates that decline. Whereas domestic population growth previously accounted for most underlying housing starts, by the 2040s replacement demand is projected to account for more starts than domestic population growth, and net immigration is projected to account for almost as many.

1. Pent-up demand equals the underlying number of vacant units minus the actual number of vacant units. When it is a positive number, it measures the shortfall of housing units from a level consistent with underlying demand. When it is a negative number—that is, when the actual number of vacant units exceeds the underlying number, as it did in the early 2010s—there are excess vacant units.

2. Congressional Budget Office, *Effects of the Immigration Surge on the Federal Budget and the Economy* (July 2024), www.cbo.gov/publication/60165.

Figure 1-1.

Housing Starts



Housing starts are projected to remain strong over the next decade and then decline as growth of the adult population slows.

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

As a result of those underlying and other factors, housing starts are expected to average 1.59 million per year from 2024 to 2033, 1.06 million from 2034 to 2043, and 0.78 million per year from 2044 to 2053, in CBO's estimates. The average during the 2024–2033 period is well above the average over the past 40 years because of strong underlying housing starts and pent-up demand. As underlying starts decline over the subsequent 20 years, primarily because of slower domestic population growth, housing starts also decline.

The Forecast of Household Formation

CBO expects household formation to remain at average historical rates over the next decade and then decline significantly over the following 20 years as growth of the number of adults in the domestic population slows (see Table 1-2 on page 8). Household formation has averaged 1.19 million per year over the past 30 years. A drop in headship rates (that is, the number of households per person) during and after the 2007–2009 financial crisis depressed household formation to 0.92 million per year from 2004 to 2013, whereas a rebound in headship rates in the aftermath of the coronavirus pandemic boosted household formation to 1.50 million per year during the past decade. Growth in the number of households would have been even faster in the final years of the 2014–2023 period if households had not been lost because of deaths from COVID-19.

In CBO's analysis, household formation remains close to its average over the past 30 years during the first 10 years of the forecast. Increased net immigration from 2022 to 2026, coupled with a rebound in domestic population growth after the elevated mortality rates that occurred during the pandemic, leads to strong household formation during the rest of the 2020s (see Figure 1-4 on page 9).

Household formation then slows markedly, from 1.16 million per year over the 2024–2033 period to 600,000 per year over the 2034–2043 period and 380,000 per year over the 2044–2053 period. Declining domestic population growth accounts for most of the slowdown in household formation relative to the past 30 years, as the rising number of deaths resulting from the aging of the population reduces domestic population growth and immigration returns to historical rates. From 2044 to 2053, nearly as many households are formed because of net immigration as are formed because of domestic population growth—in sharp contrast to the past, when household formation from domestic population growth was much larger than that from immigration.

In CBO's projections, the number of households headed by elderly people grows rapidly over the next 30 years as the population ages (see Figure 1-5 on page 10). The total number of households grows by more than 21 million between 2023 and 2053. Over that same period, the

Table 1-1.

Average Annual Housing Starts and Underlying Housing Starts

Millions

	1984–1993	1994–2003	2004–2013	2014–2023	2024–2033	2034–2043	2044–2053
Housing starts							
Underlying housing starts[a]	1.42	1.36	1.41	1.34	1.58	0.97	0.75
Housing starts from other factors	0.04	0.21	-0.25	-0.04	0.01	0.09	0.03
Total	**1.45**	**1.58**	**1.15**	**1.30**	**1.59**	**1.06**	**0.78**
Underlying demand for housing starts							
Domestic population growth	1.16	0.91	1.06	0.90	0.84	0.44	0.23
Net immigration	0.18	0.41	0.29	0.29	0.42	0.24	0.22
Changes in headship rates[b]	-0.13	-0.15	-0.17	-0.14	-0.06	-0.07	-0.08
Vacant units	0.19	0.20	0.21	0.20	0.24	0.16	0.13
Replacement units	0.22	0.19	0.09	0.15	0.19	0.25	0.28
Total	**1.62**	**1.56**	**1.48**	**1.40**	**1.64**	**1.01**	**0.79**
Underlying supply of housing units							
Shipments of mobile homes	0.25	0.23	0.11	0.09	0.10	0.07	0.06
Housing completions	1.38	1.33	1.37	1.31	1.54	0.95	0.73
Total	**1.62**	**1.56**	**1.48**	**1.40**	**1.64**	**1.01**	**0.79**

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

a. Underlying housing starts are the portion of underlying supply provided by new construction rather than by shipments of mobile homes. Underlying housing starts are slightly larger than underlying housing completions because between 2 percent and 3 percent of housing units started are never completed.

b. For each age group, the headship rate is the number of households headed by people in that age group divided by the total population of that age group.

number of households headed by people age 75 or older grows by nearly 12 million, or 56 percent of the total increase in households.

The Effects of Housing Starts on the Economy

Housing starts lead directly to the construction of new homes. That construction can affect other parts of the economy and can have implications for financial markets.

Residential Investment

Construction of new homes is the largest component of residential investment, accounting for 2.2 percent of gross domestic product in 2022. After a brief dip in 2023 and 2024, in CBO's projections, construction again averages over 2 percent of GDP until the early 2030s. As housing starts decline in the 2030s and 2040s, construction's share of GDP also falls. After 2045, construction of new homes is projected to average less than 1.2 percent of GDP.

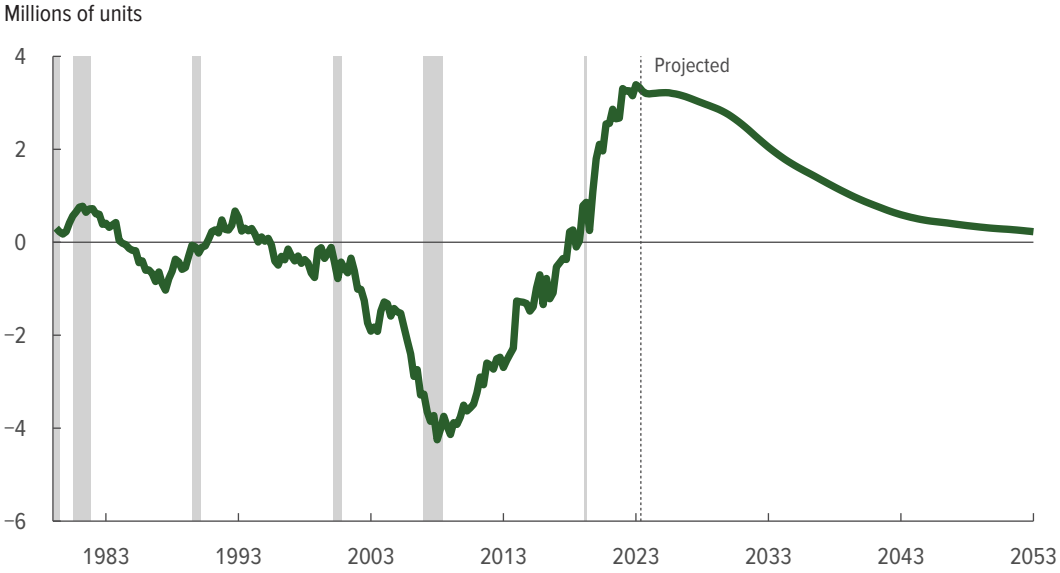
Construction of a single-family home adds more to GDP than construction of a unit in a multifamily building does, and demographics could affect the mix of homes built. The share of households living in multifamily housing declines as households age, picking up again for people age 75 or older. Although the share of younger adults in the adult population is projected to decline over time, the share of people age 75 or older is expected to increase, creating opposing effects on the mix of homes built.

The composition of homes within categories could also change, as an aging population boosts senior facilities as a share of multifamily construction. Many factors other than demographics, such as tax treatment and preferences, also affect the mix of new homes built.

New homes indirectly affect components of GDP other than construction of new units. The sale of a new home usually involves brokers' commissions and other ownership transfer costs, another component of residential investment. If the buyer of a new home sells an existing home, the effect on residential investment through increased transfer costs is multiplied. Moreover, purchases of items to furnish a new home add to consumer spending. After it is occupied, a new home produces shelter services, another component of consumer

Figure 1-2.

Pent-up Demand for Housing



Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

Pent-up demand equals the underlying number of vacant units minus the actual number of vacant units. When it is a positive number, it measures the shortfall of housing units from a level consistent with underlying demand. When it is a negative number—that is, when the actual number of vacant units exceeds the underlying number, as it did in the early 2010s—there are excess vacant units.

spending. (Shelter services measure the flow of services that housing units provide to their occupants.) CBO projects that shelter services will make up more than 11 percent of GDP over the next decade.

Some of the decline in construction of new homes projected for the 2030s and 2040s may be offset by increased residential improvements. Households that would otherwise have upgraded their living space by buying new homes may choose to make improvements to their existing homes instead.

Composition of GDP

A decline in housing starts reduces GDP in the short run, but in the long run, a permanent decline in housing starts leads to a change in the composition of GDP that restores the balance between GDP and potential GDP (that is, the maximum sustainable output of the economy). Some mix of greater consumer spending, business investment, and net exports would offset the reduction in residential investment. However, both GDP and potential GDP would probably be lower because a smaller housing stock would generate fewer shelter services.

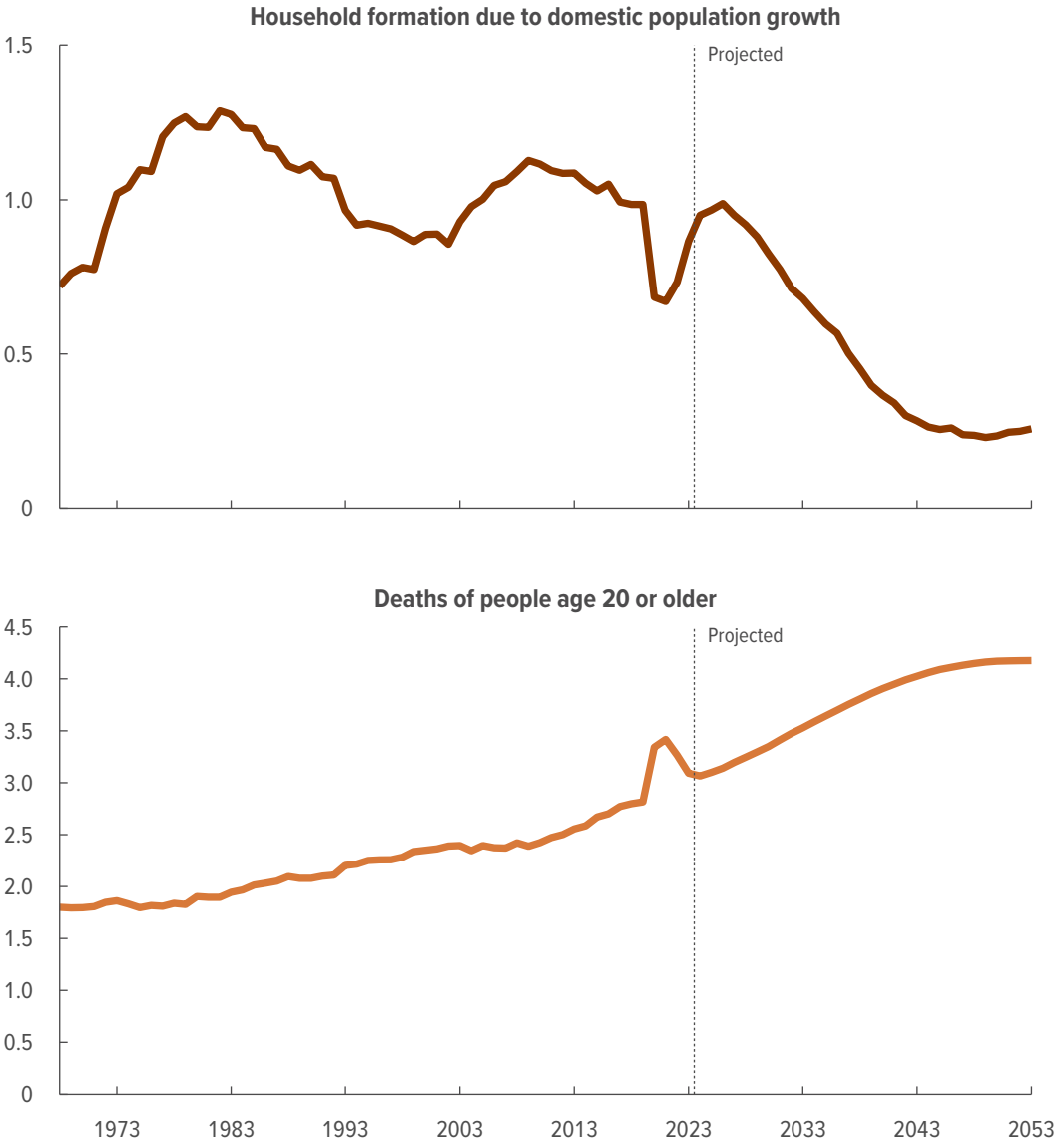
Financial Markets

Construction of new homes is one of the primary channels through which monetary policy affects the economy. An increase in the federal funds rate (the rate financial institutions charge each other for overnight loans) causes mortgage rates to rise, which reduces housing starts. That occurred when the Federal Reserve raised the federal funds rate during 2022 and 2023 in response to high inflation. The resulting increase in mortgage rates contributed to a 17.5 percent decline in real investment in permanent-site dwellings (units in single-family and multifamily structures) during 2022, measured from fourth quarter to fourth quarter. The adverse effect of higher mortgage rates on construction in 2023 was countered by an increase in headship rates.

