Arch | MI

Housing and Mortgage Market Review

HaMMR - Winter 2019

IN THIS ISSUE

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Five Predictions and One Wish for 2019 *by Ralph DeFranco*

The only thing that can be said with certainty is that everything changes. Even though uncertainty is a given, here are a few predictions on how I see the housing market evolving during 2019 – along with my one wish for the new year.

1. Home prices will increase, with only minor exceptions.

A housing shortage coupled with a strong job market should keep the current housing market slowdown from getting out of hand.[1] It follows that since the strong economy is widespread, home price growth is likely to be widespread as well, even in the face of rising interest rates. While the national average home price is likely to increase 2–5 percent next year, regional home price changes will vary widely based on local supply and demand conditions. Specifically:

- Areas likely to do well include retirement areas near water and metros popular with professionals and foreign buyers, such as coastal international hubs.
- At the other extreme, some limited and short-lived price declines would not be surprising as housing markets rebalance and adapt to higher interest rates. The areas most at risk of price declines are the extremes in both directions: metros with the hottest markets in recent years, some of which may have gotten ahead of themselves, and regions that already have relatively weak housing markets, including both legacy industrial centers and economies dependent on energy extraction, such as Alaska, North Dakota and West Virginia.

[1] *Please see this issue's "Market Recap for 2018" article for more details on why fundamentals suggest widespread home price declines are unlikely.*

(continued on page 6)

Interpreting and Understanding Current Housing Market Conditions

by David Gansberg, President and CEO of Arch MI

By all measures, the housing market has been robust for the past six to seven years. After home prices bottomed in 2012, we have enjoyed a period of significant nationwide home price increases and housing-related wealth creation. Home prices during this time generally exceeded long-term trends and increased at a rate greater than incomes. As a result, we now appear to be entering a period where home prices are increasing at a slower pace or even decreasing in some areas.

This is still a heathy market and moderate price decreases can co-exist with a healthy market. In some Metropolitan Statistical Areas, prices were increasing too quickly and a modest correction is necessary to ensure homes remain affordable to those whose earnings are at or near the median income for the region. While decreases may not be ideal for sellers, they are a positive sign for buyers and a necessary condition to building a sustainable market that avoids bubbles, overcorrections and crashes.

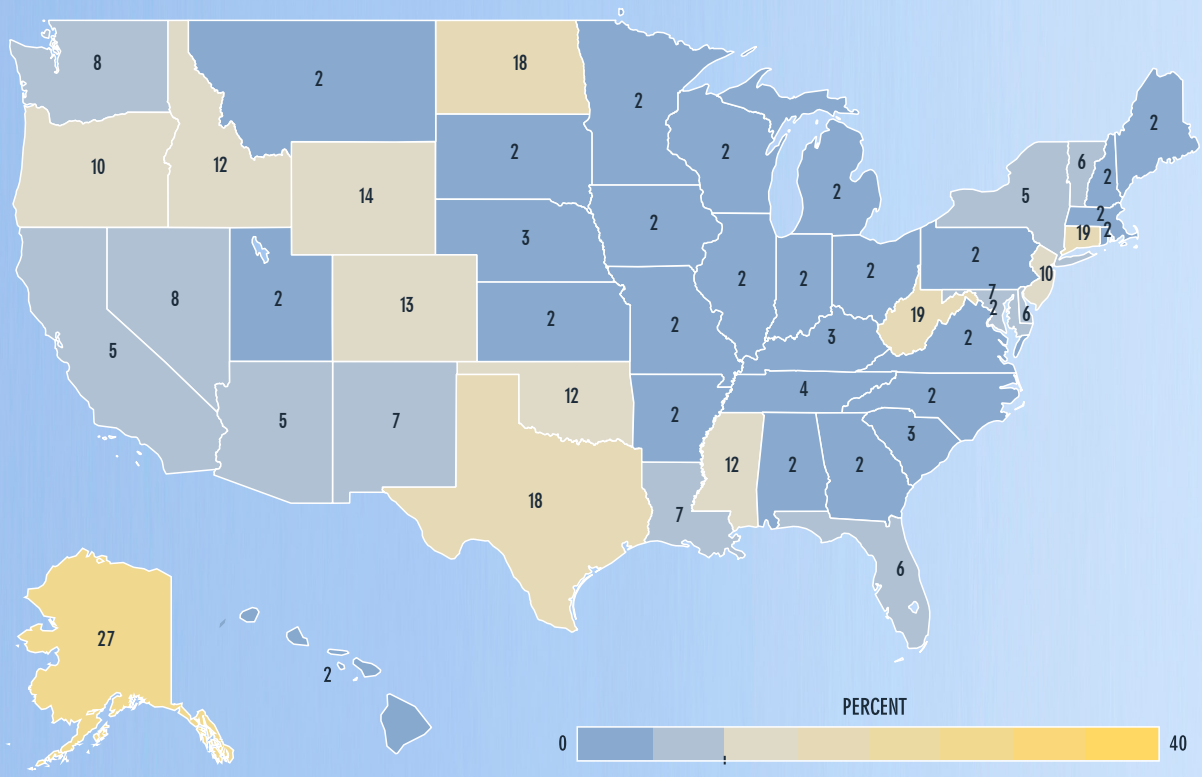
Looking ahead, 2019 may still turn out to be a decent year, even though home price growth is expected to slow. Interest rate volatility has increased in recent months, damping expectations of more increases to come. Even if mortgage rates increase slightly, rates would remain at low levels compared to decades past and home ownership is still within reach for many potential buyers. There is no doubt that the total originations market has been shrinking over the past several years, but the purchase market has been growing steadily and is forecasted to continue to do so in 2019. Total originations are expected to be level in 2019 compared to 2018 and abundant opportunities exist in the non-QM, alternative credit, first-time and Millennial homebuyers segments.

As we move into the new year, it is important to continue to understand the fundamentals and not generalize market conditions to a national level based on isolated trends, unique regional circumstances or attention-grabbing headlines meant to drive readership or generate clicks. The human psyche is an incredibly powerful tool that can either create or reduce demand for home ownership and the need for mortgages. It is our collective responsibility to continuously educate consumers and ensure they have all the tools necessary to make informed financial decisions that will generate positive long-term outcomes for every participant in the home ownership and mortgage cycle.

From my perspective, perhaps the greatest unknown as we move into 2019 is the potential impact of recent and upcoming leadership changes at key housing finance entities, regulatory agencies, policymakers and influencers. This group includes the Federal Housing Finance Agency, Fannie Mae and Freddie Mac, the Senate Committee on Banking, Housing, and Urban Affairs, the House Financial Services Committee, Ginnie Mae, the Federal Housing Administration, the Consumer Financial Protection Bureau, the Mortgage Bankers Association and countless others. It would be impossible to predict possible outcomes with any degree of confidence, but change is inevitable and on the horizon. We will see the impact of these changes in the coming months and years and it will give us great material for further commentary.

I hope you enjoy this issue of HaMMR and I want to extend my thanks to Ralph DeFranco and his team for another insightful and informative issue. If you have not yet had the opportunity, I encourage you to register for one of Ralph's webinars at archmi.com/hammr or read his latest post on our new HaMMR Blog at insights.archmi.com/hammr-blog. I know you will learn something new each time.

Arch MI Risk Index — Probability of Price Declines



The Arch MI Risk Index estimates the probability home prices will be lower in two years, times 100. It is a statistical model based on factors such as regional unemployment rates, home builder sentiment, net migration, housing starts, the percentage of delinquent mortgages, the difference between actual and estimated fundamental home prices (based on income), historical home price volatility, etc. This model doesn't estimate the size of any declines, just the probability of home prices being lower in two years. Model results are sometimes adjusted for unmodeled factors, such as energy prices.

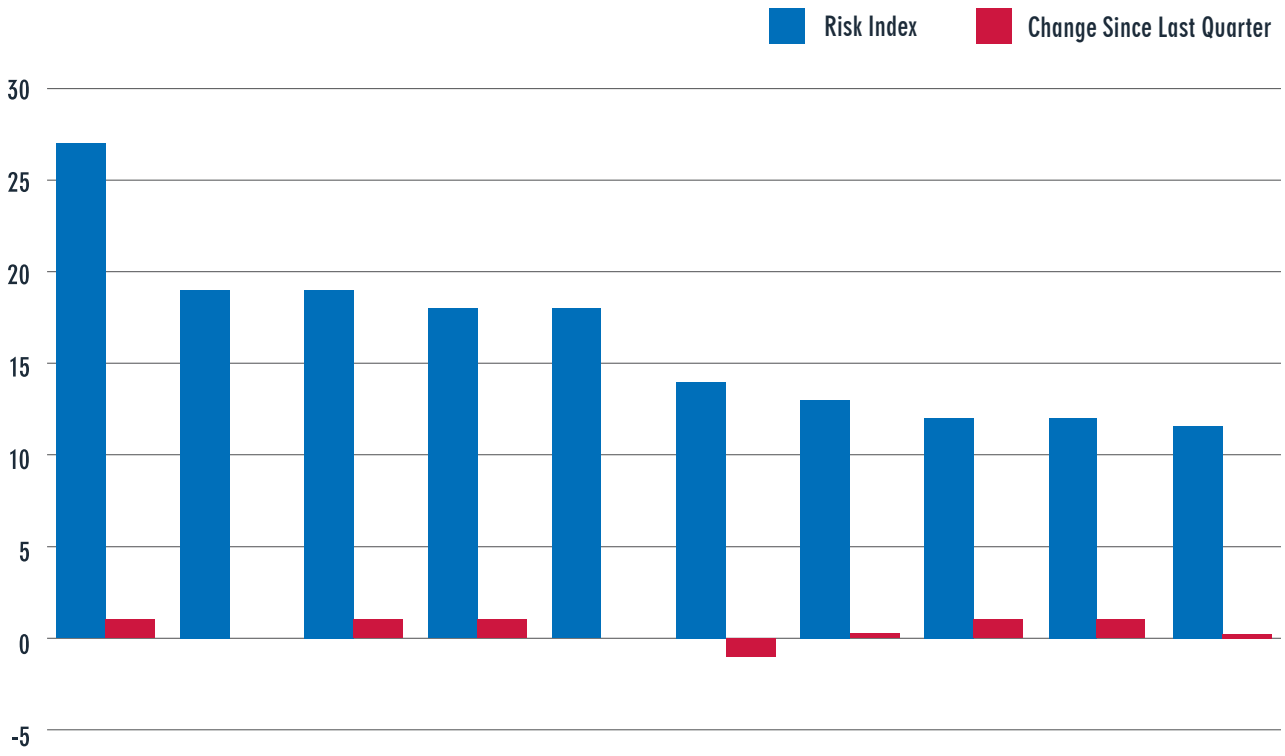
Risk of Price Declines Low but Increasing, Especially Out West

The latest quarterly Arch MI Risk Index®, a statistical model based on nine indicators of the health of local housing markets, estimates that the average probability of home prices in two years being lower is 6 percent. That is up only slightly from the previous quarter. Overall risk remains better than the historic average of 17 percent (or an average of 7 percent pre-crisis, 1975–2004). The state at highest risk of having lower home prices (by any amount) in two years is Alaska at 27 percent, followed by West Virginia at 19 percent.

10 States Most at Risk of a Price Correction

According to the Arch MI Risk Index, every state is expected to have positive home price growth over the next two years, which would be a continuation of what actually happened over the past year. Several states have above-average risk, with Alaska having a roughly one in four chance of experiencing a price decline (of any size) and Connecticut, North Dakota, Texas and West Virginia having less than a one in five chance of a price decline.

The following chart shows the states with the highest probabilities of experiencing a home price decline of any size over the next two years, along with the size of the change over the quarter.