As construction of new homes becomes a smaller share of the economy in the 2030s and 2040s, monetary policy and its consequences could be affected. Larger increases in interest rates would probably be required to produce the same dampening effect on the economy, all else being equal. A larger share of monetary restraint would have to come through reductions in consumer spending, business investment, and net exports (through the effect of interest rates on the exchange rate). Because prices of

Figure 1-3.

Declining Annual Household Formation as Deaths Increase



As the population ages and the number of deaths increases, household formation due to domestic population growth is projected to decline sharply.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

Domestic population growth is total population growth minus net immigration.

bonds move inversely to interest rates and, all else being equal, prices of stocks move with prices of bonds, larger movements in interest rates would probably lead to greater volatility of prices of financial assets in the future.

Uncertainty in the Forecast of Housing Starts

CBO's forecast of housing starts is intended to lie within the middle of the distribution of possible outcomes. However, that forecast is very uncertain. The greatest source of uncertainty in year-to-year growth is from financial and cyclical conditions, such as mortgage rates and lending standards. Demographics, especially rates of immigration, cause the greatest uncertainty in housing activity over longer periods. Headship rates could also be higher or lower than projected, although uncertainty in those rates is less important for housing starts than the uncertainty from demographics. A different rate of net removals of units from the housing stock would also affect the forecast.

Table 1-2.

Sources of Annual Household Formation

Millions of households

	1984–1993	1994–2003	2004–2013	2014–2023	2024–2033	2034–2043	2044–2053
Domestic population growth	1.17	0.92	1.06	0.89	0.87	0.46	0.24
Net immigration	0.17	0.41	0.30	0.29	0.43	0.24	0.23
Changes in headship rates	-0.08	-0.16	-0.44	0.33	-0.14	-0.10	-0.09
Total	**1.27**	**1.16**	**0.92**	**1.50**	**1.16**	**0.60**	**0.38**

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

Net immigration is not the total effect of immigration on household formation; it is only the direct effect of new adult immigrants. Many people immigrate as children, and the households they form as they become adults are counted as part of domestic population growth rather than as net immigration. In addition, immigrant adults tend to be relatively young and thus are in age groups with low headship rates. The increase in households as they age is also included in domestic population growth, as is the loss of households as immigrants die.

The headship rate for an age group is the number of heads of households within that age group as a percentage of the number of people in that age group.

Financial and Cyclical Conditions

Changes in financial and cyclical conditions have caused most of the year-to-year variance in housing starts in the past and will probably do so in the future. Most significant are variations in mortgage rates and lending standards. The output gap (the difference between GDP and potential GDP as a percentage of potential GDP) has a smaller effect.

Mortgage Rates. Higher mortgage rates make housing less affordable for potential buyers and thus reduce new construction of homes for owner occupancy. Because rental units are partly financed through borrowing, higher interest rates also slow the construction of units for rental occupancy. By CBO's estimate, a permanent increase in mortgage rates of 2 percentage points above the baseline forecast, beginning in the first quarter of 2025, would reduce the annual pace of housing starts to almost 180,000 below the baseline projection by the end of 2025, all else being equal. The number of housing starts would remain more than 100,000 below the projection in 2026 and 2027 but would gradually drift back toward baseline levels thereafter. In the long run, housing starts would return to baseline levels, but the housing stock would be permanently smaller because of the units lost while starts were lower. The number of households would also be permanently smaller than that in the baseline projections.

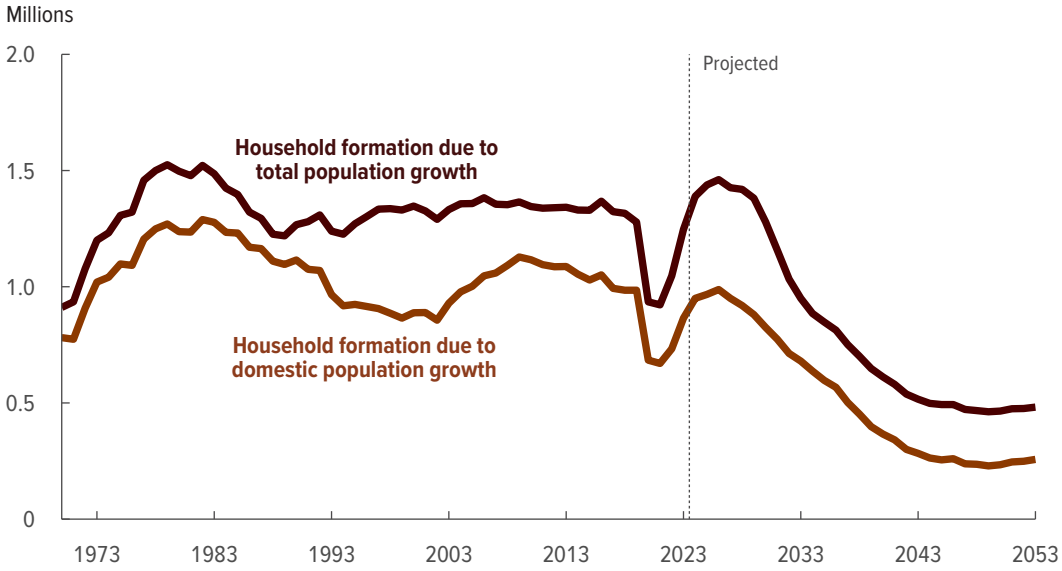
One consideration is that other determinants of housing starts would probably change if mortgage rates were permanently 2 percentage points higher than currently projected. In particular, if mortgage rates were higher because inflation was higher, then expected appreciation of home prices would also be greater, reducing the increase in real (inflation-adjusted) mortgage rates and their effect on housing starts. However, higher mortgage rates would probably affect the size of homes being built, so the percentage reduction in real construction of new units would probably be greater than the percentage reduction in housing starts.

Lending Standards. The effect of a permanent change in lending standards would be qualitatively similar to that of a permanent change in mortgage rates. For example, a permanent tightening of mortgage lending standards relative to those underlying the baseline projections would reduce housing starts relative to the baseline by a decreasing amount over time. In the long run, housing starts would return to baseline levels, but both the stock of housing units and the number of households would be permanently smaller than CBO projects.

The Output Gap. The business cycle is also a source of uncertainty for housing starts, although less so than that from financial conditions. If the output gap in 2025 was smaller by 2 percentage points than that projected in the baseline, the annual pace of housing starts would fall to more than 30,000 below the baseline level by the end of 2025, a drop of about 2 percent. Much of that reduction would occur because of tighter lending conditions for private borrowers as the economy weakened. However, if the deterioration in the economy caused the Federal

Figure 1-4.

Annual Household Formation Due to Total Population Growth and Domestic Population Growth



Household formation due to total population growth is expected to remain strong during the 2020s but then to slow as household formation due to domestic population growth slows.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

Domestic population growth is total population growth minus net immigration.

Reserve to reduce interest rates, then housing starts could increase, on net.

Demographics

Demographics have the greatest potential to affect the number of housing starts over longer periods of time. CBO's projections of net immigration, life expectancy, and birth rates are highly uncertain. Net immigration rates that permanently differed from those in the baseline could have a large effect on housing starts over the next 30 years. Different rates of mortality could also affect the forecast.

Net Immigration. CBO examined two scenarios that show the possible effects of a change in immigration. In the first, net immigration increases above the baseline projections by 500,000 people in 2026 and by 1.0 million people per year thereafter. In the second, net immigration is below those projections by 500,000 people each year beginning in 2026.[3] The simulations maintain the same age distribution as in historical experience and incorporate the assumption that household formation by immigrants remains 10 percent below that of other people of the same age even after the normal lags for household formation by new immigrants are factored in.

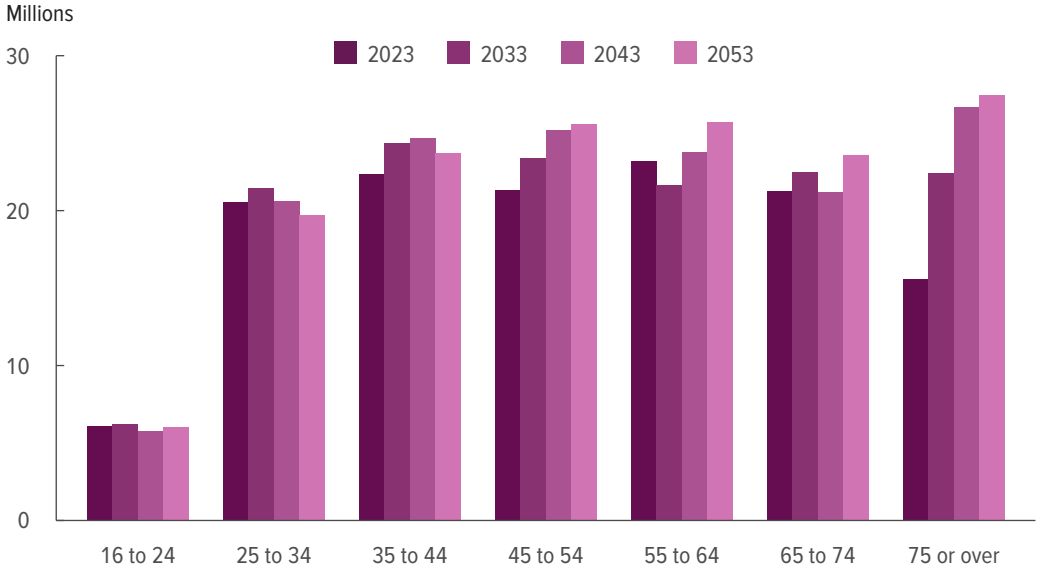
In the scenario with more immigration, CBO expects that the combination of increased household formation and existing pent-up demand would boost housing starts to an average of nearly 1.8 million per year from 2027 to 2031 (see Figure 1-6 on page 11). In addition, increased immigration would partially mitigate the decline in domestic population growth in the 2030s and 2040s. Housing starts would fall to 1.2 million per year after 2045, roughly the number of housing starts in the years immediately before the pandemic, rather than to the less than 800,000 that CBO projects.

The scenario includes only the direct effects of net immigration on housing starts and not other economic effects

3. The two scenarios are not symmetrical. Reducing the number of new immigrants to 1 million people fewer than in the baseline projections would drop net immigration to just over 100,000 people per year beginning in 2027. Such a scenario does not produce plausible results. Coupled with slower domestic population growth, that scenario could imply negative housing starts in some parts of the country in the 2040s, which is impossible. Instead, some homes in usable condition in those areas would be left unoccupied and would eventually pass out of the housing stock as they deteriorated.

Figure 1-5.

Households by Age of Head of Household



The number of households headed by people age 75 or over is projected to grow rapidly over the next 30 years.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

of immigration on housing starts. For example, increased residential investment due to increased housing starts, all else being equal, would increase the output gap and thus put upward pressure on mortgage rates. Those higher rates would offset a modest portion of the increase in housing starts.

In the scenario with less immigration, lower rates of household formation would push housing starts below baseline levels. By the late 2040s, the number of housing starts would fall to its average in 2009, which had the fewest starts of any year during or after the 2007–2009 recession, as less immigration compounded the effects of slower domestic population growth.

Life Expectancy. Longer life expectancy would increase the number of households and the number of homes needed to house them, whereas shorter life expectancy would have the opposite effect. Two scenarios illustrate those effects: In the first scenario, a proportionate decrease in death rates that adds two years to life expectancy is gradually phased in from 2025 to 2034, and life expectancy remains two years above the baseline level thereafter. In the second scenario, life expectancy falls two years below the baseline level, phased in over the same period.

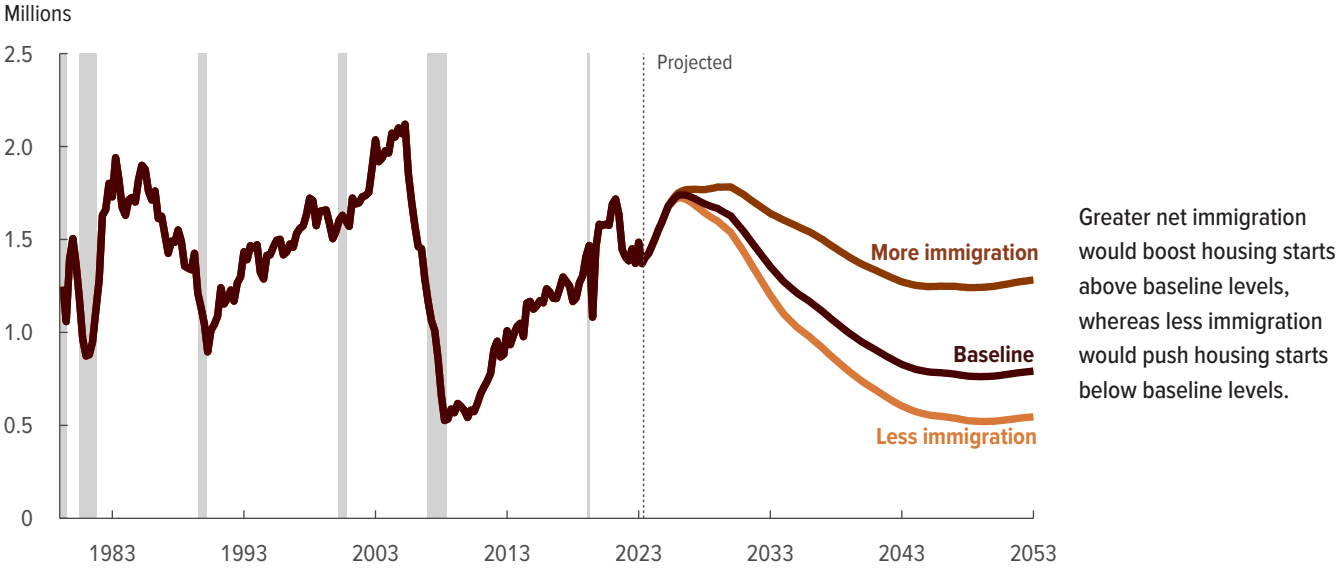
In those scenarios, the largest effect on housing starts—a change of more than 200,000 starts per year in either direction from the baseline projection—is reached in 2035, a year after the change in life expectancy is fully phased in (see Figure 1-7). That difference would be an increase or a decrease of about 20 percent. Thereafter, housing starts gradually drift back toward baseline levels as those who are now living longer die or because those who die at an earlier age would have eventually died.

Birth Rates. Virtually everyone who will head a household in the next 20 years has already been born, so a change in the birth rate beginning in 2025 would not affect household formation and housing starts until those newborns reached adulthood in the mid-2040s. Such a situation would resemble the baby boom after World War II, which led to a big increase in household formation in the 1970s. CBO did not analyze alternative fertility scenarios, because any effects on housing starts would not begin until the late 2040s, although those effects could be large by the early 2050s.

Alternative assumptions about fertility could affect residential investment before the 2040s. Families with more children are likely to want larger homes, so higher fertility rates would increase the size of new homes built, boosting construction activity even if housing starts were unaffected.

Figure 1-6.

Housing Starts Under Alternative Scenarios for Net Immigration



Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

Other Sources of Uncertainty

In addition to uncertainty related to financial conditions and household demographics, two other sources of it—headship rates and replacement demand—could affect CBO's forecast of housing starts.

Headship Rates. Headship rates could turn out differently than expected for a variety of reasons. Some of those involve financial and cyclical conditions, such as changes in mortgage lending standards and mortgage rates (as discussed earlier). A change in preferences unrelated to financial or cyclical conditions, such as the recent desire for more living space, could also affect housing starts.

Demand for Replacements. The rate at which existing housing units are removed from the stock and require replacement is uncertain. Net removal rates have varied in the past, running considerably higher in the 1970s, 1980s, and 1990s than in subsequent years. In addition, it is uncertain how net removals will vary as household formation slows. More areas could lose population than in the past. In those places, some homes that remained habitable would be abandoned as people moved elsewhere or died, and those homes would eventually decay and be removed from the housing stock. In that case, additional homes would be needed in growing areas to replace the homes abandoned in areas with declining populations. Although that outcome could be dire for areas losing population, it would boost the need for new construction in the country overall. More severe weather could also affect the number of homes that need to be replaced.

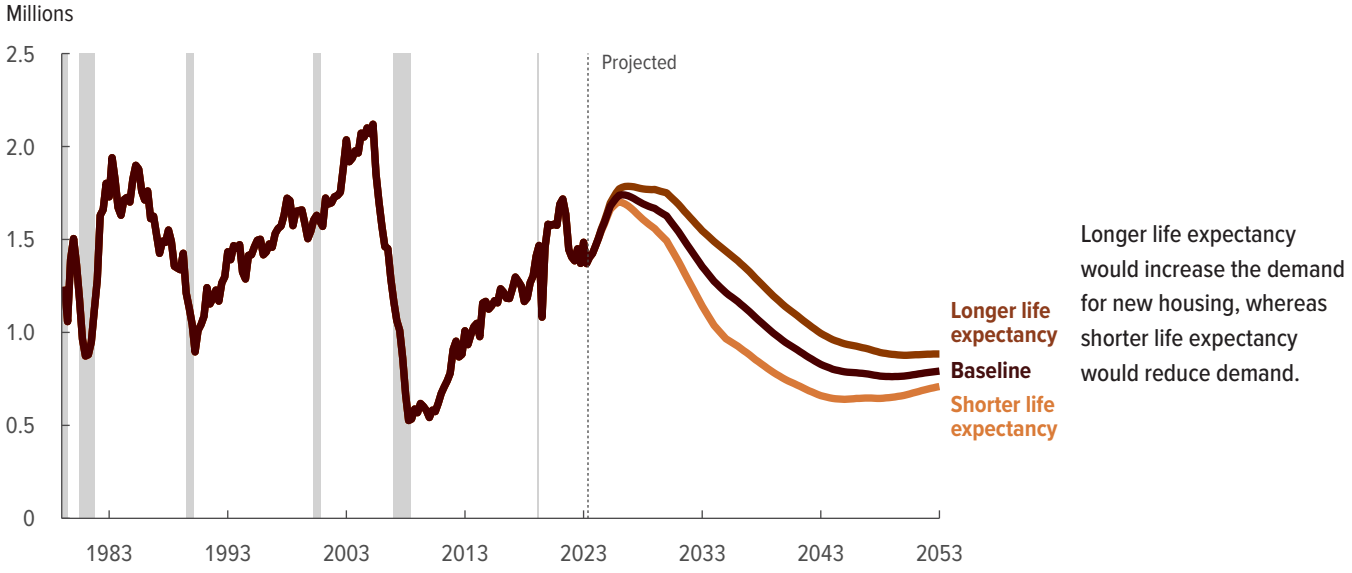
Net removals will average 0.14 percent of the existing stock per year from 2024 to 2053, CBO estimates. The agency examined two scenarios in which the removal rate varies. In the first scenario, net removals average 0.28 percent of the stock per year beginning in 2025, as they did from 1968 (the earliest year available) to 1999. After 20 years, the number of housing starts is more than 200,000 above the baseline projection per year (see Figure 1-8). In the second scenario, net removals average between 0.07 percent and 0.08 percent of the stock per year, as they did from 2000 to 2019. After 20 years, the number of housing starts is more than 110,000 less than in the baseline projection per year.

CBO's Forecasting Record

To help quantify uncertainty in its forecasts, CBO assesses its two-year and five-year forecasts of housing starts and compares them with forecasts from the *Blue Chip* consensus, an average of about 40 private-sector forecasts (see Table 1-3). CBO compared the two-year forecasts of housing starts made from 1991 to 2022 and the five-year forecasts made from 1991 to

Figure 1-7.

Housing Starts Under Different Assumptions About Life Expectancy



Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

2019, following the methodology in *CBO's Economic Forecasting Record: 2023 Update*.[4]

As measured by the average error, CBO's two-year and five-year forecasts for housing starts have been high—by an average of about 2 percent and 10 percent of the average actual values, respectively. (The average error is CBO's primary measure of centeredness, which indicates how close the average forecast value is to the average actual value over time.) The longer-term, five-year forecasts have been less accurate than the two-year forecasts and have exhibited larger root mean square errors. (The root mean square error, which is calculated by squaring the forecast errors, averaging those squares, and taking the square root of that average, is CBO's primary measure of accuracy, or the degree to which forecast values are dispersed around actual outcomes.)

Because all forecasters faced the same challenges, periods in which CBO made large overestimates typically coincide with periods in which other forecasters made similarly large overestimates. At times, errors have been quite large (see Figure 1-9). Both CBO and the *Blue Chip* consensus failed to anticipate the magnitude of the housing boom in the mid-2000s or the magnitude of the collapse in home building during and after the 2007–2009 recession. The pattern of five-year errors is broadly similar.

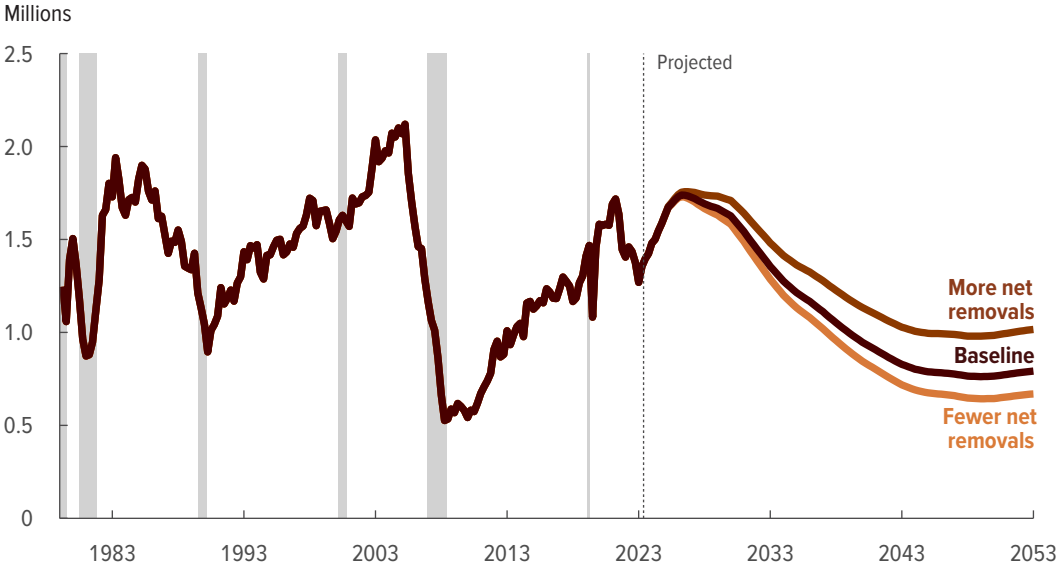
CBO's two-year projections of housing starts have been as accurate as those of the *Blue Chip* consensus, and CBO's five-year projections have been less accurate than those of the *Blue Chip* consensus: For the five-year period, CBO's forecasts have exhibited larger root mean square errors. Both CBO's and the *Blue Chip* consensus forecasts of housing starts have displayed positive average errors, meaning that the forecasts have been too high, on average.

The treatment of demographics in the analysis of housing starts and in the number of households shown in this report is a recent enhancement to CBO's forecasting model, made partly to improve the accuracy of CBO's forecasts. Compared with CBO's modeling of housing starts in 2021, the approach used in the current analysis reduces the historical errors by more than one-quarter. However, even a perfect model can give an erroneous forecast if the forecasts for the variables used in the model are wrong. For example, if financial conditions for mortgages became much more restrictive than CBO expects, the number of housing starts would probably be less than CBO forecast, even if the model of housing starts was perfectly accurate.

4. Errors are equal to the forecast value minus the actual value. See Congressional Budget Office, *CBO's Economic Forecasting Record: 2023 Update* (June 2023), www.cbo.gov/publication/59078.

Figure 1-8.

Housing Starts Under Different Assumptions About Replacement Demand



More net removals of units from the housing stock would increase replacement demand for new housing units. Fewer net removals would reduce replacement demand.

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

Table 1-3.