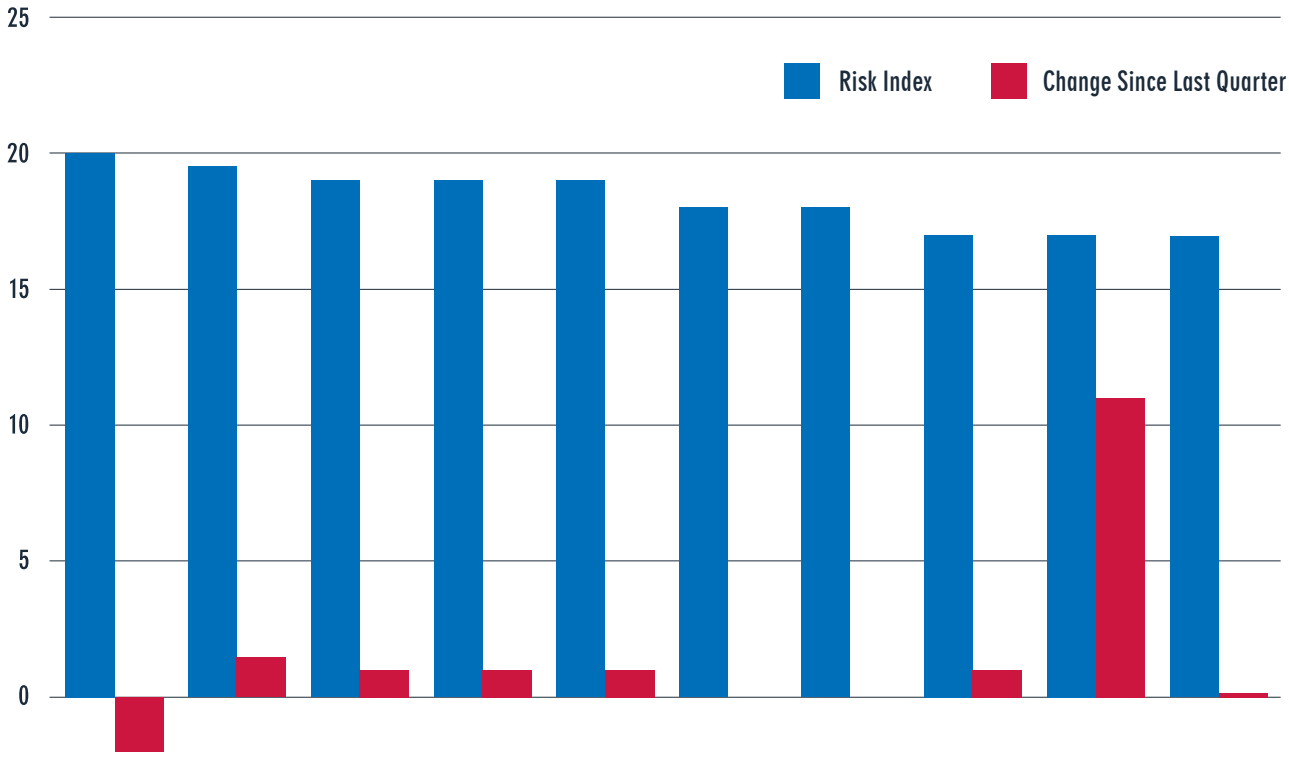


	ALASKA	WEST VIRGINIA	CONNECTICUT	NORTH DAKOTA	TEXAS	WYOMING	COLORADO	OKLAHOMA	MISSISSIPPI	IDAHO
Risk Index	27	19	19	18	18	14	13	12	12	12
Change in Qtr.	1	0	1	1	0	-1	0	1	1	0

10 States Most at Risk of a Price Correction *(continued from page 4)*

These are the same 10 states as last quarter. Six states make the list due to the lingering effects of slowdown in the energy-extraction sector and weak energy prices: Alaska, West Virginia, Texas, North Dakota, Wyoming and Oklahoma. Connecticut made the list because the housing market has been weak and because as a high-cost, high-tax state, it may suffer disproportionally from new federal tax limitations on state and local tax deductions. Colorado and Idaho made the top 10 list because their home prices are unusually high relative to their pasts.

Among the 100 largest metros, Houston (20 percent) was the riskiest. Nearly all of the 10 riskiest cities make the list because home prices are far higher than expected compared to the historical relationship between prices and incomes. Portland shows the largest increase because, in looking at affordability from several different angles, we found that home prices there are much higher than we would expect given its history.



	HOUSTON-THE WOODLANDS-SUGAR LAND, TX	SAN ANTONIO-NEW BRAUNFELS, TX	NEW HAVEN-MILFORD, CT	HARTFORD-WEST HARTFORD-EAST HARTFORD, CT	EL PASO, TX	MCALLEN-EDINBURG-MISSION, TX	AUSTIN-ROUND ROCK, TX	PORTLAND-VANCOUVER-HILLSBORO, OR-WA	BOISE CITY, ID	DALLAS-FT. WORTH, TX
Risk Index	20	20	19	19	19	18	18	17	17	16
Change in Qtr.	-2	1	1	1	1	0	0	1	11	4

To find out more about your local market, such as your specific Risk Index value, please visit archmi.com/hammr and explore the variety of visualizations under the **View Our HPI Charts and Maps** link.

Five Predictions and One Wish for 2019 *(continued from page 1)*

2. Millennials drive the hottest markets.

The most rapid home price growth is expected to occur in the areas most desirable to Millennials. These include neighborhoods in, or close to, downtowns and vibrant areas near universities. It is worth noting that these areas have done better than average in recent decades. That has been true during both booms and busts, at least in "magnet" cities that are attracting workers from other areas, such as Washington D.C., Seattle and Denver. This trend continued in 2018, with above-average home price growth in the ZIP codes with the most Millennial buyers.[2] This makes sense, given that Millennials now dominate the first-time homebuyer market.

3. Credit risk will increase.

Lending guidelines may continue to gradually loosen (and yet still remain vastly better than during 2005–2008 thanks to the stricter regulations that were put in place after the housing market collapse). When you combine more relaxed guidelines with the trend to higher debt-to-income ratios (DTIs) and loan-to-value ratios (LTVs), which is mostly driven by worsening affordability, it's easy to see why credit risk will continue to increase. On top of that, credit risk from economic factors may be higher since some forecasters are starting to think we could be in or close to a recession in 2020 due to the way current tax and spending laws are structured.

One implication of any loosening at the margins would be increased housing demand (all else remaining equal), particularly for starter homes.

4. Housing affordability will continue to worsen.

Both interest rates and home prices are forecasted to increase, hurting affordability. With unemployment at peacetime historic lows and the tax cut adding an oddly timed and only temporary stimulus, the Federal Reserve needs to continue raising interest rates. For one thing, the inflation rate is expected to trend upwards (wage growth increased from 2 to 3 percent over the past year and makes up the majority of product costs). Even though higher interest rates reduce home sales, modest increases in mortgage rates are not as apocalyptic for housing as many believe. Rising rates historically only caused temporary, mild slowdowns in home sales, ranging between 5 to 10 percent.[3]

The potential implications of higher interest rates in 2019 include the following scenarios:

- **Total originations fall** due to fewer refinancing loans.
- **Longer loan life.** Loans with low mortgage rates will stick around on investors' portfolios longer than usual.
- **Fewer trade-up home sales**, keeping inventory tight. This will negatively impact home ownership rates, affecting Millennials the most.

5. No bursting housing bubble.

Why? Because there is no widespread housing bubble. The typical warning signs – excessive debt levels, poor-quality loans, exponentially increasing home prices, rising vacancy rates and a high number of internet searches on house flipping – are not present. The one warning sign flashing red at the moment is poor affordability compared to the past in many metros. But the trend of firms to concentrate in denser cities, together with interest rates lower than the historical average, suggests that high home prices are more supportable than 10 years ago.

Lastly, my 2019 housing wish **is for more construction** of entry-level homes. The demand is certainly there and the high end of the market is fairly saturated (as suggested by much slower home price growth in recent years).

(continued on page 7)

[2] A related phenomenon is that home price growth has been fastest over the past five years in the lower-priced half of the market. One reason is a smaller stock of starter homes, as people move less often now than in the past – cutting off the natural flow of smaller homes into the market as people traded up. Supply will also be hampered going forward by rising interest rates, which have given most existing borrowers a financial incentive to stay put and renovate instead of moving. Another factor is demand – the percentage of overall sales to first-time homebuyers has been trending upwards.

[3] See the Spring 2016 HaMMR for a look back at prior rate increases.

Five Predictions and One Wish for 2019 *(continued from page 6)*

One relevant question is "have existing home prices risen to the point at which builders can make an acceptable return on starter homes?" For many areas the answer, unfortunately, remains no. This is due to:

- Upfront fixed costs for land and impact/hook-up/inspection fees are higher than in the past.
- Higher material[5] and labor costs, which have pushed builders toward more expensive projects.
- Local zoning often limits construction, to the benefit of existing homeowners.

[5] *There is a 20 percent tariff on lumber and a 25 percent tariff on steel, among others.*

Market Recap: Housing Rebalances as Boom Ends

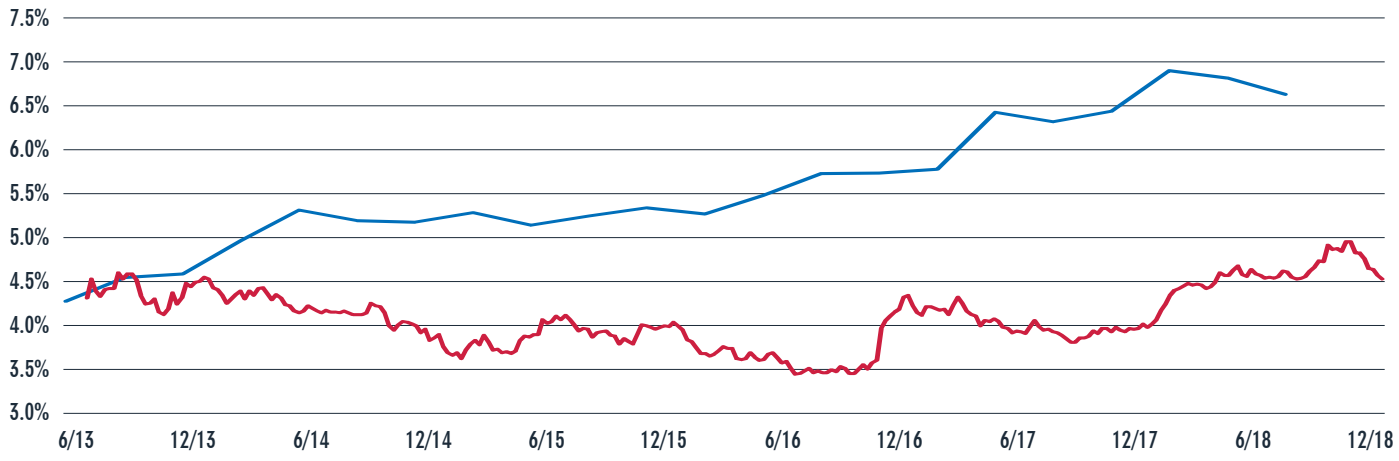
by Ralph DeFranco

The housing market is caught in the middle of a tug-of-war between poor affordability on one side and on the other a strong economy teamed up with a tight supply of homes. The opposing forces have become more evenly matched now than at any time over the past five years, during which demand driven by job creation overpowered supply, forcefully pushing up home prices.

The shift in the balance of power is clear. An undeniable slowdown has arrived, particularly in the least affordable areas. Nationally, new home sales are down 12 percent and existing home sales were down 5 percent in October from the year before (a chart appears on page 21). The slowdown is worse in expensive areas – home sales fell 8 percent in Southern California, 9 percent in Denver and pending sales fell 9 percent in North Texas, to give just a few examples.[1] The slowdown is across the board, including lower price-points dominated by first-time homebuyers – which had been the hottest segment of the market.

Nevertheless, there is no need to panic. The evidence suggests we are only moving from a market that strongly favored sellers to a market more evenly balanced between buyers and sellers. After all, the months' supply of existing homes for sale remains low, at 4.1 months nationally in October (on page 21). Even in areas where home sales are slowing the most, the inventory of homes for sale remains comparatively tight by historic norms, albeit often 10 or 20 percent higher than a year ago.

Figure 1: Home Price Growth Is Slowing Due to Higher Mortgage Rates



Source: *Federal Housing Finance Agency All-Transactions Home Price Index (FHFA AT HPI)/Freddie Mac/Moody's Analytics/Arch MI*

[1] *National, California, Colorado and MetroTex Associations of Realtors, October 2018 data.*

Market Recap: Housing Rebalance as Boom Ends *(continued from page 8)*

And while in a few cities home prices are down from the spring season, home values are higher on a year-over-year basis practically everywhere.

It is understandable that some potential buyers have sticker shock and have hit the pause button. Especially if they have been looking off and on at what they can afford: The size of the monthly payment needed for the median priced home increased by 15 percent on average over the past year, and by as much as 26 percent in the hottest markets.

Silver Lining: Healthier in the Long Run

While clearly unpleasant for sellers, brokers and originators, at least moving to a more normal and balanced housing market is healthier in the long run because it is more sustainable. Affordability went from bad to worse in many cities, so more subdued home price growth coupled with rising income growth would at least keep affordability from worsening at such a rapid rate.