Measures of Performance for Forecasts of Annual Housing Starts

Millions of housing starts

	CBO	*Blue Chip*
Two-year forecasts of housing starts		
1991 to 2022		
Average error	0.03	0.01
Root mean square error	0.19	0.19
Five-year forecasts of housing starts		
1991 to 2019		
Average error	0.13	0.08
Root mean square error	0.35	0.31

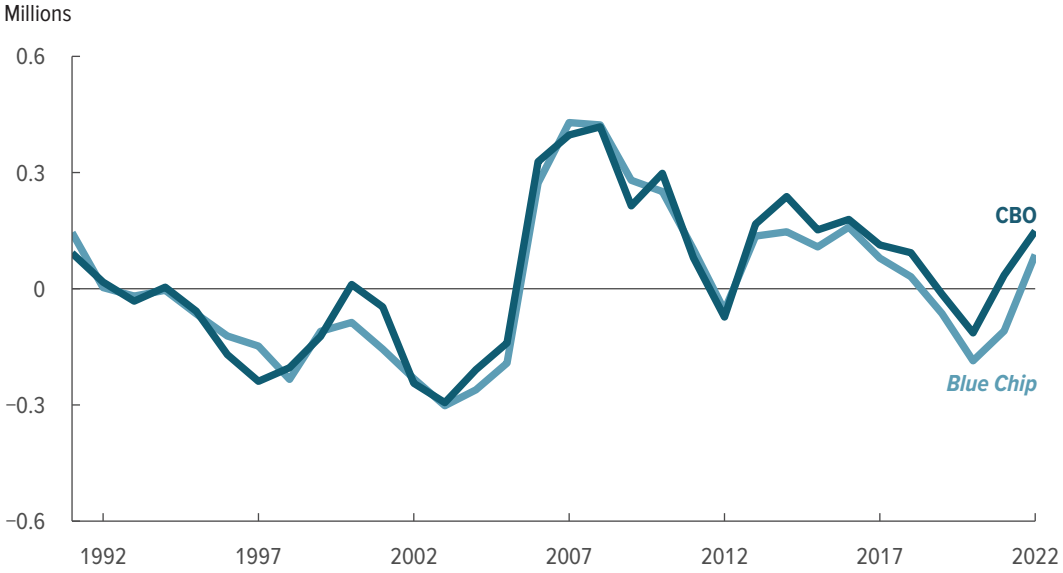
Data sources: Congressional Budget Office; Wolters Kluwer, *Blue Chip Economic Indicators*. See www.cbo.gov/publication/60191#data.

For context, the average actual value of housing starts for the two-year forecasts was 1.34 million, so the average error of 0.03 million is somewhat more than 2 percent of that average value.

The root mean square error, which is calculated by squaring the forecast errors, averaging those squares, and taking the square root of that average, is CBO's primary measure of accuracy, or the degree to which forecast values are dispersed around actual outcomes.

Figure 1-9.

Difference Between Projected and Actual Values in Two-Year Forecasts of Housing Starts



Errors in CBO's two-year forecasts of housing starts have been similar to those of the *Blue Chip* consensus.

Data sources: Congressional Budget Office; Wolters Kluwer, *Blue Chip Economic Indicators*. See www.cbo.gov/publication/60191#data.

The lines show projected values minus actual values. Positive numbers indicate an overestimate.

Chapter 2: CBO's Method for Projecting Housing Starts

To project housing starts, the Congressional Budget Office begins by separating demand for new housing units into two components: one reflecting underlying conditions and another reflecting other factors. CBO uses many variables, including population growth and financial conditions, to model those components. Housing starts are modeled as the primary source of supply needed to meet that demand.

Framework for Projecting Housing Starts

Housing starts, which are the primary source of the supply of new housing units, help to balance the supply and demand of those units.[1] Shipments of mobile homes are the other source, but they account for only a small share of new housing units.

Demand for new housing units can be divided into two parts:

- The underlying demand for new housing units that prevails when financial and cyclical conditions are normal and vacancy rates are consistent with their historical trends; and
- The effects of all other factors on demand for new housing units, including the cost of housing, lending standards, and deviations in the number of vacant housing units (including second homes) from its trend level.

Underlying Demand for New Housing Units

Over long periods, underlying demand for new housing units is the main factor determining housing starts. That underlying demand arises from five sources:

- Household formation due to domestic population growth by age group;
- Household formation due to net immigration by age group;
- Household formation due to underlying changes in households per person by age group;
- Underlying demand for additional vacant units, including second homes; and
- Underlying demand for replacement units.

Those sources are discussed in the next section. Domestic population growth is usually the largest driver of underlying demand.

Effects of All Other Factors on Demand for New Housing Units

Many factors can cause actual demand for new housing units to differ from underlying demand (see Table 2-1). Deviations in mortgage rates from typical (or underlying) rates influence the number of housing units that existing and potential homeowners demand. The tax treatment of housing can also affect demand for both owner-occupied and rental housing units. Lending standards influence the ability of potential homeowners to qualify for mortgages. For the most part, those factors cause the number of households per person to differ from underlying numbers. In addition, a deviation in the number of vacant housing units from its trend level can cause demand for new housing units to differ from underlying demand.

Household Formation

Household formation is closely related to the demand for new housing units, although the two can differ because of changes in the number of vacant housing units and in replacement demand. Projections of the underlying demand for housing units and demand for new housing units from other factors can be used to project the number of households. Details on underlying demand for housing units by age group can be used to project the number of households by age group.

1. The start of construction occurs when excavation begins for the footings or foundation of a building. All housing units in a multifamily building are defined as being started when that excavation begins. For example, the beginning of excavation for a 300-unit apartment building counts as 300 multifamily starts. A housing unit is a house, an apartment, a mobile home or trailer, a group of rooms, or a single room occupied or intended for occupancy as separate living quarters.

Table 2-1.

Average Annual Historical and Projected Housing Starts

Millions

	Actual or forecast housing starts	Underlying housing starts	Factors causing starts to differ from underlying housing starts
2002–2006	1.88	1.37	Expectations of rising home prices, loose lending standards
2007–2014	0.84	1.41	Excess supply, tight lending standards, expectations of falling home prices[a]
2015–2019	1.21	1.44	Excess supply, tight lending standards[a]
2020–2023	1.49	1.21	Desire for more living space, low real mortgage rates
2024–2033	1.59	1.58	
2034–2043	1.06	0.97	Pent-up demand
2044–2053	0.78	0.75	

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

a. Changing preferences for living arrangements and increased student debt may also have been factors.

Estimating the Underlying Demand for New Housing Units

The bulk of underlying demand for new housing units comes from underlying household formation—that is, household formation that results from domestic population growth by age group, net immigration by age group, and underlying changes in the number of households per person by age group. The other sources of underlying demand are underlying demand for vacant units, including second homes, and replacement demand.

Choosing an Estimate of the Number of Households

The first step in estimating underlying household formation is to choose which estimate of the number of households to use. Many such estimates are available, and each has advantages and disadvantages. The choice of which estimate to use depends on the characteristics that will be optimal for a particular analysis.

In CBO's assessment, quarterly estimates from the Census Bureau's Current Population Survey/Housing Vacancy Survey (CPS/HVS) provide the best estimate of households for the purpose of forecasting housing starts.[2] However, analysis that uses other estimates can help explain how various determinants of the demand for housing affect the number of households.

Various Measures of the Number of Households. The Census Bureau publishes several estimates of the number of households. The definitive estimate is from the decennial census, which is available every 10 years. The American Community Survey and the American Housing Survey include a wide variety of housing data but are published with a lag of one or two years. The Annual Social and Economic Supplement of the Current Population Survey (CPS ASEC) also provides an annual estimate of households and is published with only a six-month lag. The Census Bureau tabulates a monthly estimate of households, CPS Basic, which, when averaged over each year, closely parallels the CPS ASEC at an annual frequency. Finally, the CPS/HVS provides quarterly estimates of households released with a lag of one month.

In addition, other data sets (such as the Federal Reserve's Survey of Consumer Finances and the University of Michigan's Panel Study of Income Dynamics) contain detailed information about a sample of families or individuals regarding factors that could affect the decision to form a household. Although those data sets can be valuable for determining why the number of households changes over time, they do not provide estimates of the total number of households.

The Measure CBO Uses. To create its forecast of housing starts, CBO uses the CPS/HVS's estimate of the number of households (adjusted for changes in the Census Bureau's methodology).[3] The agency does not use

2. Census Bureau, "Housing Vacancies and Homeownership" (accessed April 30, 2024), www.census.gov/housing/hvs/index.html.

3. Occasionally, the Census Bureau changes the methodology it uses to estimate households and the housing stock. When it makes a change, it does not revise its past estimates but rather publishes data for the year in which the change was made with and without the change. To make the data consistent, CBO applies the percentage change to data for all previous years. For example, if a change boosted the number of households by 1 percent in the year in which a change was made, CBO also boosts the number of households in each prior year by 1 percent. However, CBO gradually phases out changes resulting from a decennial census over the preceding decade.

the decennial census, because it is available only every 10 years. The annual CPS/HVS is a better predictor of housing starts than the CPS ASEC.

Moreover, the number of households in the CPS/HVS's data rose during and after the coronavirus pandemic in a way that matches other information about how preferences for living arrangements changed. The survey's data coincided more closely with the sharp rise in home prices since the pandemic: Its measure of households grew faster—by 900,000 per year—from 2020 to 2022 than it did over the prior decade. The CPS ASEC series instead grew more slowly from 2020 to 2022, adding 300,000 fewer households per year than it did during the prior decade, which is seemingly at odds with the rise in home prices.

Household Formation Due to Population Growth

The net change in the number of households can be split into the portion caused by population growth and the portion caused by other factors, the latter of which is captured by changes in headship rates:

- For each age group, the change in the number of households due to population growth is the change in the population of that age group multiplied by its headship rate; and
- The change in the number of households due to other factors is the population of the age group multiplied by the change in its headship rate.[4]

Headship rates for most age groups are lower now than they were in the early 1980s, so population growth has been responsible for all of the rise in the number of households since then.

Population growth is the sum of domestic population growth and net immigration. The speed with which immigration, as measured by the Census Bureau, affects household formation appears to differ from the speed with which domestic population growth affects household formation. Consequently, CBO modeled the effects of immigration on household formation separately.

Domestic Population Growth. To simplify the analysis in this report, CBO divided the population into age groups. The domestic growth of an age group equals the number of people aging into the age group minus the number of people aging out of it and the number of deaths. That growth differs from total population growth by age group, which also includes net immigration by age group.

For a given year, household formation stemming from domestic population growth is the sum across age groups of each age group's domestic population growth times its headship rate in the previous year. Headship rates are higher for older age groups, so the growth of older age groups has a greater influence on household formation than the growth of younger age groups. If those aging effects are strong enough, household formation stemming from domestic population growth could be positive even if the number of adults is declining.

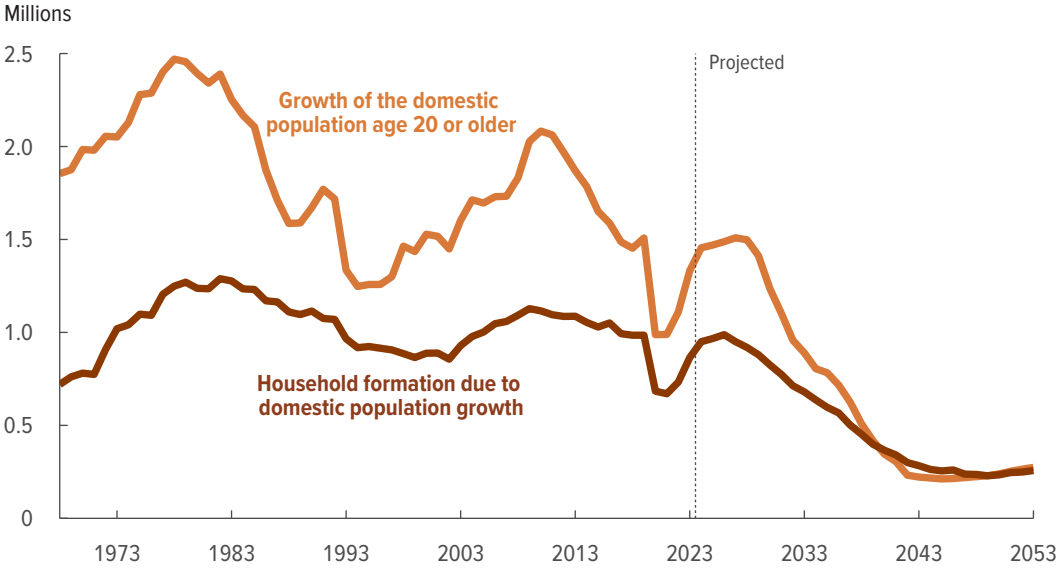
Total household formation due to domestic population growth is correlated with domestic growth of the population age 20 or older (see Figure 2-1). Growth in the number of households is typically about half that of the adult population because a majority of adults live with another adult—a spouse, partner, roommate, or adult child or other relative.

Historically, population growth has varied proportionately more than the amount of household formation resulting from that growth because much of the variation in population growth stems from growth in the population of younger adults, who have lower headship rates than older adults. In CBO's forecast, a decline in the number of people ages 20 to 34 during the early 2040s has a larger negative effect on population growth than on household formation, so domestic growth of the adult population falls below household formation.

4. Population is the resident population plus members of the U.S. armed forces living abroad. A household consists of all people who occupy the same housing unit as their usual residence, whether one person, a family, or a group of unrelated individuals. Each household has one head of household. The headship rate for an age group is the number of heads of households within that age group expressed as a percentage of the number of people in that age group. Higher headship rates imply stronger demand for housing. The age groups are 24 or under, 25 to 29, 30 to 34, 35 to 44, 45 to 54, 55 to 64, 65 to 74, and 75 or older. They correspond to the age groups for which the number of households is available from the CPS ASEC. To make those data consistent with the household data from the CPS/HVS, CBO estimated the headship rate for each age group by multiplying the number of households from the CPS ASEC for each age group by the ratio of total households from the CPS/HVS to total households from the CPS ASEC and dividing by population for each age group. Because most households headed by people under age 25 are headed by people ages 20 to 24, the population divisor for that age group is the population ages 20 to 24 plus 0.3 times the population ages 18 and 19.

Figure 2-1.

Declining Annual Household Formation Due to Slower Domestic Population Growth



Household formation due to domestic population growth is expected to slow as domestic growth of the population age 20 or over slows.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

Domestic population growth is total population growth minus net immigration.

Net Immigration. Modeling the effect of net immigration on household formation is less straightforward than modeling the effect of domestic population growth on household formation for two reasons: Annual data on net immigration are less accurate than annual data on domestic population growth, and new immigrants do not form households as rapidly as native-born residents do.[5]

Net immigration is more difficult to measure than births and deaths. Estimates of net immigration have often been smoothed and thus provide limited information about year-to-year changes. To calculate annual numbers for net immigration from the Census Bureau's data, CBO used total population growth minus births plus deaths, because total population growth equals net immigration plus births minus deaths. The Census Bureau appears to have estimated that net immigration occurred at a roughly steady rate between decennial censuses through 2000 (see Figure 2-2). Without specific information on annual immigration, that is a reasonable estimate, but it probably introduces measurement error into annual estimates of net immigration.[6]

A second reason that modeling household formation from net immigration differs from modeling it from domestic population growth is that newly arrived immigrants form independent households at a slower rate than native-born residents of the same age. On average, the headship rate of newly arrived immigrants is lower than that of native-born residents, but immigrants' headship rates gradually converge on those of native-born residents the longer they remain in the United States.

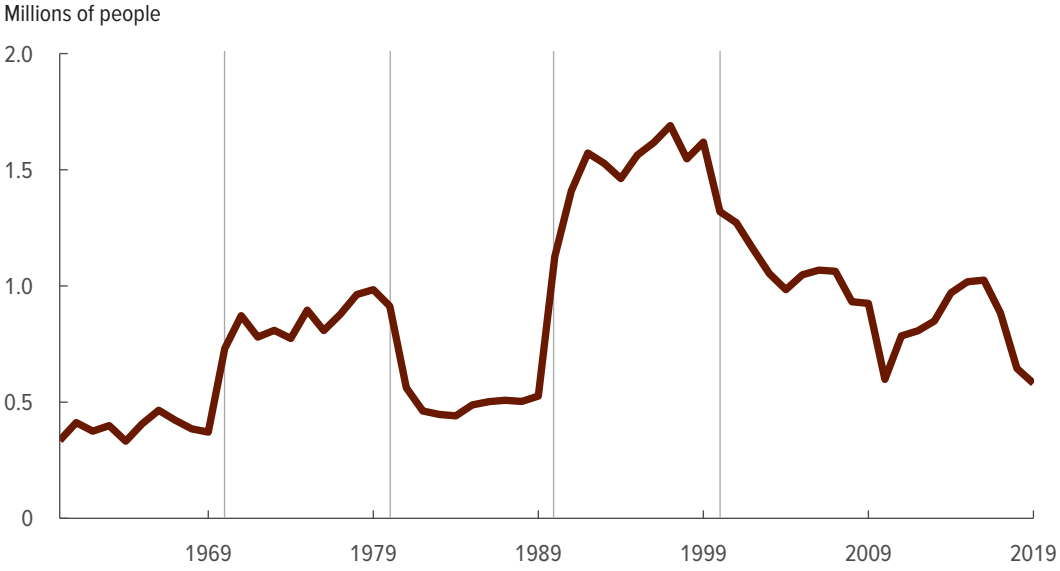
CBO addressed both of those modeling challenges by using moving averages of the number of households resulting from net immigration. (A moving average is a succession of averages of the raw data. For example, a four-quarter moving average is, for each quarter, an

5. Gary Painter and Zhou Yu, "Caught in the Housing Bubble: Immigrants' Housing Outcomes in Traditional Gateways and Newly Emerging Destinations," *Urban Studies*, vol. 51, no. 4 (March 2014), pp. 781–809, https://doi.org/10.1177/0042098013494425; and Zhou Yu and Michael Haan, "Cohort Progress Toward Household Formation and Homeownership: Young Immigrant Cohorts in Los Angeles and Toronto Compared," *Ethnic and Racial Studies*, vol. 35, no. 7 (July 2012), pp. 1311–1337, https://doi.org/10.1080/01419870.2011.602089.

6. For CBO's estimates of net immigration, see Congressional Budget Office, *The Demographic Outlook: 2024 to 2054* (January 2024), www.cbo.gov/publication/59697. This report uses the Census Bureau's estimates through 2021 and CBO's estimates for 2022 through 2054.

Figure 2-2.

Implied Net Immigration



The annual number of net immigrants implied by the Census Bureau's data on births, deaths, and the total population was fairly constant between decennial censuses through 2000.

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

Net immigration is estimated as the change in population minus the number of births plus the number of deaths.

The annual population data from the Census Bureau used to create the figure do not incorporate data from the 2020 census, which imply faster population growth and thus greater immigration than are implied by the Census Bureau's previous estimates for 2011 to 2019. That more rapid pace of immigration during the 2011–2019 period is incorporated in this report's estimates of the effects of immigration on household formation.

average of the raw data for that quarter and the previous three quarters.) Moving averages eliminate the artificially large changes in immigration rates in census years through 2000. Moving averages also address the issue of gradual household formation by new immigrants by incorporating an assumption that their headship rates converge with those of the native-born population over the course of the years encompassed by the moving average. Before applying the moving averages, CBO calculated household formation stemming from net immigration in the same way that it calculated household formation from domestic population growth—by summing across age groups each age group's net immigration multiplied by its headship rate in the previous year.

From those annual estimates of the effect of net immigration on household formation, CBO was able to estimate historical household formation most accurately by combining contemporaneous net immigration with a moving average of net immigration reflecting information from earlier periods. Specifically, CBO used a model in which a weight of 20 percent was assigned to contemporaneous net immigration and a weight of 80 percent was assigned to a moving average covering the previous seven years of net immigration. The raw data imply spikes in household formation and housing starts in the early 1990s that did not occur. A specification using moving averages, which puts less weight on annual fluctuations in the Census Bureau's data for net immigration and includes a more gradual rate of household formation for immigrants, fits the data better (see "The Equation for Housing Starts" in the appendix, and see Figure A-2 on page 32).

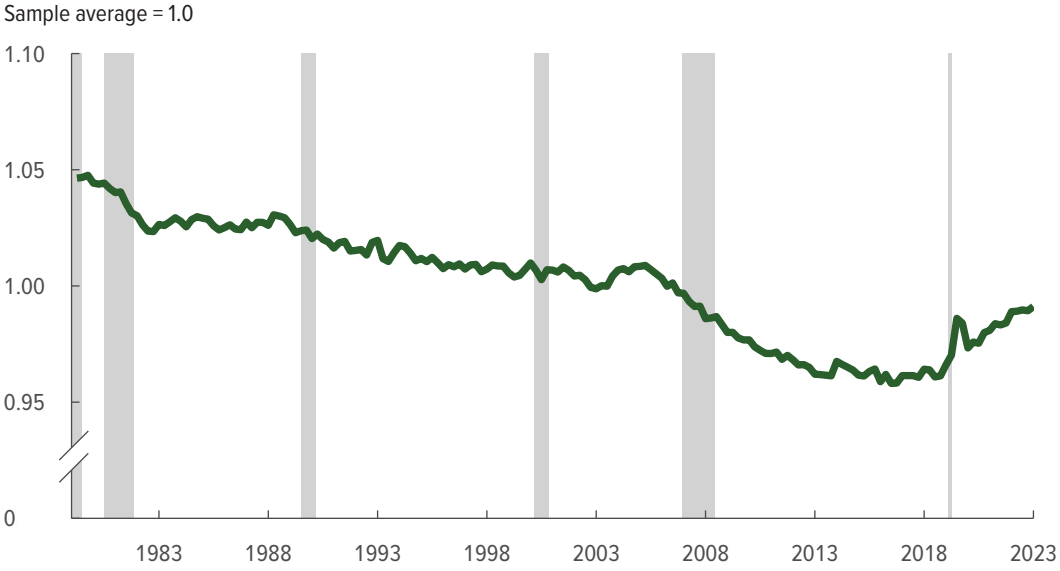
Household Formation Due to Underlying Changes in Headship Rates

A variety of factors can affect headship rates of different age groups. The underlying change is what remains after removing the identifiable effects of those factors.

The Age-Adjusted Headship Index. To simplify the analysis of factors affecting headship rates, CBO calculated an aggregate headship index adjusted to reflect the composition of the population by age group. To do that, the agency divided the total number of households by the number of households that would be expected on the basis of population growth alone (see Figure 2-3). The index is "age-adjusted" because the denominator weights the population growth of each age group by that group's

Figure 2-3.

Historical Age-Adjusted Headship Index



Headship rates fell during and after the 2007–2009 financial crisis as lending standards tightened. Headship rates rose after the coronavirus pandemic as people desired more living space.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

The headship rate of an age group is the number of households headed by people of that age group divided by its population. The age-adjusted headship index is the total number of households divided by the number of households that would be expected on the basis of population growth alone.

headship rate. The main features of that index are a sharp drop beginning at the peak of the housing boom in the 2000s, a large rebound after the pandemic, and a modestly declining underlying trend. The timing of that rebound is distorted by a temporary spike in headship rates in 2020 as a result of assumptions the Census Bureau made to address the difficulty of conducting interviews for the CPS/HVS during the pandemic.[7]

Factors Affecting Headship Rates. Several economic factors have affected headship rates in the past, including broad economic conditions, mortgage lending standards, student debt, real mortgage rates and rents (that is, mortgage rates and rents adjusted to remove the effects of inflation), the tax treatment of housing, and real incomes. In addition, living preferences, including changes in the desire or ability to work from home, affect headship rates.

Quantifying the relative importance of those factors to changes in headship rates is difficult, and CBO's choice of the CPS/HVS's measure of households adds to that difficulty. Although that survey's measure is the best suited to explaining housing starts, it has considerably less detail than other measures of households. Researchers often use such details to examine the effects of various factors on headship rates. Consequently, movements in headship rates that are explained in the research literature may differ from those in the data used in this report.

Many economists have explored the reasons for the fall in headship rates between 2006 and 2013. Initially, a rise in unemployment was viewed as playing a key role.[8] As headship rates continued to decline after the unemployment rate began to fall, it became clear that other factors

7. After in-person interviewing was suspended in mid-March 2020, the percentage of units for which an interview could not be completed but that were classified as occupied increased in relation to its historical average. That increase probably did not reflect a true increase in the number of occupied units. The percentage remained above its historical average through September 2020 as in-person interviews were gradually restored. See Census Bureau, "Frequently Asked Questions: The Impact of the Coronavirus (COVID-19) Pandemic on the Current Population Survey/Housing Vacancy Survey (CPS/HVS)" (October 27, 2020), https://tinyurl.com/mttbbauu.

8. Andrew Paciorek, "The Long and the Short of Household Formation," *Real Estate Economics*, vol. 44, no. 1 (Spring 2016), pp. 7–40, https://doi.org/10.1111/1540-6229.12085; and Timothy Dunne, *Household Formation and the Great Recession*, Economic Commentary 2012-12 (Federal Reserve Bank of Cleveland, August 2012), https://doi.org/10.26509/frbc-ec-201212. For the modest effects of unemployment on household formation, see Marianne Bitler and Hilary Hoynes, "Living Arrangements, Doubling Up, and the Great Recession: Was This Time Different?" *American Economic Review*, vol. 105, no. 5 (May 2015), pp. 166–170, https://doi.org/10.1257/aer.p20151087.

were at work as well. Focusing on young adults, whose rates of headship declined most sharply, some researchers found that factors such as declining real wages and rising housing costs were also important.[9]

Mortgage lending standards and borrowing constraints had important effects on homeownership and home prices both in the run-up to the financial crisis and in its aftermath.[10] Although the literature examining those effects focused on homeownership and home prices, it is plausible that lending standards also affected headship rates. For example, greater ease of obtaining a mortgage may encourage people who were previously renting together to each purchase a home, thereby increasing the number of households.