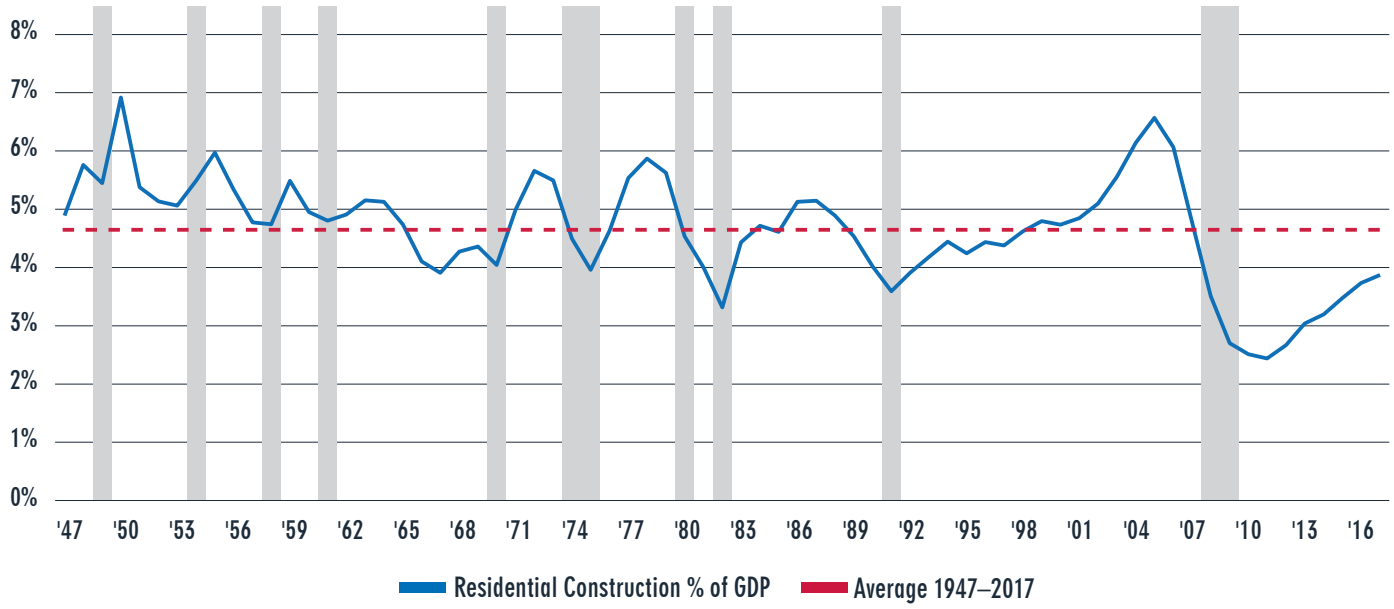
The recent decline in home sales is right in line with what we expected, based on reviewing the historical record for rate increases.[2] After all, the whole point of higher interest rates is to slow the economy and it does that via the most rate-sensitive sectors: housing, durable goods (autos, appliances), business investment and, sometimes, lower financial asset valuations. Given that the recent home sales slowdown was triggered by higher mortgage rates, it is too early to call this a new normal, since 2019's spring homebuying season could still be strong if we have the right mix of economic growth and relatively stable interest rates.

Fundamentals Favorable, Except for Affordability

Affordability, especially out West, is clearly worrisome. Even so, there are sufficiently strong fundamentals supporting the housing market that the current weakness isn't likely to descend into a full-scale meltdown. Home prices are still likely to increase, but at a slower pace because of the following factors:

1. **The housing shortage is not going away** anytime soon. Residential fixed investment as a percentage of GDP (shown in Figure 2) has remained unusually weak. It was only 3.9 percent compared to the historical

Figure 2: Residential Construction Remains Well Below Normal



Recessions are indicated by gray bars. ***Source:*** *U.S. Bureau of Economic Analysis/Arch MI*

[2] *Attendees of my HaMMR webinars over the past several years may recall that I have been predicting a temporary 5 to 10 percent decline in home sales once mortgage rates increased by 0.5 to 1.0 percent.*

Market Recap: Housing Rebalance as Boom Ends *(continued from page 9)*

average of 4.6 percent. Looking back over time, we see that the level of construction now is similar to levels seen only during past recessions, just 60 percent of its 2005 peak of 6.5 percent.

My estimate is that there is a national housing shortage of between 1.5 to 2.5 million units.[3] And the shortfall is probably worsening. The rate of new construction is roughly 1.3 million new units a year, while trend demand is higher, probably somewhere between 1.4 and 1.7 million new units a year.[4] Compounding the supply shortage, new home starts (and sales) have been trending down this year (page 18) because of higher interest rates. In short, the supply shortage appears to be chronic.

2. The **job market is as good as it gets** (particularly in urban areas). The unemployment rate is the lowest ever experienced during peacetime in more than 50 years of data, at only 3.7 percent.

3. **Demographics** point to more first-time homebuyers coming into the market. Over the next 10 years, the number of people in their 30s will increase by 4 million (from 13.4 percent of the population to 13.8 percent).

Forecasting What's Next

These three positive fundamentals might yet cause home price growth to exceed income growth over the next year or two. If mortgage rates only increase by a quarter of a percentage point or so over the course of 2019 as expected, and assuming continued strength in the job market, then national home price growth in 2019 is projected to be between 3 to 5 percent.

The usual caveats on forecasts apply: Things can turn out differently due to unexpected economic shocks, both positive and negative, which are all too common. Shocks, such as worsening trade frictions, a financial market correction, major terrorist attack, war or political crisis, could certainly hurt home sales and, if bad enough, could potentially push down home prices temporarily.

It is also worth mentioning that many economic forecasters expect a slowdown by late 2019 or 2020, which would put us at much greater risk of a recession.[5] However, given the shortage of housing, national home prices are unlikely to crash, even when the current economy boom comes to an end, although some regional housing market corrections cannot be ruled out. A few factors should help cushion the recession, whenever it does arrive:

1. **Household debt** as a percentage of disposable income is close to a 15-year **low**.[6] In aggregate, the monthly cost of servicing all outstanding debts is relatively low thanks to low fixed-rate mortgages.

2. Loan production **quality remains better** than in the early 2000s, even with DTIs and LTVs trending up.[7]

In short, the housing market has gone from full boil to a slow simmer, but is not ice-cold. While a slowdown is more bad news for originators, it shouldn't metastasize into a total disaster as long as the economy continues to run hot. But a shortage of housing appears to be here to stay.

		Arch MI Forecast		
	2017	2018	2019	2020
Annual Home Price Growth (FHFA HPI)	6.3%	5.9–6.4%	3.0–5.0%	2.0–4.0%
30-Year Fixed Mortgage Rates	4.1%	4.5%	4.8–5.2%	4.8–5.4%

[3] *Based on analyzing historical vacancy rate trends and by comparing the growth in net supply and net demand over time.*

[4] *Mark Zandi of Moody's Analytics estimates trend housing demand at 1,700,000 by assuming household formations of 1,200,000, obsolescence of 325,000 and new second homes at 175,000. However, these are rough estimates and some components cannot be directly measured.*

[5] *Capital Economics, for example, forecasts GDP growth could slow to 2.2 percent in 2019 and to only 1.5 percent in 2020 (U.S. Economic Outlook, 27 September, 2018).*

[6] *Federal Reserve Q3 Flow of Funds data.*

[7] *See the Urban Institute's Housing Credit Availability Index.*

Millennial Home Ownership Rates Increase

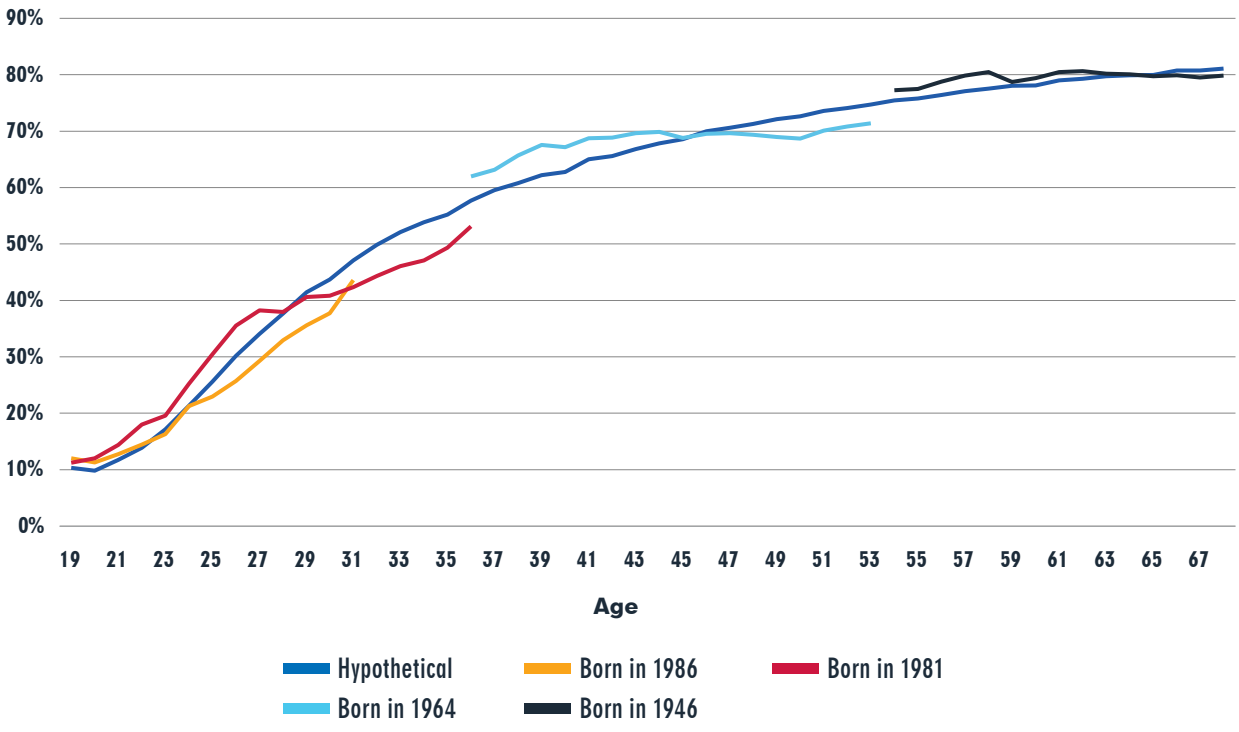
by Manhong Feng

While the home ownership rate for Millennials was hurt by the housing bust, the biggest generation in American history has recently been making up for lost ground.

The consensus view is that Millennials lag behind prior generations in embracing home ownership. This statement is mostly true if we compare the home ownership rate of Millennials (born 1980–1994, thus aged 24–38 today) to that of prior generations at the same age. But it wasn't always the case – there was a brief period when some Millennials achieved home ownership at an earlier age than other cohorts did.

The chart below shows the cumulative home ownership rate by age for people born at different times. The expected or hypothetical home ownership rate is defined as the average of age-specific home ownership rate throughout the sample periods – years 2000–2017 (American Community Survey data). For instance, the hypothetical home ownership rate of a head of a household aged 40 is 62.7 percent. In other words, during 2000–2017, the average home ownership rate for 40-year-olds was 62.7 percent. Typically, the home ownership rate peaks at age 68, and data for householders younger than 19 is sparse and less reliable, so we will focus on the window between ages 19 and 68.

Home Ownership Rate by Age and Birth Year



Source: *Integrated Public Use Microdata Series (IPUMS-USA), University of Minnesota, ipums.org/Arch MI*

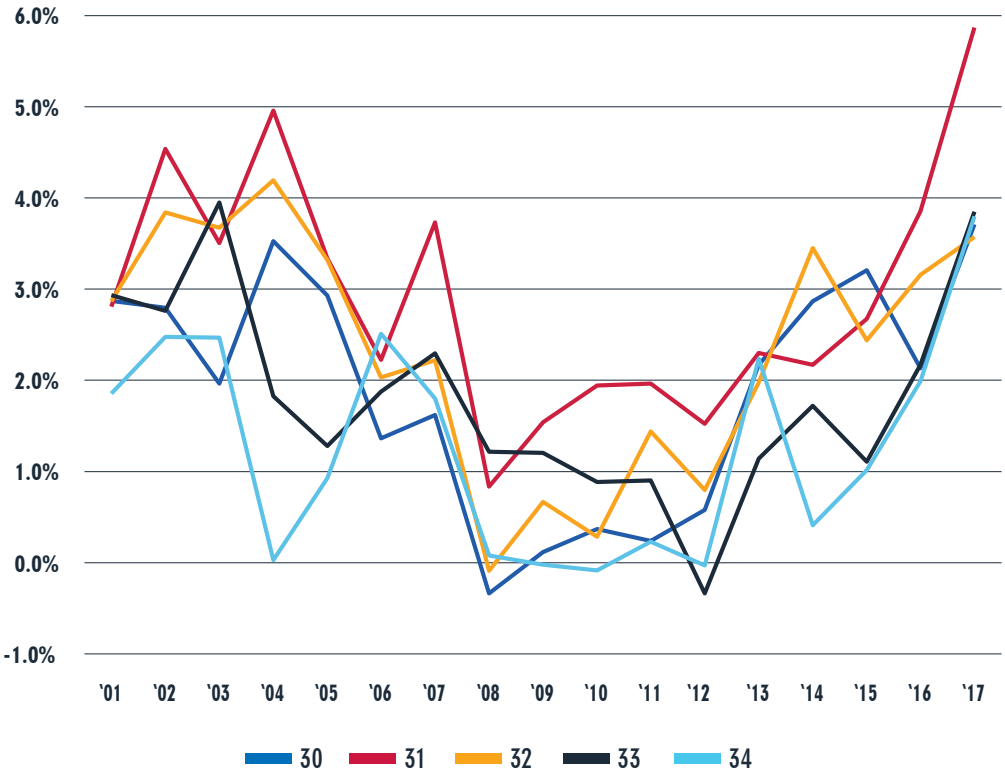
Millennial Home Ownership Rates Increase *(continued from page 11)*

Compared to all age cohorts, older Millennials did fairly well in terms of achieving home ownership in their early 20s. For example, people who were born in 1981 started off from a home ownership rate slightly above the average and they retained their advantage until hitting age 28.