Increased amounts of student debt reduce homeownership and increase the likelihood that young adults will live with their parents, although most studies find small effects.[11] One study found a larger effect of student debt on the propensity of young adults to live with their parents, but that effect was reduced by about 75 percent when a time trend was added to the equation estimating the effect.[12] That change highlights the difficulty of disentangling the effects of economic variables from shifts in preferences.

A shift in preferences appears to have driven the sharp rebound in headship rates since the pandemic. One study found that appreciation in home prices was driven by increased demand rather than a tightening of supply.[13] Because population growth was slowed by the pandemic, increased demand could only come from increased headship rates. Another study found that a shift to remote work explained over half of the increase in national home prices from 2019 to early 2022.[14] A rise in headship rates drove increased demand for both rental units and owner-occupied housing.[15]

Other factors can affect headship rates as well. CBO estimates that a higher cost of housing, as measured by the real mortgage rate and the real rental rate, reduces headship rates. Lower mortality rates among elderly people increase the chance that both spouses survive into old age, reducing the number of single-person households and thus the headship rate. CBO expects that trend to be at least partly offset in the future, as younger cohorts with higher divorce rates replace the current elderly population. The tax treatment of housing can also influence the desire to form households. During the three quarters following enactment of the 2017 tax act, home sales declined most in the highest price range—the one in which homebuyers were most affected by changes to the deductibility of property taxes and mortgage interest.[16]

9. Daniel Cooper and María José Luengo-Prado, "Household Formation Over Time: Evidence From Two Cohorts of Young Adults," *Journal of Housing Economics*, vol. 41 (September 2018), pp. 106–123, https://doi.org/10.1016/j.jhe.2018.06.002; Jordan D. Matsudaira, "Economic Conditions and the Living Arrangements of Young Adults: 1960 to 2011," *Journal of Population Economics*, vol. 29, no. 1 (January 2016), pp. 167–195, https://doi.org/10.1007/s00148-015-0555-y; and Kwan Ok Lee and Gary Painter, "What Happens to Household Formation in a Recession?" *Journal of Urban Economics*, vol. 76 (July 2013), pp. 93–109, https://doi.org/10.1016/j.jue.2013.03.004.

10. Paolo Gelain, Kevin J. Lansing, and Gisle J. Natvik, "Explaining the Boom-Bust Cycle in the U.S. Housing Market: A Reverse-Engineering Approach," *Journal of Money, Credit and Banking*, vol. 50, no. 8 (December 2018), pp. 1751–1783, https://doi.org/10.1111/jmcb.12504; Arthur Acolin and others, "Borrowing Constraints and Homeownership," *American Economic Review*, vol. 106, no. 5 (May 2016), pp. 625–629, http://dx.doi.org/10.1257/aer.p20161084; and Stuart A. Gabriel and Stuart S. Rosenthal, "The Boom, the Bust and the Future of Homeownership," *Real Estate Economics*, vol. 43, no. 2 (Summer 2015), pp. 334–374, https://doi.org/10.1111/1540-6229.12075.

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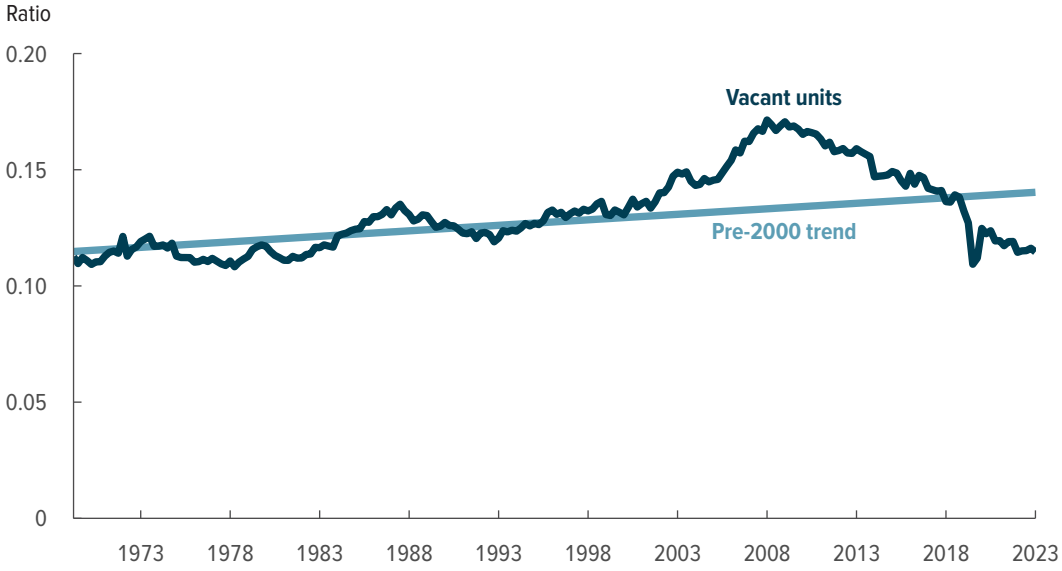
Figure 2-4.

Vacant Housing Units per Household



During the 2000s, the number of vacant housing units increased in relation to its pre-2000 trend. But that number is now well below that trend, indicating pent-up demand.

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

Pent-up demand is the inverse of the difference between the lines. That value is then converted to millions of units and adjusted for problems in the Census Bureau's Current Population Survey/Housing Vacancy Survey in 2020.

Underlying Changes in Headship Rates. The underlying age-adjusted headship index is the age-adjusted headship index after subtracting the identifiable effects of factors affecting headship. (For discussion of how those effects are estimated, see the appendix.) Because of the downward trend in the age-adjusted headship index, household formation due to underlying changes in headship rates has been negative over time and is expected to continue to subtract from underlying household formation in the future.

Other Components of Underlying Demand for New Housing Units

The other two components of the underlying demand for new housing units are the demand for vacant units, including second homes, and the demand for replacement units.

Underlying Demand for Vacant Units. Several types of vacant housing units are included in the CPS/HVS's data.[17] Conceptually, they can be classified as seasonal units, other utilized vacant units, and unutilized vacant units. Seasonal units are vacant most of the year but are occupied seasonally. Other utilized vacant units include units rented or sold but not yet occupied and units held off the market for various reasons, including use as second homes. Unutilized vacant units are vacant units for rent or for sale.[18]

The number of vacant units per household trended up gradually until about 2000 (see Figure 2-4). The number of seasonal units per household and the number of unutilized vacant units per household increased during the housing bubble of the 2000s and subsequently declined as the number of unutilized vacant units fell because of less new construction. Numbers of both types of units per household returned to pre-2000 levels in 2019. Other utilized vacant units, which include second homes, account for the long-term upward trend in total vacant units per household.

CBO projects that the long-term upward trend in vacant units per household will continue. Underlying demand for additional vacant housing units consists of

17. Housing units are considered vacant if they are usable but not occupied year-round. Units that have been condemned or have interiors exposed to the elements are not considered part of the housing stock and are not counted as vacant units.

18. For a fuller discussion of vacant housing units, see Congressional Budget Office, *The Outlook for Housing Starts, 2009 to 2012* (November 2008), pp. 6–10, www.cbo.gov/publication/20375.

the growth due to the upward trend in that ratio plus the units needed to accommodate the underlying growth in the number of households. Because the latter is projected to slow, by CBO's estimate, that demand slows from an average of 240,000 per year over the next decade to 160,000 per year from 2034 to 2043 and 130,000 per year from 2044 to 2053.

Underlying Demand for Replacement Units. Many housing units are removed from the housing stock each year through demolition, disaster, dilapidation to the point that the interior is exposed to the elements, or conversion to nonresidential use. At the same time, fewer units are added to the stock when previously condemned structures are rehabilitated or when nonresidential structures are converted to residential use, although such conversions can be difficult.[19] Underlying demand for replacement units is the difference between those removals and additions, after adjusting for temporary fluctuations.

The rate at which existing units have been removed from the housing stock has varied over time. During the 1980s and 1990s, net removals averaged 0.24 percent of the stock per year. The rate at which units were removed from the stock plunged below 0.1 percent per year during the housing boom of the 2000s. It has since recovered somewhat and is projected to rise further over the next 30 years as the housing stock ages—but to a rate below that of the 1980s and 1990s. Even so, CBO estimates, because the stock of units is expected to be much larger in the future than in the past, replacement demand will eventually exceed that of the 1980s and 1990s—rising from an average of 190,000 per year over the next decade to 250,000 per year from 2034 to 2043 and 280,000 per year from 2044 to 2053.

Other Factors Determining Demand for New Housing Units

In addition to underlying housing starts, several other factors, including lending standards, the cost of housing, and pent-up demand or excess supply of housing units, affect the number of housing starts. Lending standards are measured primarily by mortgage lending standards but also by banks' willingness to make consumer loans. The cost of housing includes changes in mortgage rates, real after-tax mortgage rates, and some other effects of tax policy. Supply constraints such as zoning restrictions can also affect housing starts. (See the appendix for CBO's analytic approach to projecting housing starts.)

Another important factor that can cause demand for new housing units to differ from underlying demand is a deviation in the number of vacant housing units from its underlying level. When the number of vacant units is above its trend, as it was in the early 2010s after the housing boom and financial crisis, the resulting excess vacant units reduce the demand for new units below underlying levels. When the number of vacant units is below its trend, as it is currently after a surge in the number of households over the past few years, the resulting pent-up demand boosts the demand for new units above underlying levels. Excess vacancies accumulate or pent-up demand declines when the number of new units exceeds growth in the demand for units. Excess vacancies decrease or pent-up demand increases when the number of new units falls short of growth in the demand for units.

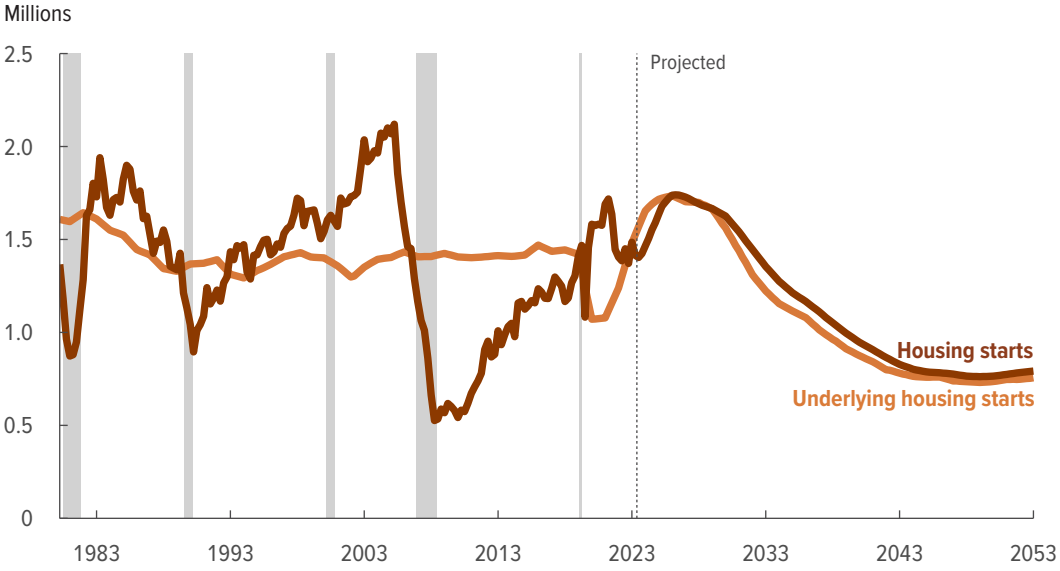
Although underlying housing starts generally account for the number of housing starts over the past 40 years, factors other than underlying housing starts have accounted for most of the year-to-year movement in housing starts (see Figure 2-5). During the housing boom from 2002 to 2006, expectations of soaring home prices caused housing starts to exceed underlying levels by a wide margin (see Table 2-1 on page 16). For the next decade, a combination of excess vacant units and tight mortgage lending standards pushed starts well below underlying levels. Student debt and an increased willingness of adult children to live with their parents may have contributed to excess supply by reducing demand.