This is when the housing crisis hit. By 2010, the actual home ownership rates of those born between 1981 and 1986 started to fall below the hypothetical expected line. This was about the same time when the home ownership rate for other age groups, like Baby Boomers – who led other age groups in achieving and retaining home ownership throughout most of their lives – also began to fall behind the hypothetical line. In aggregate, the total U.S. home ownership rate fell.

The chart below shows the one-year increase in home ownership rates for different age cohorts (age 30–34). It compares the increase in the home ownership rate over the prior year for the same group of people. For example, the red line has a reading of 3.7 percent in 2007: This means that for the cohort aged 31 in 2007, the home ownership rate is 3.7 percent higher than the home ownership rate for the cohort aged 30 in 2006. Generally speaking, the home ownership rate should be increasing along with age. But in 2008, two age groups plotted in the chart experienced negative growth in their home ownership rates, while other groups experienced a sharp slowdown in the normal rate increase for home ownership. The table on the right shows the hypothetical one-year increase in home ownership rate by age. By comparing the age-specific increase to their hypothetical value, it is obvious that all age groups shown here experienced a lower-than-expected increase in home ownership during 2008–2012. As a result, home ownership rates were severely weakened for people aged 30–34 during that time period.

1-Year Increment in Home Ownership Rate



Hypothetical 1-Year Increment in Home Ownership Rate

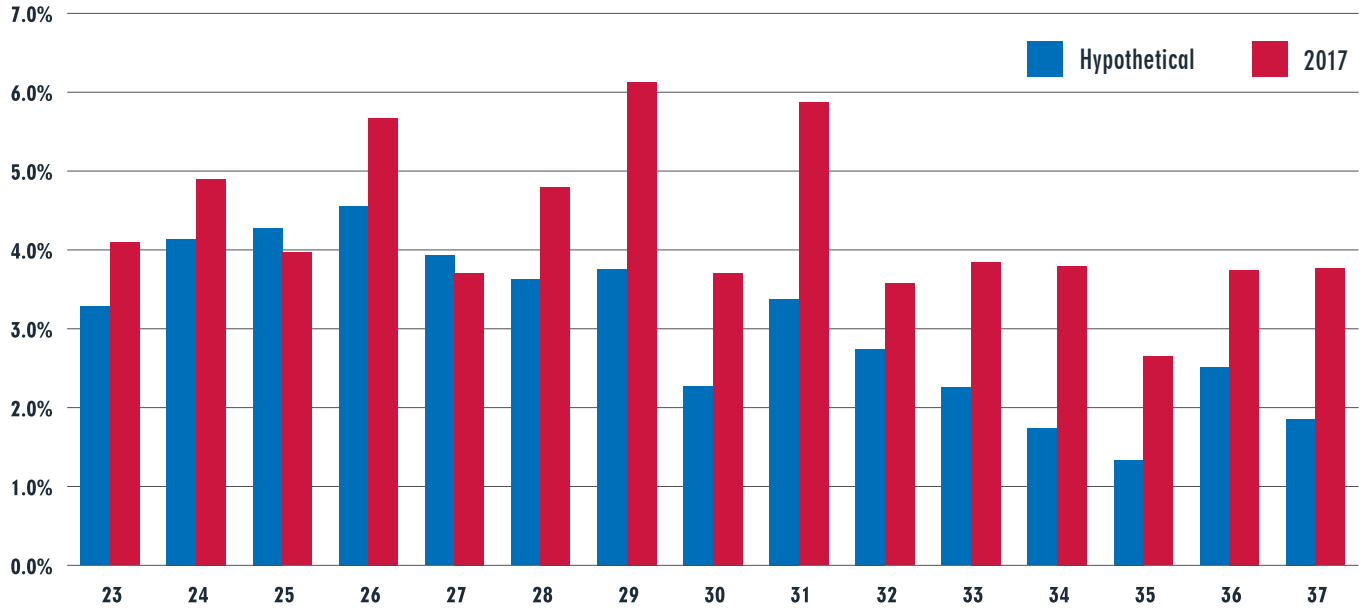
Age	Increase
30	2.3%
31	3.4%
32	2.7%
33	2.3%
34	1.7%

Source: *IPUMS-USA, University of Minnesota, ipums.org/Arch MI*

Millennial Home Ownership Rates Increase *(continued from page 12)*

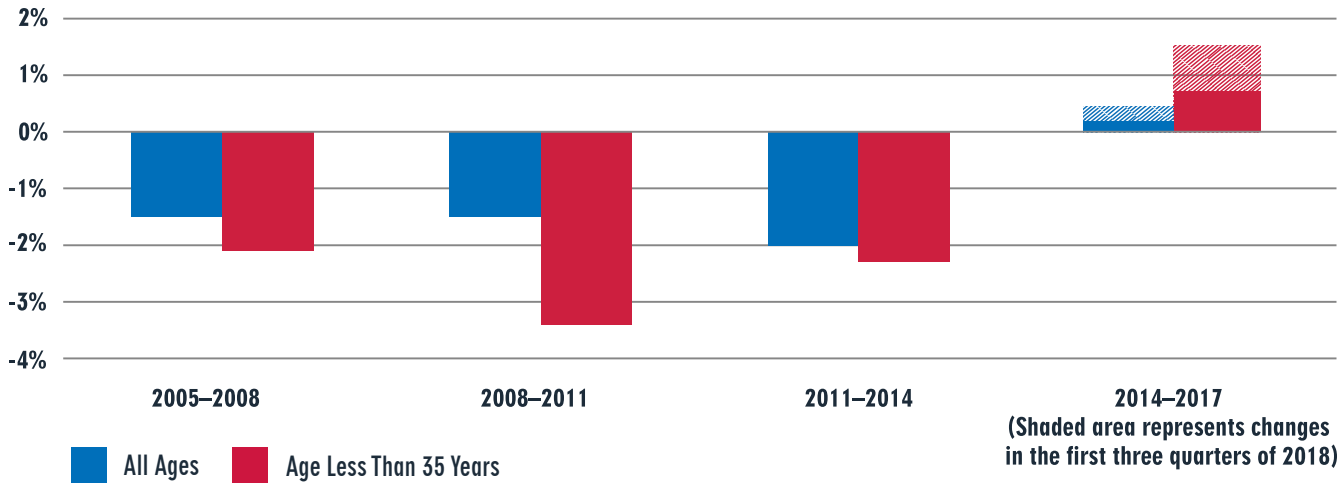
Looking at 2017, Millennials of all ages enjoyed an improvement in their home ownership rate. Compared with the hypothetical one-year increase in home ownership rate, all Millennials aged 23–37 in 2017 had a higher increase in 2017 – except for those aged 25 and 27, who saw a slightly weaker gain (this could perhaps just be due to measurement error). More recent data from the Housing Vacancy Survey shows a continued strong gain in home ownership rate in 2018 for Millennials. The breakout of the changes in home ownership rate on the final chart shows that the overall home ownership rate improved recently, especially for younger households. Great job, Millennials!

1-Year Increase in Home Ownership Rate



Source: *IPUMS-USA, University of Minnesota, www.ipums.org/Arch MI*

3-Year Change in Home Ownership Rate



Source: *U.S. Census Bureau/Arch MI*

Arch MI State-Level Risk Index

STATE (Sorted by Risk Ranking, then alphabetically)	ARCH MI RISK INDEX			ANNUAL HOME PRICE % CHANGE (FHFA HPI)		UNEMPLOYMENT RATE		
	RISK RANKING	LATEST	1-YEAR CHANGE	LATEST	1 YEAR EARLIER	LATEST	1-YEAR CHANGE	LONG RUN AVG.
Alaska	Moderate	27	-10	1.1	1.7	6.4	-0.8	7.9
Colorado	Low	13	5	9.8	9.4	3.2	0.2	5.4
Connecticut	Low	19	8	1.9	1.6	4.2	-0.3	5.5
Idaho	Low	12	6	13.0	9.0	2.7	-0.3	5.9
Mississippi	Low	12	2	3.3	3.2	4.7	-0.1	7.5
North Dakota	Low	18	-14	1.0	1.9	2.8	0.2	3.8
Oklahoma	Low	12	-4	3.7	3.4	3.4	-0.7	5.2
Texas	Low	18	6	6.8	8.1	3.7	-0.2	6.0
West Virginia	Low	19	-6	4.0	1.1	5.2	-0.2	8.1
Wyoming	Low	14	-17	5.0	0.9	4.1	-0.1	4.9
Alabama	Minimal	2	0	5.3	2.9	4.1	0.3	7.1
Arizona	Minimal	5	1	8.8	9.4	4.7	0.0	6.3
Arkansas	Minimal	2	0	4.0	3.9	3.5	-0.2	6.5
California	Minimal	5	2	8.6	8.0	4.1	-0.4	7.3
Delaware	Minimal	6	4	4.8	1.1	3.9	-0.6	5.4
District Of Columbia	Minimal	2	0	6.9	8.0	5.6	-0.3	7.6
Florida	Minimal	6	0	9.2	8.9	3.4	-0.5	6.2
Georgia	Minimal	2	0	8.9	6.8	3.6	-0.9	6.0
Hawaii	Minimal	2	0	5.5	5.6	2.3	0.2	4.9
Illinois	Minimal	2	0	3.0	3.6	4.2	-0.7	6.9
Indiana	Minimal	2	0	7.4	5.0	3.5	0.0	6.2
Iowa	Minimal	2	0	4.7	4.6	2.4	-0.5	4.6
Kansas	Minimal	2	0	5.1	5.1	3.3	-0.2	4.7
Kentucky	Minimal	3	1	5.1	5.7	4.5	-0.1	6.7
Louisiana	Minimal	7	-6	2.1	3.7	5.0	0.3	7.3
Maine	Minimal	2	0	5.5	5.4	3.4	0.2	5.8
Maryland	Minimal	7	2	4.0	3.6	4.1	0.1	5.3
Massachusetts	Minimal	2	0	6.4	6.8	3.5	0.0	5.5
Michigan	Minimal	2	0	7.4	7.9	3.9	-0.8	7.9
Minnesota	Minimal	2	0	6.8	7.0	2.8	-0.5	4.8
Missouri	Minimal	2	0	6.0	5.1	3.1	-0.5	5.9
Montana	Minimal	2	0	5.7	5.7	3.7	-0.4	5.8
Nebraska	Minimal	3	1	6.6	6.6	2.8	-0.1	3.5
Nevada	Minimal	8	3	15.0	10.0	4.4	-0.5	6.6
New Hampshire	Minimal	2	0	6.7	5.5	2.6	0.0	4.3
New Jersey	Minimal	10	2	4.2	3.3	4.1	-0.6	6.3
New Mexico	Minimal	7	-4	2.6	4.7	4.6	-1.4	6.7
New York	Minimal	5	1	6.0	5.4	4.0	-0.7	6.5
North Carolina	Minimal	2	0	7.4	6.0	3.6	-0.9	5.8
Ohio	Minimal	2	0	6.3	5.5	4.6	-0.3	6.7
Oregon	Minimal	10	7	7.1	9.1	3.8	-0.4	7.1
Pennsylvania	Minimal	2	0	4.8	4.2	4.1	-0.7	6.5
Rhode Island	Minimal	2	0	7.3	7.6	3.8	-0.7	6.5
South Carolina	Minimal	3	0	6.6	5.8	3.3	-0.9	6.5
South Dakota	Minimal	2	0	5.2	6.3	3.0	-0.4	3.7
Tennessee	Minimal	4	1	7.7	7.9	3.7	0.4	6.4
Utah	Minimal	2	0	10.4	10.1	3.2	0.0	4.9
Vermont	Minimal	6	4	4.8	1.5	2.8	-0.1	4.7
Virginia	Minimal	2	0	4.3	3.7	2.9	-0.7	4.7
Washington	Minimal	8	6	9.9	11.6	4.3	-0.4	7.0
Wisconsin	Minimal	2	0	6.7	6.0	3.0	-0.2	5.5
Population Weighted Average	**Minimal**	**6**	**1**	**6.8**	**6.7**	**3.7**	**-0.4**	**5.8**

GROSS STATE PRODUCT		SINGLE-FAMILY HOUSING STARTS		POPULATION	
PER CAPITA 2018Q3	1-YEAR % CHANGE	PER 1,000 PEOPLE 2018Q3	1-YEAR % CHANGE	2018Q3 (THS.)	1-YEAR % CHANGE
$ 77,019	7.6	1.8	15.7	743	0.4
$ 64,707	5.1	5.3	22.6	5,693	1.2
$ 77,495	5.8	0.8	-5.4	3,588	0.0
$ 43,607	4.2	7.5	19.7	1,751	1.5
$ 39,231	4.5	2.1	-2.8	2,987	0.1
$ 76,361	4.4	3.0	-6.8	762	0.7
$ 50,062	4.7	2.4	-3.4	3,956	0.5
$ 63,094	5.2	4.3	5.4	28,858	1.6
$ 45,557	6.7	1.3	-0.3	1,809	-0.3
$ 76,719	10.0	2.7	-1.6	578	-0.1
$ 45,394	4.9	2.7	7.8	4,899	0.4
$ 47,999	4.5	4.6	13.0	7,170	1.8
$ 42,921	3.5	2.5	3.3	3,019	0.4
$ 73,980	5.9	1.7	17.1	39,801	0.5
$ 80,246	4.1	5.6	6.5	973	0.9
$ 200,568	4.9	0.2	-56.4	701	0.7
$ 47,937	4.1	4.3	8.1	21,505	2.0
$ 55,838	4.8	4.0	3.3	10,602	1.3
$ 64,968	4.9	1.9	4.5	1,431	0.3
$ 67,834	5.2	0.8	-7.1	12,776	-0.1
$ 56,648	5.0	2.6	3.4	6,701	0.4
$ 62,999	4.6	2.8	0.1	3,161	0.4
$ 56,605	4.0	2.1	-7.0	2,923	0.3
$ 48,116	5.6	1.8	0.0	4,474	0.3
$ 56,630	7.5	3.0	2.7	4,685	0.0
$ 48,715	5.3	2.9	-3.0	1,336	-0.1
$ 68,675	4.7	2.1	2.8	6,085	0.4
$ 81,294	5.1	1.1	-7.4	6,900	0.5
$ 53,397	4.9	1.8	0.8	9,985	0.2
$ 65,381	4.4	2.5	-3.7	5,629	0.7
$ 52,748	5.4	2.1	0.9	6,138	0.3
$ 47,271	3.6	3.3	4.0	1,065	1.1
$ 66,499	4.6	2.8	-5.0	1,935	0.6
$ 54,744	4.4	4.6	6.3	3,074	2.0
$ 63,386	5.0	2.4	0.5	1,350	0.4
$ 69,439	5.1	1.2	-3.2	9,032	0.2
$ 48,962	4.9	2.3	17.6	2,097	0.4
$ 82,265	5.1	0.6	-1.7	19,850	0.0
$ 54,830	4.6	5.0	4.4	10,436	1.3
$ 58,938	5.2	1.5	-1.4	11,688	0.2
$ 59,254	3.5	2.7	-1.9	4,192	0.9
$ 62,324	5.4	1.5	2.1	12,805	0.0
$ 59,362	4.9	1.0	-8.0	1,061	0.1
$ 45,696	4.9	6.0	4.7	5,099	1.2
$ 60,382	5.0	3.9	-8.0	877	0.6
$ 54,163	4.9	4.1	0.3	6,798	1.0
$ 56,551	5.4	6.2	10.4	3,166	1.6
$ 54,352	5.2	1.8	-9.3	624	0.0
$ 63,402	5.1	2.6	-4.0	8,545	0.7
$ 72,658	5.7	3.4	6.7	7,527	1.3
$ 59,176	5.1	2.1	-3.4	5,819	0.3
$ 62,887	**4.8**	**2.7**	**4.9**	**328,510**	**0.7**

Explanatory Notes

The Arch MI Risk Index, both at the state and Metropolitan Statistical Area (MSA) level, estimates the probability of home prices being lower in two years, times 100. For example, a score of 20 means the model estimates a 20 percent chance the FHFA All-Transactions Regional HPI will be lower two years from the date of the input data release. **The Risk Ranking** column is a mapping of the Risk Index values into buckets, while the next column shows the actual Risk Index values. Risk Ranking is "Minimal" if Risk Index is 10 or less; "Low" if Risk Index is between 10 and 25; "Moderate" if Risk Index is between 25 and 50; "Elevated" if Risk Index is between 50 and 75; and "High" if Risk Index is higher than 75.

Historical Risk Index scores change as revisions to source data become available. The largest changes are typically from HPI revisions.

Home Price Changes: The first column is the most recent year-over-year percentage change in the FHFA All-Transactions HPI. The next column is the annual HPI change from a year earlier. Recent price appreciation is an indicator of strength in the local housing market and is generally correlated with near-term future price changes.

Unemployment Rates are seasonally adjusted statewide or MSA-wide unemployment rates released by the U.S. Bureau of Labor Statistics.

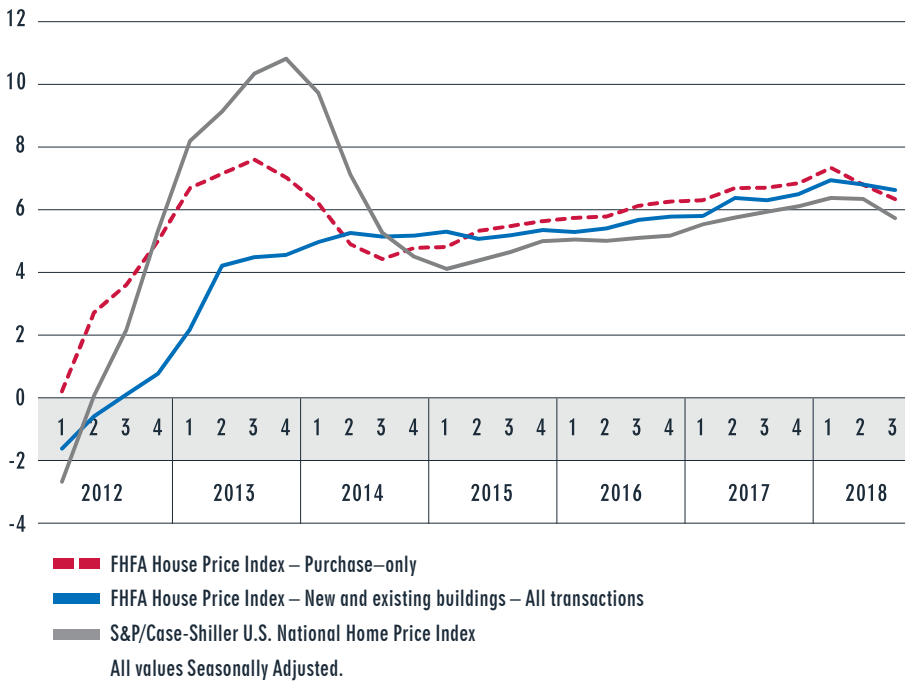
Gross State Product/Gross Metro Product is from a Moody's Analytics estimation, which is based on gross product data released by the U.S. Bureau of Economic Analysis.

S.F. Housing Starts are a 12-month moving average of single-family housing starts data released by the U.S. Census Bureau.

Population is from a Moody's Analytics estimation, which is based on population data released by the U.S. Census Bureau.

Housing and Mortgage Market Indicators

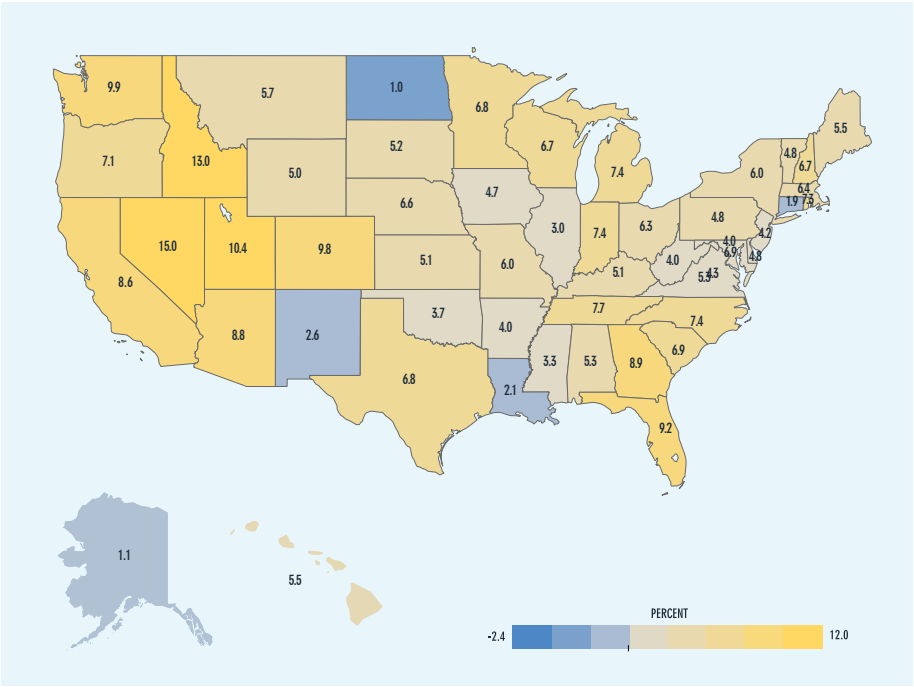
YEAR-OVER-YEAR PERCENTAGE CHANGE IN HOME PRICES



Annual home price growth decelerated again in Q3 and is projected to slow further. Year-over-year growth rate was around **6 percent** for all home price indexes. Indexes vary in source data and methodologies. For example, the FHFA index is based on GSE loans, while the Case-Shiller index uses a broader selection of loans and different estimation methods.

Sources: *CoreLogic®/Case-Shiller/FHFA/ Moody's Analytics/Arch MI*

YEAR-OVER-YEAR PERCENTAGE CHANGE IN HOME PRICES

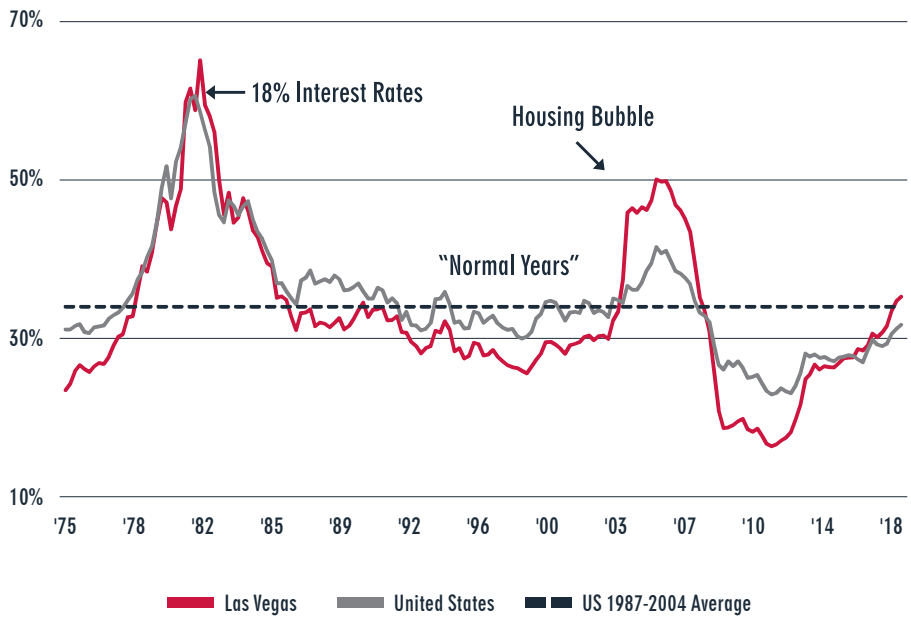


Year-over-year home prices are up in all 50 states. **The fastest growth in home prices was in Nevada, Idaho and Utah. The slowest growth was in North Dakota, Alaska and Connecticut.** Metro-level data and quarter-over-quarter changes are available at archmi.com/hammr under the HPI Charts and Maps link.