In 2020, underlying starts fell sharply, but housing starts rose. The sharp increase in mortality rates due to the pandemic seemed likely to reduce the number of housing starts, as reflected in underlying starts. Instead, a drop in mortgage rates and then an increase in headship rates after the pandemic raised housing starts above prepandemic numbers. Rising mortgage rates pushed housing starts back down during the second half of 2022 and in 2023. High mortgage rates have also reduced the number of existing homes for sale by homeowners who borrowed at lower rates. However, those homeowners could become buyers if they sold their current homes, so the net effect on new construction of fewer existing homes for sale is uncertain.

19. Konrad Putzier and Will Parker, "Turning Empty Offices Into Apartments Is Getting Even Harder," *Wall Street Journal* (November 6, 2023), https://tinyurl.com/59fcn8ks.

Figure 2-5.

Housing Starts and Underlying Housing Starts



Beginning in 2030, housing starts are projected to fall with underlying housing starts, which in turn are projected to decline as growth of the adult population slows.

Data sources: Congressional Budget Office; Census Bureau. See www.cbo.gov/publication/60191#data.

The start of construction occurs when excavation begins for the footings or foundation of a building. All housing units in a multifamily building are defined as being started when that excavation begins. Underlying demand for new housing units is the demand that prevails when financial and cyclical conditions are normal and vacancy rates are consistent with their historical trends. Underlying housing starts are the portion of underlying demand met by new construction rather than by shipments of mobile homes.

CBO's Method for Forecasting Household Formation

A forecast of household formation is useful in projecting housing starts because the number of households contributes directly to housing starts, through its effect on the number of excess vacant units, and because many of the drivers of household formation are also drivers of housing starts. To forecast the rate of household formation, CBO combined the rate of household formation due to population growth with its forecast of the age-adjusted headship index. In addition to the underlying trend, several factors could affect headship rates by age group over the next 30 years, including housing costs, mortgage lending standards, incomes, and structural factors. (For details about CBO's use of those factors in its analysis, see the appendix.)

Although the forecast is uncertain, CBO expects the underlying declining trend in the age-adjusted headship index over the past 40 years to moderate over the forecast period (see Figure 2-6). A slower decline is plausible because the index increased in the 1970s and has recently increased. The rise in headship rates from a desire for more space after the pandemic is likely to permanently push that rate above the underlying trend.

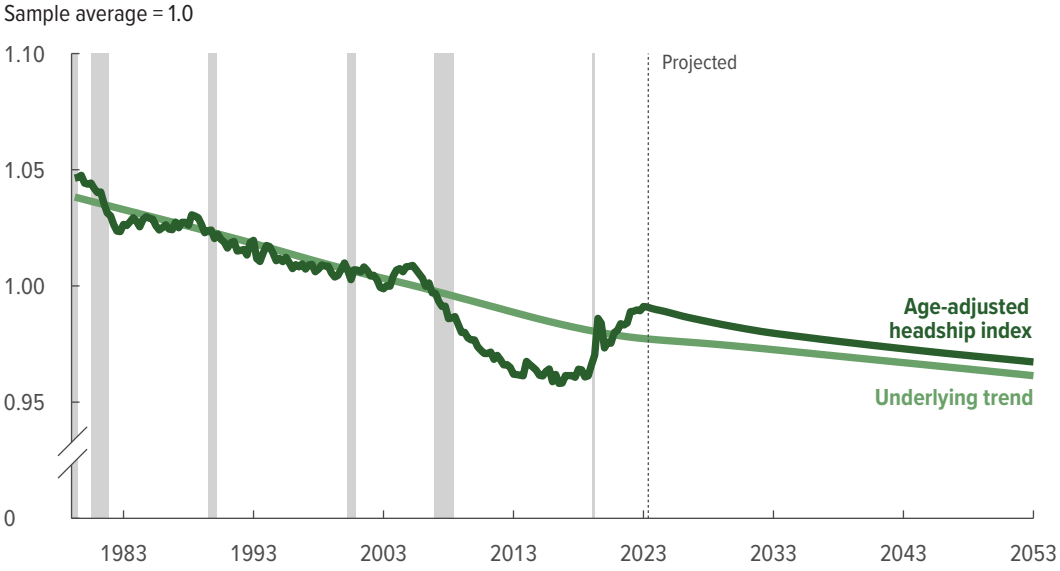
Underlying Supply of New Housing Units

The underlying supply of new housing units—that is, their supply in the absence of deviations from trends in lending standards, the cost of housing, pent-up demand for housing, or shifts in preferences—is defined by CBO as being equal to the underlying demand for new housing units. The two sources of underlying supply of new housing units are underlying completions of started units and underlying shipments of mobile homes. Underlying completions of started units equal underlying demand for new housing units minus the underlying shipments of mobile homes. Underlying housing starts are slightly larger than underlying completions because 2 percent to 3 percent of housing units that are started are never completed (see Table 1-1 on page 5).

CBO projects the underlying shipments of mobile homes separately to account for factors such as replacement demand and changing preferences for different types of housing. Mobile homes accounted for a far larger share of new housing units before the housing boom of the 2000s than they have since. Mobile homes accounted for 16.4 percent of new housing units added from 1970 to 2001 but just 7.0 percent of new housing

Figure 2-6.

Forecast of the Age-Adjusted Headship Index



The age-adjusted headship index is projected to decline over the next 30 years.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

The headship rate of an age group is the number of households headed by people of that age group divided by its population. The age-adjusted headship index is the total number of households divided by the number of households that would be expected on the basis of population growth alone. The underlying age-adjusted headship index is the age-adjusted headship index after subtracting the identifiable effects of factors affecting headship.

units added from 2002 to 2023. In CBO's projections of the underlying supply of housing units, the number of mobile homes rises slightly as a percentage of total new units in the 2030s and 2040s as replacement demand becomes a larger share of total demand. Mobile homes depreciate faster than other types of housing and thus contribute disproportionately to replacement demand.

The actual supply of new housing units can differ from the underlying supply of new housing units for the same reasons that the actual demand for new housing units can differ from the underlying demand for new housing units. Thus, deviations from trends in lending standards, the cost of housing, pent-up demand for housing, or shifts in preferences can cause the actual supply of new housing units to be more or less than the underlying supply. In addition, variation from trends in factors such as zoning and land use requirements or geographic restrictions that reduce the availability of developable land can cause supply to differ from underlying levels.

Appendix: The Equations for Households and Housing Starts

This appendix provides technical information about the equations that the Congressional Budget Office used to model households and housing starts.

The Equation for Households

CBO projected the number of households using an equation for the age-adjusted headship index, or the total number of households divided by the number of households that would be expected on the basis of population growth alone. That effect of population growth on the number of households differs by age group and between domestic population growth and net immigration. (Domestic population growth differs from growth of the native-born population in that it includes the effects on the number of households of changes in the number of households per person for past immigrants and deaths of past immigrants.)

The Age-Adjusted Headship Index

The numerator of the age-adjusted headship index is the number of households. The denominator is the cumulative effect on the number of households that is due to population growth by age group. Lags for that cumulative effect differ between domestic population growth and net immigration. (Lagged data are those from previous quarters or years.)

For each age group in a given year, the raw effect (that is, the effect before any moving averages are applied) of domestic population growth on the number of households is growth of the total population minus net immigration for that age group times the headship rate for that age group in the previous year. (The headship rate is the number of heads of households within an age group expressed as a percentage of the number of people in that age group.) The headship rate rises with age as income and wealth rise and, for older age groups, as people become widowed, so an increase in the population of an older age group has a greater effect on household formation than an increase in the population of a younger age group.

CBO cumulated those raw effects of population growth on household formation beginning with 1961. To account for lags in household formation, CBO applied a 4-quarter moving average to the cumulated sum for domestic population growth. The agency applied a longer lag to net immigration because those annual estimates are less reliable and because immigrants tend to form households more slowly than the overall population does. For net immigration, CBO applied 0.2 times a 4-quarter moving average plus 0.8 times the average of the seven prior years (that is, a 28-quarter moving average lagged 4 quarters) to the cumulated effects of population growth to account for lags in household formation. To reflect population growth before 1961, the agency added 56.9 million to the cumulated sums so that the age-adjusted headship index averaged 1.0 over the sample period for the estimation.

Factors Affecting the Age-Adjusted Headship Index

Several factors affect the age-adjusted headship index. Some of those influence the cost of housing, such as the real rental rate (that is, the rate adjusted to remove the effects of inflation), the mortgage rate, and recent growth of home prices (as a measure of expected future growth of home prices). Other variables measure the difficulty of obtaining a mortgage and people's financial resources. The cumulative change in mortgage lending standards is an indicator of the difficulty of obtaining a mortgage. Real (inflation-adjusted) income per household affects people's ability to afford housing. Additional variables reflect the effect of sampling problems during the coronavirus pandemic and the desire for more living space during and after the pandemic. A time trend adjusts for trends in several of those variables and also captures the general downward trend of the age-adjusted headship rate over the past 40 years.

The Cost of Housing. The real rental rate is the logarithm of the ratio of the price index for shelter services to the price index for personal consumption expenditures. (Shelter services measure the flow of services that housing units provide to their occupants.) The mortgage rate is the rate on 30-year fixed-rate mortgages from Freddie Mac divided by 100. Past growth of home prices

Table A-1.

Equation for the Age-Adjusted Headship Index

	Coefficient	T-statistic
Constant	-0.233	-3.8
Real rental rate	-0.043	-3.5
Mortgage rates	-0.065	-3.2
Growth of home prices	0.045	6.9
Cumulative change in mortgage lending standards	-0.0043	-13.0
Real income per household	0.063	5.1
Effect of the coronavirus pandemic on the CPS/HVS	0.025	11.2
Desire for more living space	0.031	19.5
Trend	-0.0021	-8.2
R-squared	0.989	

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

CPS/HVS = Current Population Survey/Housing Vacancy Survey.

is the annualized 6-quarter growth rate of the quarterly housing price index for all transactions from the Federal Housing Finance Agency (FHFA), seasonally adjusted by CBO, lagged by 1 quarter, and divided by 100.

Lending Standards. Changes in mortgage lending standards are measured in different ways over time, depending on which data series are available from the Federal Reserve's Senior Loan Officer Opinion Survey. All of the series measure the net percentage of banks' tightening standards for residential mortgages. For the third quarter of 1990 through the first quarter of 2007, a series for all banks is available. For the second quarter of 2007 through 2014, series for prime, nontraditional, and subprime loans are weighted by their shares of originations. For the period after 2014, series for a variety of types of loans are weighted by their shares of originations. For quarters before the third quarter of 1990, fitted values are used from an equation relating the series for all banks to banks' willingness to make consumer loans and the lagged stock of excess vacant units. (Fitted values are those that would prevail if the estimated equation held exactly.)

Those changes in mortgage lending standards are then cumulated. That cumulative change in mortgage lending standards equals zero in the third quarter of 1966 and is then augmented by the change in mortgage lending standards in each subsequent quarter. The variable used in the equation is a 16-quarter moving average of the cumulative change in mortgage lending standards divided by 100.

Household Income. Real income per household is the logarithm of the ratio of the sum of 4-quarter moving averages of real disposable income and real potential gross domestic product to 56.9 million plus the cumulated effect of population growth since 1961 on household formation. (Real potential gross domestic product is the maximum sustainable output of the economy, adjusted to remove the effects of inflation.) The denominator in that ratio uses the effect of population growth on household formation rather than the actual number of households to avoid simultaneity.

Other Variables. The variable capturing the effects of the pandemic on the Current Population Survey/Housing Vacancy Survey is 1/6 in the first quarter of 2020, 1 in the second quarter, and 2/3 in the third quarter.[1] The variable capturing the desire for more space equals zero through the first quarter of 2020, rises by 1/12 for each of the next 12 quarters, and equals 1 thereafter. The time trend equals zero in the fourth quarter of 1958 and increases by 1/4 in each subsequent quarter, or by 1 per year.

The Estimated Equation

The dependent variable is the logarithm of the age-adjusted headship index. The equation is estimated beginning in 1981 because the availability of mortgages was constrained by the Federal Reserve's Regulation Q before then, leading to a different relationship between mortgage rates and headship.[2] The sample period ends in the third quarter of 2023. (For estimated coefficients and their *t*-statistics, see Table A-1. For the age-adjusted headship index and its fitted values, see Figure A-1.)

The equation fits well, with an *R*-squared value close to 0.99, and all variables are statistically significant. Relative to trends, the largest effects are an adverse effect from tighter mortgage lending standards from 2008 to 2012 and a positive effect from a desire for more living space since the pandemic that more than reversed that adverse

1. For the unadjusted survey data, see Census Bureau, "Housing Vacancies and Homeownership" (accessed April 30, 2024), www.census.gov/housing/hvs/index.html.