Sources: *FHFA All-Transactions HPI/ Moody's Analytics/Arch MI*

Housing and Mortgage Market Indicators

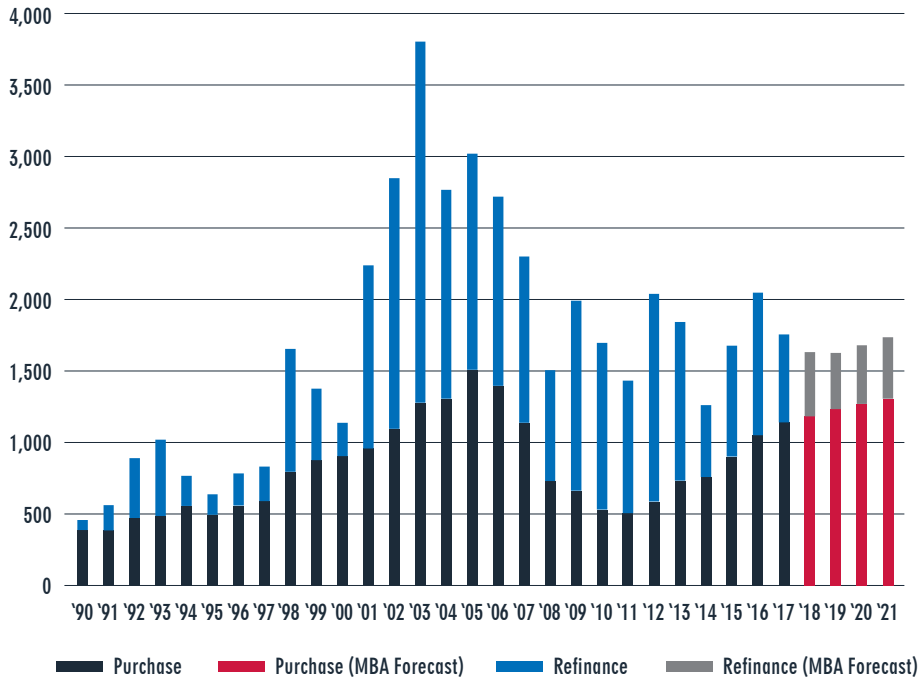
PERCENTAGE OF MEDIAN INCOME NEEDED FOR PAYMENTS ON A MEDIAN-PRICED HOME



With housing affordability worsening due to higher home prices and interest rates, **a higher percentage of income is needed to buy the median-priced home.** The Y-axis is Arch MI's hypothetical median Debt to Income (DTI) ratio, which is the percentage of the median household's income needed to cover mortgage payments on a median price home. For the U.S., it is **32 percent**, **2 percent** lower than during 1987–2004. Las Vegas is at **35 percent**, higher than pre-crisis but well below its peak.

Sources: *U.S. Census Bureau/Freddie Mac/ National Association of REALTORS® (NAR)/ Moody's Analytics/Arch MI*

ORIGINATIONS IN MILLIONS OF $

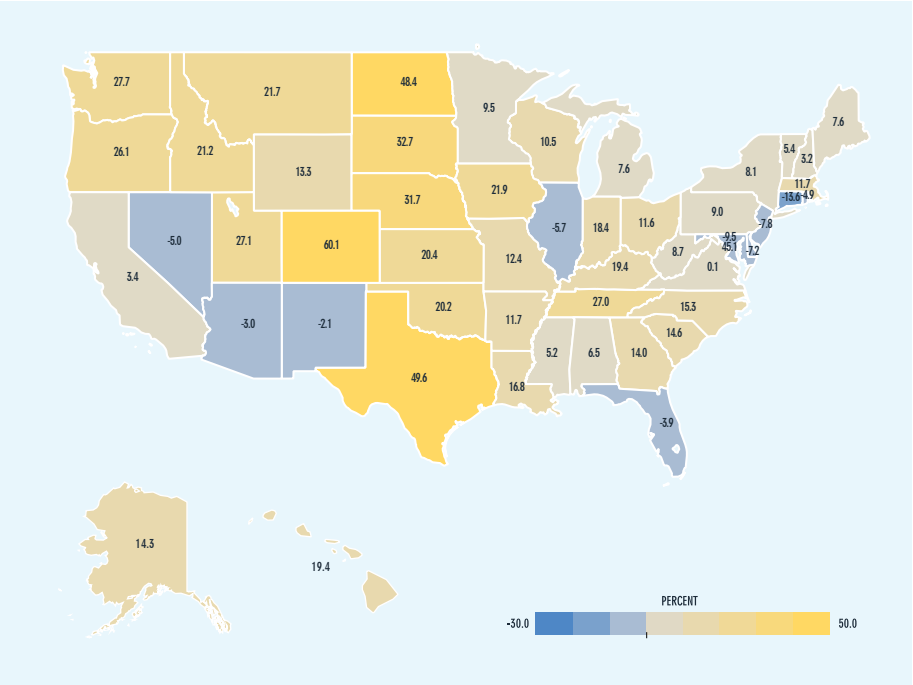


Purchase mortgage originations have been on an upward trend since the start of the housing recovery. With mortgage rates forecasted to rise, growth in purchase mortgage originations is expected to continue outpacing growth in refinance originations.

Sources: *Mortgage Bankers Association (MBA)*

Housing and Mortgage Market Indicators

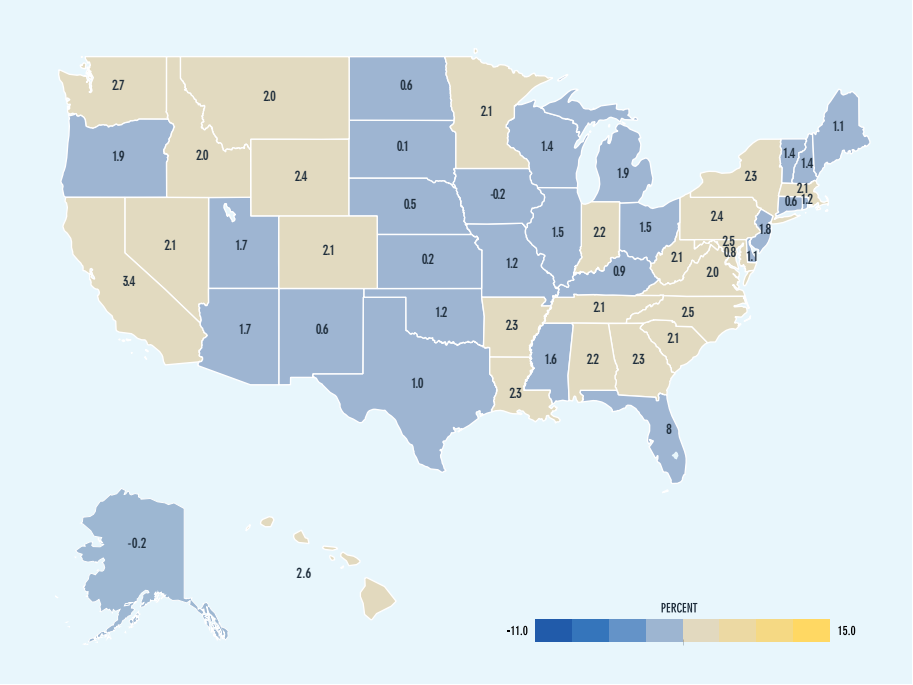
HOME PRICE PERCENTAGE CHANGE FROM PRIOR PEAK (2005–2008)



House prices have increased rapidly since bottoming out in 2012 and have surpassed their prior peak levels; however, growth has been very unbalanced across states. The **largest cumulative growth since home prices peaked** during 2005–08 (we use the peak for each state, which varied by time) **was in Colorado, followed by Texas and North Dakota**. As of the third quarter of 2018, 10 states had house prices lower than their prior peaks, with Connecticut and Maryland still lower by **10 percent** or more. Values shown are in nominal (not inflation-adjusted) terms. If we were to adjust for the **21 percent** inflation in consumer prices since 2006, then home prices are still below their pre-crisis peak in most areas.

Sources: *FHFA/Moody's Analytics/Arch MI*

ANNUAL PERCENTAGE CHANGE IN PER-CAPITA INCOME

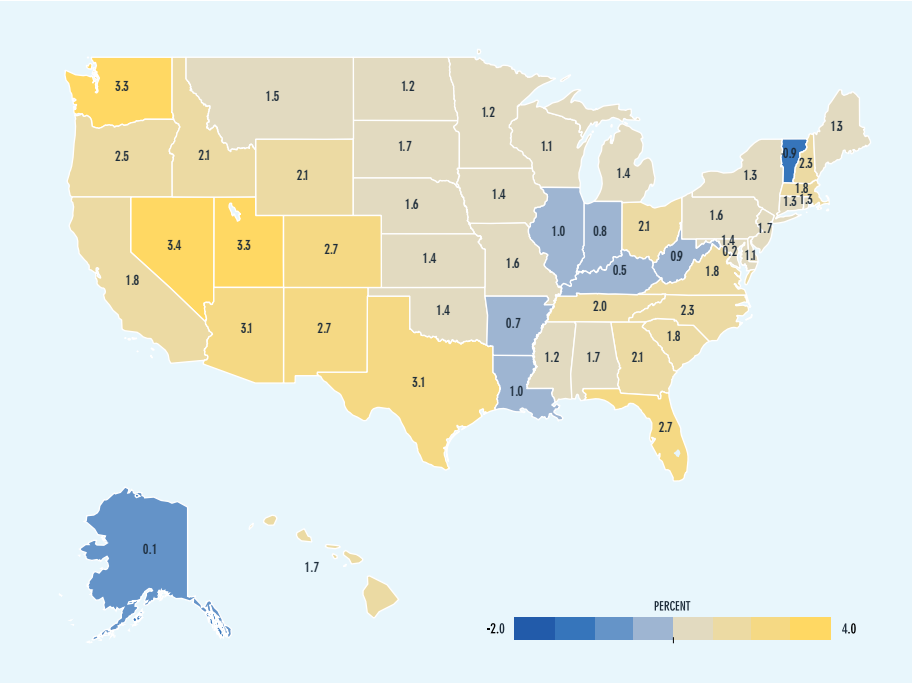


Income growth is an important driver of housing demand. The year-over-year **change in per-capita income was strongest in California** (**3.4 percent**), followed by Washington (**2.7 percent**) and Hawaii (**2.6 percent**). Two states experienced negative year-over-year growth in per-capita income: Iowa and Alaska (both at **-0.2 percent**).

Sources: *U.S. Bureau of Economic Analysis/ U.S. Census Bureau/Moody's Analytics/ Arch MI*

Housing and Mortgage Market Indicators

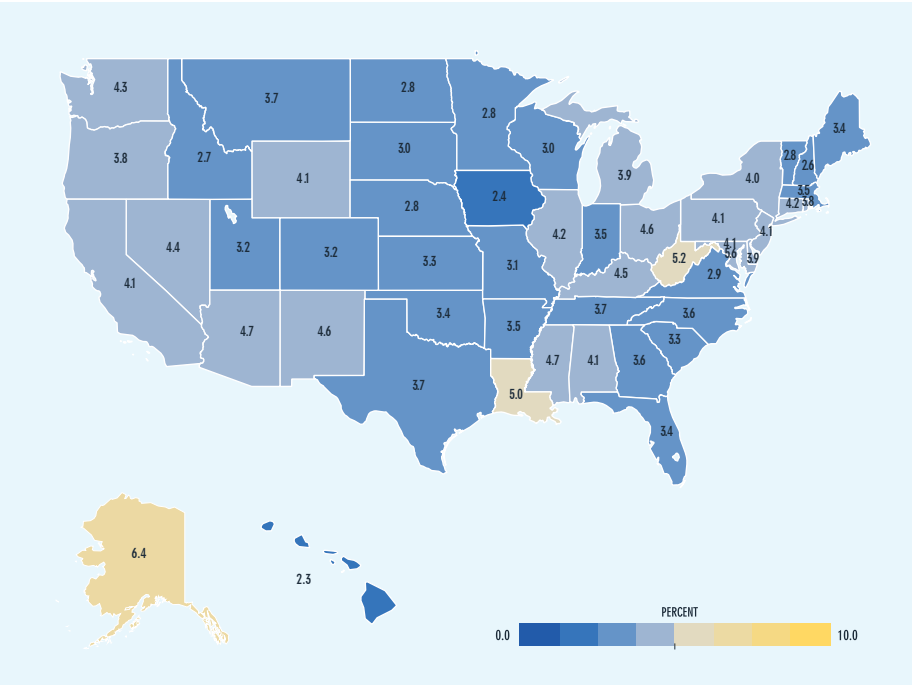
ANNUAL PERCENTAGE GROWTH IN TOTAL EMPLOYMENT



Job growth remains solid across the nation. On a year-over-year base, total employment grew in October for all states **except for Vermont. The number of jobs in Nevada had the fastest growth**, followed by Utah and Washington. For the U.S., the annual growth rate was **1.7 percent**.

Sources: *U.S. Bureau of Labor Statistics (BLS)/Moody's Analytics/Arch MI*

US UNEMPLOYMENT RATES

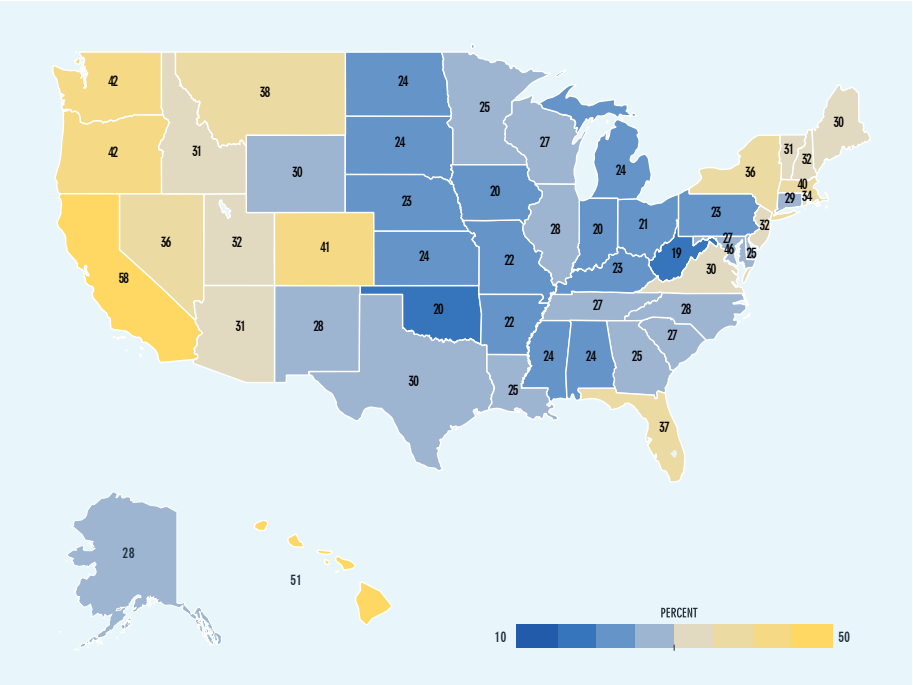


The unemployment rate is exceptionally low. **The Great Plains region and New England have some of the tightest labor markets** in the nation. Alaska and West Virginia lag the nation at the moment due to a slower energy-sector recovery than in other areas.

Sources: *BLS/Moody's Analytics/Arch MI*

Housing and Mortgage Market Indicators

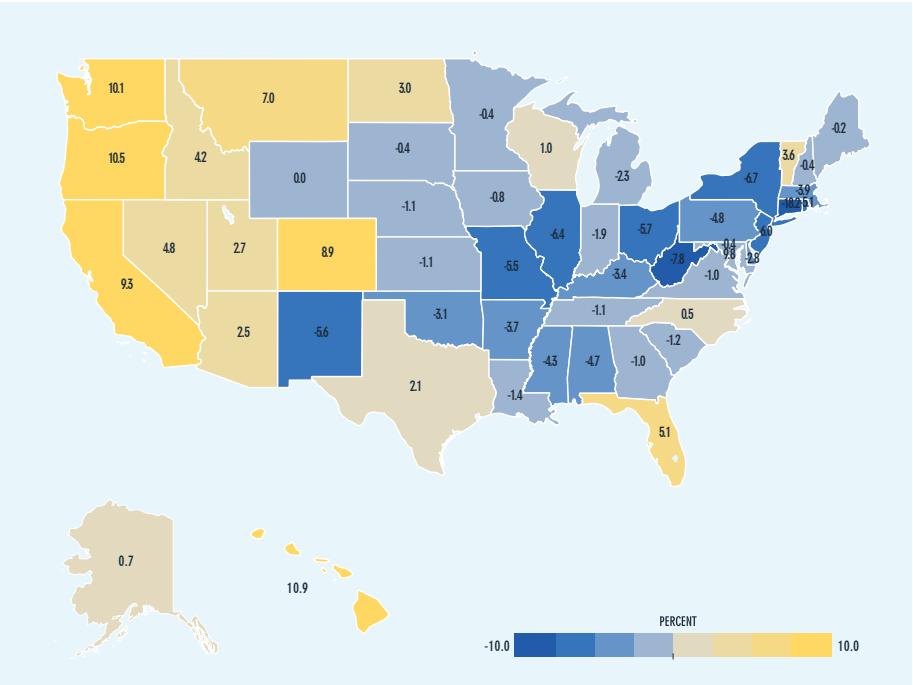
PERCENTAGE OF MEDIAN INCOME NEEDED FOR PAYMENTS ON A MEDIAN-PRICED HOME



The percentage of median income needed to buy a median-priced home varies widely. Affordability is poor out West, great in the heartland. California required the highest percentage of median income, followed by Hawaii. This hypothetical DTI ratio is the lowest in West Virginia and Oklahoma.

Sources: *U.S. Census Bureau/Freddie Mac/NAR/Moody's Analytics/Arch MI*

DIFFERENCE IN PERCENTAGE OF MEDIAN INCOME NEEDED NOW VS. NORMAL YEARS

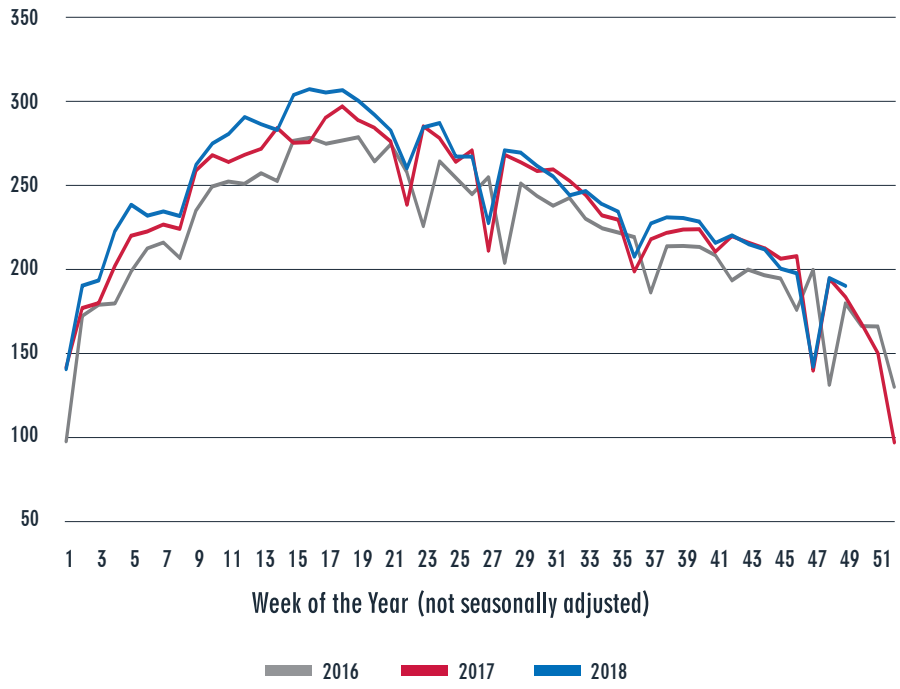


This chart shows the percentage of median income needed to buy a median-priced home minus the average from more normal years 1987–2004. Hawaii is the worst in terms of affordability compared to its 1987–2004 average values, followed by Oregon and Washington. Affordability is better now than during 1987–2004 in 18 states, led by Connecticut, West Virginia and New York.

Sources: *U.S. Census Bureau/Freddie Mac/NAR/Moody's Analytics/Arch MI*

Housing and Mortgage Market Indicators

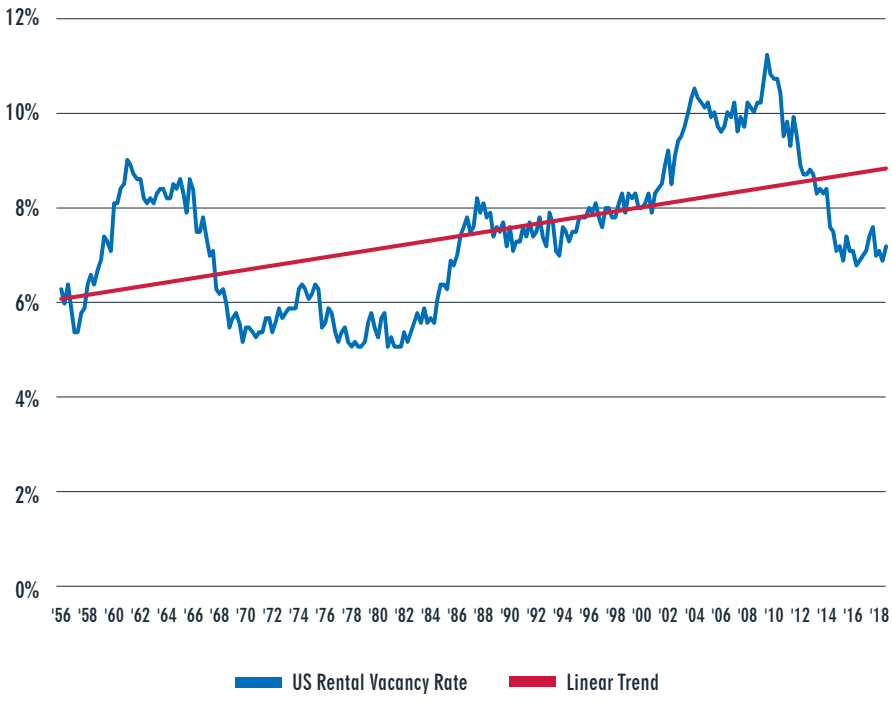
MBA MORTGAGE PURCHASE APPLICATION INDEX



The MBA index is similar to last year's at the same time, **so purchase mortgage applications remain solid.** In general, purchase mortgage applications are weaker in spring and winter, and are strongest in summer. Purchase mortgage applications in early December are about 34 percent higher than their levels at the start of 2018.

Sources: *MBA/Arch MI*

US RENTAL VACANCY RATE

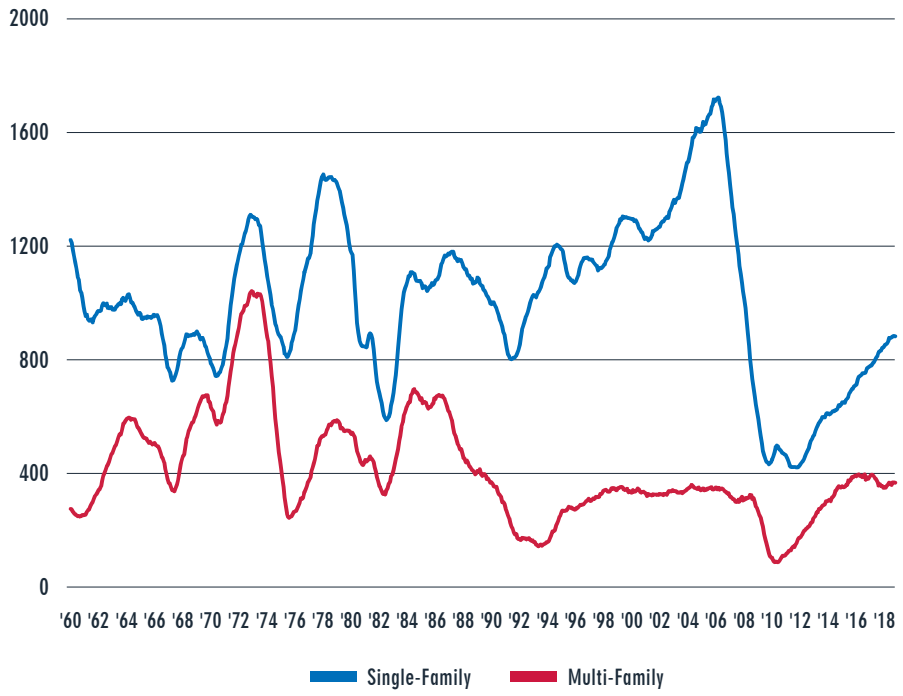


U.S. rental vacancy rate remains low, at **7.1 percent** in the second quarter, only 0.4 percent higher than the three-decade low reached two years ago. Sustained low rental vacancy rate indicates a tight housing market.

Sources: *U.S. Census Bureau/Moody's Analytics/Arch MI*

Housing and Mortgage Market Indicators

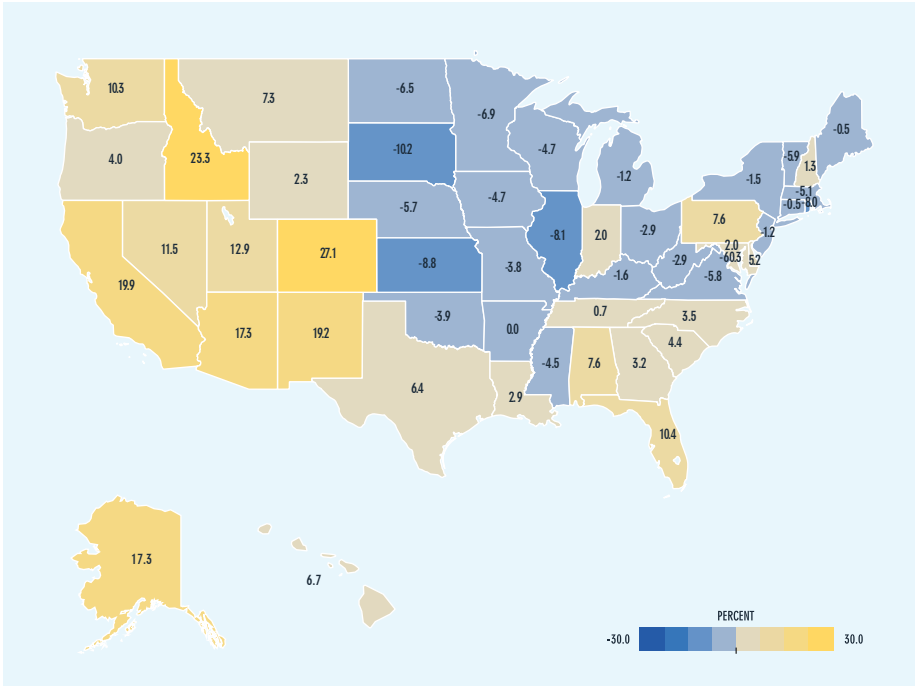
ANNUAL HOUSING STARTS IN THOUSANDS



Single-Family Housing Starts have slowed, declining 3 percent nationally from a year ago to 865,000 units (seasonally adjusted annual rate) in October. Multi-family starts are **3 percent** higher than a year ago, at **372,000 units** a year (after smoothing out highly volatile monthly data by taking a 12-month moving average).