2. Before the early 1980s, Regulation Q imposed ceilings on interest rates for savings deposits. As a result, during periods of high interest rates on other investments, depository institutions lost deposits and could not issue as many mortgages.

Figure A-1.

Age-Adjusted Headship Index and Fitted Values

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

The numerator of the age-adjusted headship index is the number of households. The denominator is the cumulative effect on the number of households that is due to population growth by age group. Lags for that cumulative effect differ between domestic population growth and net immigration. Fitted values are those that would prevail if the estimated equation held exactly.

effect. As noted earlier, it is difficult to disentangle changes in preferences from economic variables, so the estimated effect from tighter mortgage lending standards may partially reflect a change in living preferences among young adults.

The coefficients on the real rental rate and real income per household should not be interpreted as the elasticities of the demand for housing services with respect to real rents and real incomes. Rather, household formation is just one way in which people respond to the cost of housing and their incomes. Most of the increased demand for housing services in response to higher incomes is satisfied by increased quality of dwelling units. Over long periods of time, the average sales price of new units (which incorporates both higher prices and increased quality) is roughly proportional to income per household.

Forecasting With the Estimated Equation

A key question in constructing a forecast using the estimated equation for households is how to treat the time trend. If projected over enough years, the negative trend would eventually lead to an unrealistically small forecast of the number of households. In addition, the trend was positive in the decade before the 1981–2023 sample period. In CBO's construction of the forecast, the effect of the estimated trend on the headship rate was cut by roughly half during the final two decades of the 30-year forecast period.

The Equation for Housing Starts

The equation for housing starts consists of two pieces that are multiplied together. The first piece contains three of the five components of underlying demand for housing units—household formation due to domestic population growth, household formation due to net immigration, and replacement demand—as well as a term capturing excess vacant units or pent-up demand. The second piece contains cyclical and financial variables, such as mortgage rates and lending standards, as well as a constant. The other two components of underlying demand for housing units—household formation due to the underlying trend in the headship rate and underlying demand for additional vacant units—roughly cancel each other out during the estimation period. To the extent that they do not, the net effect is captured in the constant term in the second piece of the equation.

The two pieces are multiplied together because the effect of a change in cyclical or financial variables on the number of housing starts is greater when underlying demand is higher. For example, a given decrease in mortgage rates

will lead to a larger number of additional starts if the population is growing rapidly and the number of potential new homeowners and renters is larger than it would be if the population was growing slowly and the number of potential new homeowners and renters was small. Similarly, a given decrease in mortgage rates will lead to a larger number of additional starts if there is pent-up demand for housing than it would if the number of excess vacant units was large.

Variables in the Equation

Variables in the equation for housing starts include components of underlying demand as well as cyclical and financial variables and other variables.

Components of Underlying Demand. Annual replacement demand is 0.14 percent of the lagged stock (*K*, in millions), the average annual replacement rate since 1980. The demographic contribution to housing starts is an 8-quarter moving average of household formation due to domestic population growth (*PD*, annual rate in millions), plus a 36-quarter moving average of household formation due to net immigration (*PI*, annual rate in millions). Those contributions are multiplied by 1 – *a*1 because the 4-quarter change in households (*HHa*, in millions), adjusted for sampling problems during the pandemic, is also included with a coefficient of *a*1. The final noncyclical nonfinancial variable is a lagged 12-quarter moving average of excess vacant housing units (*E*, in millions). Lengths of the moving averages were chosen on the basis of fit. Adding the underlying supply of mobile homes to the equation, by dividing by 1 plus the ratio of mobile homes to housing starts, worsens the fit, so that factor is left out.

Cyclical and Financial Variables. Two variables capture the effect of mortgage rates on new construction. A 2-quarter moving average of the mortgage rate (*r*, as a percentage) minus a 12-quarter moving average lagged 4 quarters measures the effect of changes in mortgage rates on housing starts. (That mortgage rate is the rate on new 30-year fixed-rate mortgages from Freddie Mac.) The second mortgage rate variable is the real after-tax mortgage rate (*rr*, as a percentage). The nominal after-tax mortgage rate is found by multiplying the mortgage rate by 1 minus the personal tax rate times the share of mortgage holders deducting mortgage interest from their taxable income. That nominal rate is converted to a real rate by subtracting an estimate of expected home price appreciation, equal to the annualized rate of growth of the FHFA house price index over the previous 6 quarters. Two variables in the equation for housing starts measure lending conditions. The first is the cumulative change in mortgage lending standards (*ML*, as a percentage), which, divided by 100, is also used in the equation for households. The second is a 2-quarter moving average of the net percentage of senior loan officers reporting greater willingness to make consumer loans (*WL*, as a percentage). (That variable fits better than the short-run change in mortgage lending standards.) To reflect an apparent downshift in that series beginning in mid-1995, 9 percentage points are subtracted from it beginning at that time.

Other Variables. The remaining variables in the equation are dummy variables, a trend, and a constant. A dummy variable to reflect the housing bubble (*B*) grows by 1/13 in each quarter of 2003, is flat at 4/13 through the first quarter of 2006, and decreases by 1/13 for each of the next 4 quarters. The scaling is chosen so that the annual averages of the variable sum to 1. A pandemic dummy (*CV*) equals 1 in the second quarter of 2020 and –1/4 in each of the subsequent 4 quarters. Its negative coefficient reflects a loss of construction during the worst of the pandemic and the catch-up afterward. A 5-quarter moving average of a dummy variable equal to 1 from 1981 to 1986 (*D80*) controls for a period when tax laws were more favorable for investors in rental housing. A final dummy variable captures the period from the second quarter of 2008 through the second quarter of 2010, when the first-time homebuyer tax credit was available (*HC*). The time trend (*T*) is the same as that in the equation for households. The effect of increased headship rates since the pandemic is captured through increased household formation (*HHa*) and through increasingly negative excess vacant units (*E*).

Final Form of the Equation

Here is the final form of the equation to be estimated:

$$
\begin{aligned}
HS_t = \{&0.0014K_{t-1} + (1 - a1) * [@m(PD_t, 8) + \\
&@m(PI_{t-4}, 28)] + a1 * d(HHa_t, 4) + a2 \\
&* @m(E_{t-1}, 12)\} \\
&\times \{c1 + c2 * [@m(r_t, 2) - @m(r_{t-4}, 12)] \\
&+ c3 * rr_t + c4 * ML_t + c5 \\
&* @m(WL_t, 2) + c6 * B_t + c7 * CV_t \\
&+ c8 * @m(D80_t, 5) + c9 * HC_t + c10 * T_t\},
\end{aligned}
$$

in which the subscripts denote time periods, $@m(x, y)$ denotes a y-quarter moving average of variable x, and $d(HHa_t, 4)$ is the 4-quarter change in HHa_t. All variables are quarterly. The sample period is the same as that for the equation for households, because Regulation Q

Table A-2.

Equations for Housing Starts

	Coefficient	T-statistic
	Model specification	
a1	0.037	2.1
a2	-0.116	-12.5
c1	1.151	26.5
c2	-0.024	-6.6
c3	-0.021	-8.8
c4	-0.0009	-13.3
c5	0.0012	2.1
c6	0.693	8.0
c7	-0.299	-5.3
c8	0.090	4.4
c9	0.008	0.2
c10	0.0020	5.4
R-squared	0.949	
	Alternative lag structure for immigration	
a1	0.117	5.2
a2	-0.073	-5.6
c1	1.038	18.1
c2	-0.028	-5.5
c3	-0.021	-6.4
c4	-0.0012	-13.1
c5	0.0011	1.4
c6	0.891	7.2
c7	-0.356	-4.5
c8	0.253	9.2
c9	0.086	1.9
c10	0.0032	6.5
R-squared	0.907	

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

The model specification uses a 36-quarter moving average of household formation due to net immigration. The alternative lag structure for immigration uses an 8-quarter moving average of household formation due to net immigration.

affected the availability of mortgages in earlier years, changing the relationship between mortgage rates and housing starts.

Estimated coefficients have the expected sign (see Table A-2). A permanent fall in mortgage rates would have a larger effect on housing starts in the first year than in later years, because the permanent level effect on starts from $c3 * rr_t$ would be augmented by a transitory effect from changes in mortgage rates from previous levels via $c2 * [@m(r_t, 2) - @m(r_{t-4}, 12)]$ in the first year. The coefficient on the first-time homebuyer tax credit has a large standard error and depends significantly on the specification of the equation. Therefore, the estimated coefficient should not be interpreted as CBO's assessment of the effect of such a tax credit on housing starts.

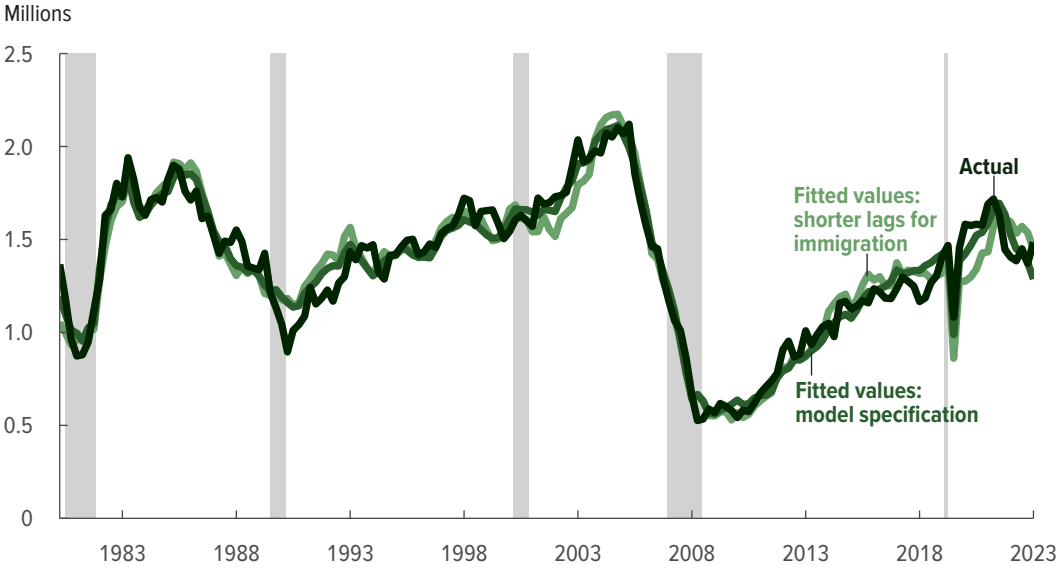
The importance of using different lag structures for domestic population growth and for net immigration can be seen by constraining them to have the same lag structure. Imposing the same lag structure on net immigration as that for domestic population growth significantly worsens the fit of the equation for housing starts (see Table A-2). It also produces some questionable coefficients; the large coefficient on the 1980s tax variable implies that multifamily housing starts would have been negative in early 1982 in the absence of favorable tax law. The model specification performs better than the alternative specification during the early 1990s, when the rate of immigration estimated by the Census Bureau rose sharply (see Figure A-2). It also performs better recently, when the alternative specification's swifter response to immigration implies that housing starts should have been stronger in 2023, as immigration increased, than in the second half of 2020 and 2021. Instead, housing starts decreased, in line with the model specification. Imposing the same lag structure for net immigration as for domestic population growth also significantly worsens the fit of the headship rate equation.

Forecasting With the Estimated Equation

To maintain consistency between the number of households and the housing stock, which is determined primarily by housing starts, CBO set the add factor (or projected error term) for housing starts to produce a realistic forecast of pent-up demand for housing. That is the reason that housing starts are greater than the underlying demand for housing starts over much of the forecast, as shown in Figure 2-5 on page 24. The excess vacancies term in the housing starts equation helps to reduce pent-up demand but on its own is not enough, possibly because of the long lags on that variable.

Figure A-2.

Actual Housing Starts and Fitted Values



CBO's equation for housing starts can account for most major movements in housing starts over time. An alternative specification with shorter lags for the effects of immigration performs less well.

Data source: Congressional Budget Office. See www.cbo.gov/publication/60191#data.

Fitted values are those that would prevail if the estimated equation held exactly.

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About This Document

This report is part of the Congressional Budget Office's continuing efforts to make its work transparent. In keeping with the agency's mandate to provide objective, impartial analysis, the report makes no recommendations.

Mark Lasky wrote the report with guidance from Robert Arnold and Richard DeKaser (formerly of CBO) and contributions from Nicholas Abushacra. Daniel Crown, Devrim Demirel, Michael Falkenheim, Sebastien Gay, Mitchell Remy, Jennifer Shand, Julie Topoleski, and David Torregrosa offered comments. Nicholas Abushacra and Grace Berry (formerly of CBO) fact-checked the report.

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CBO seeks feedback to make its work as useful as possible. Please send comments to communications@cbo.gov.

Phillip L. Swagel
Director
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