Sources: *U.S. Census Bureau/Moody's Analytics/Arch MI*

ANNUAL PERCENTAGE CHANGE IN HOUSING STARTS

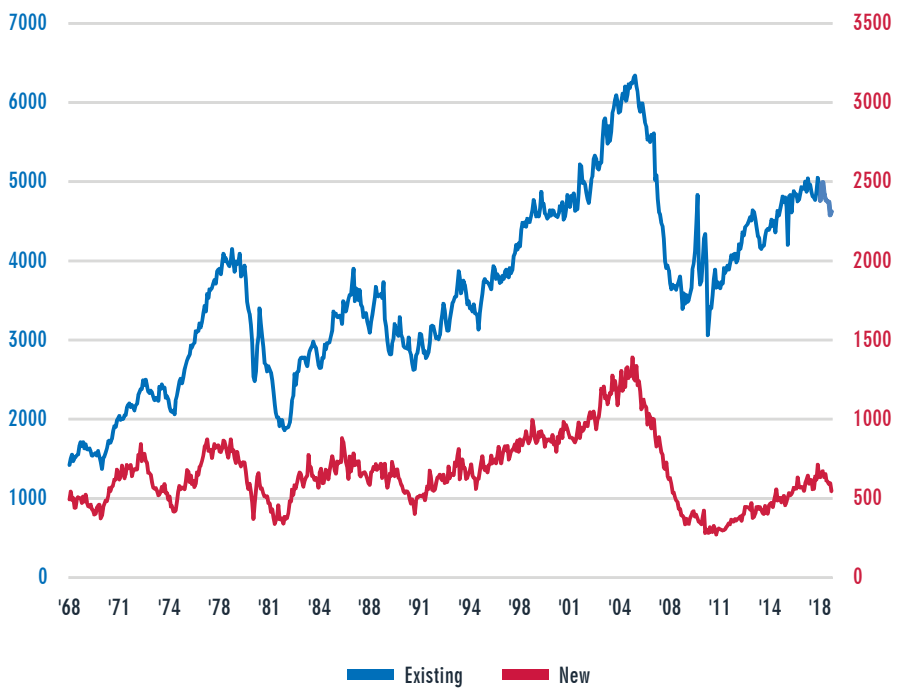


The growth in Single-Family Housing Starts is weakest in the District of Columbia, South Dakota and Kansas. The strongest areas are in the South and West. **Housing starts increased most in Colorado**, followed by Idaho and California. In order to remove monthly volatility due to survey limitations, weather, etc., this data has been smoothed by taking a 12-month moving average (through October).

Sources: *U.S. Census Bureau/Moody's Analytics/Arch MI*

Housing and Mortgage Market Indicators

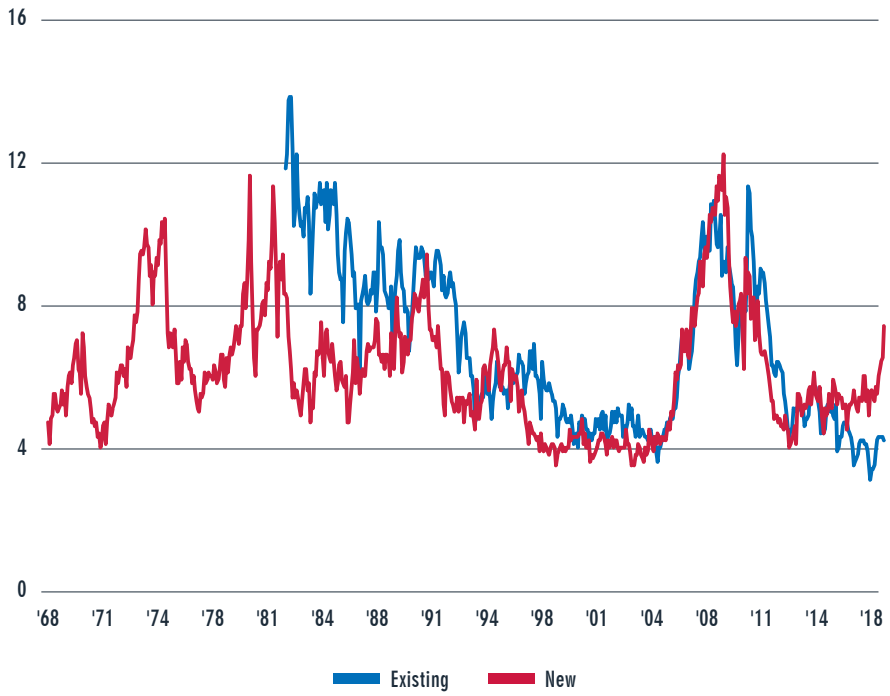
NEW AND EXISTING HOME SALES IN THOUSANDS



Both new and existing home sales are trending down (new homes on the right axis, existing homes on the left). **Sales of existing single-family homes were 4.6 million units** (after annualizing the monthly number) in October; a decrease of **5.3 percent** compared to the same period last year. Sales of newly constructed homes were **544,000 units** (annualized rate), down **12.0 percent** from a year ago.

Sources: *NAR/U.S.Census Bureau/Moody's Analytics/Arch MI*

MONTHS' SUPPLY OF HOMES FOR SALE



The months' supply of existing single-family homes for sale (total current listings ÷ last month's sales) **was 4.2** months in October, compared to 3.9 months at the same time a year ago. The months' supply of new homes for sale, shown in red, jumped to **7.4 months** in October, the highest level in 7 years.

Sources: *NAR/Moody's Analytics/ Arch MI*

Arch MI Risk Index for the 100 Largest MSAs

100 LARGEST METROPOLITAN

Statistical Areas Sorted by Risk Ranking, then State, then MSA	ST	RISK RANKING	ARCH MI RISK INDEX			% HOME PRICE CHANGE	
			2018Q3	1-YR. CHANGE	LONG RUN AVG.	1-YR. 2018Q3	1-YR. 2017Q3
Colorado Springs, CO	CO	Low	13	11	16	11.4	10.0
Denver-Aurora-Lakewood, CO	CO	Low	16	6	14	10.0	10.3
Bridgeport-Stamford-Norwalk, CT	CT	Low	19	8	24	1.6	0.8
Hartford-West Hartford-East Hartford, CT	CT	Low	19	8	23	1.9	1.9
New Haven-Milford, CT	CT	Low	19	8	26	3.1	0.7
Miami-Miami Beach-Kendall, FL	FL	Low	12	-7	23	9.5	8.0
North Port-Sarasota-Bradenton, FL	FL	Low	12	2	23	8.5	7.2
West Palm Beach-Boca Raton-Delray Beach, FL	FL	Low	13	-3	26	8.9	9.1
Boise City, ID	ID	Low	17	10	22	16.6	12.1
Oklahoma City, OK	OK	Low	12	-4	11	3.0	4.9
Tulsa, OK	OK	Low	12	-4	13	5.0	2.6
Portland-Vancouver-Hillsboro, OR-WA	OR	Low	17	14	19	6.0	9.6
Austin-Round Rock, TX	TX	Low	17	-8	16	6.6	7.2
Dallas-Plano-Irving, TX	TX	Low	16	4	13	7.6	11.4
El Paso, TX	TX	Low	18	6	19	3.2	3.4
Fort Worth-Arlington, TX	TX	Low	16	4	11	8.6	11.1
Houston-The Woodlands-Sugar Land, TX	TX	Low	20	-12	14	7.4	4.5
McAllen-Edinburg-Mission, TX	TX	Low	18	6	12	2.6	3.7
San Antonio-New Braunfels, TX	TX	Low	20	8	15	6.3	7.0
Birmingham-Hoover, AL	AL	Minimal	2	0	17	5.6	4.5
Little Rock-North Little Rock-Conway, AR	AR	Minimal	2	0	14	-0.2	3.9
Phoenix-Mesa-Scottsdale, AZ	AZ	Minimal	7	1	22	9.7	9.6
Tucson, AZ	AZ	Minimal	2	0	23	6.6	8.7
Anaheim-Santa Ana-Irvine, CA	CA	Minimal	5	-3	24	6.8	6.1
Bakersfield, CA	CA	Minimal	5	3	25	6.4	4.8
Fresno, CA	CA	Minimal	5	3	25	6.7	10.2
Los Angeles-Long Beach-Glendale, CA	CA	Minimal	5	3	27	9.0	8.6
Oakland-Hayward-Berkeley, CA	CA	Minimal	5	3	24	11.4	8.6
Oxnard-Thousand Oaks-Ventura, CA	CA	Minimal	5	3	24	4.6	6.3
Riverside-San Bernardino-Ontario, CA	CA	Minimal	5	3	25	8.8	8.7
Sacramento--Roseville--Arden-Arcade, CA	CA	Minimal	5	3	27	8.3	10.3
San Diego-Carlsbad, CA	CA	Minimal	5	3	25	7.1	8.6
San Francisco-Redwood City-South San Francisco, CA	CA	Minimal	8	5	25	14.2	6.9
San Jose-Sunnyvale-Santa Clara, CA	CA	Minimal	8	6	29	13.0	7.0
Stockton-Lodi, CA	CA	Minimal	5	3	26	10.2	10.0
Washington-Arlington-Alexandria, DC-VA-MD-WV	DC	Minimal	2	0	20	5.3	4.7
Wilmington, DE-MD-NJ	DE	Minimal	6	4	23	4.6	0.8
Cape Coral-Fort Myers, FL	FL	Minimal	8	3	22	6.0	7.9
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	FL	Minimal	8	-10	24	7.8	8.6
Jacksonville, FL	FL	Minimal	2	-1	23	10.1	8.1
Lakeland-Winter Haven, FL	FL	Minimal	7	3	23	9.0	11.6
Orlando-Kissimmee-Sanford, FL	FL	Minimal	3	1	22	10.2	9.6
Tampa-St. Petersburg-Clearwater, FL	FL	Minimal	8	3	22	10.8	10.8
Atlanta-Sandy Springs-Roswell, GA	GA	Minimal	2	0	21	10.5	8.2
Urban Honolulu, HI	HI	Minimal	2	0	22	3.6	4.8
Chicago-Naperville-Arlington Heights, IL	IL	Minimal	2	0	28	4.1	5.0
Lake County-Kenosha County, IL-WI	IL	Minimal	2	0	25	4.1	4.4
Gary, IN	IN	Minimal	2	0	18	6.8	3.9
Indianapolis-Carmel-Anderson, IN	IN	Minimal	2	0	14	8.3	6.0
Louisville-Jefferson County, KY-IN	KY	Minimal	2	0	15	6.5	5.7

Data sources are listed on page 15.

100 LARGEST METROPOLITAN

Statistical Areas Sorted by Risk Ranking, then State, then MSA

	UNEMPLOYMENT RATE			GROSS METRO PRODUCT		SINGLE-FAMILY HOUSING STARTS		POPULATION	
	LATEST	1-YR. CHANGE	LONG RUN AVG.	PER CAPITA 2018Q3	1-YR. % CHANGE	PER 1000 PEOPLE 2018Q3	1-YR. % CHANGE	2018Q3 (THS.)	1-YR. % CHANGE
Colorado Springs, CO	3.5	0.2	5.4	$ 50,462	6.4	5.7	7.2	731	0.7
Denver-Aurora-Lakewood, CO	2.8	0.0	4.8	$ 71,327	6.8	4.1	5.0	2,917	0.8
Bridgeport-Stamford-Norwalk, CT	4.1	-0.3	5.0	$ 81,226	4.8	0.8	-14.6	952	0.1
Hartford-West Hartford-East Hartford, CT	4.2	-0.3	5.5	$ 87,692	5.1	0.8	6.3	1,212	0.1
New Haven-Milford, CT	4.6	-0.3	5.9	$ 66,899	4.6	0.5	-36.5	862	0.1
Miami-Miami Beach-Kendall, FL	4.2	-0.5	5.9	$ 52,799	6.0	0.8	5.2	2,818	2.1
North Port-Sarasota-Bradenton, FL	3.4	-0.3	5.2	$ 41,921	6.2	7.1	-7.1	824	1.9
West Palm Beach-Boca Raton-Delray Beach, FL	3.6	-0.3	6.2	$ 51,195	5.6	1.6	-11.3	1,507	2.0
Boise City, ID	2.6	-0.3	4.9	$ 47,889	6.7	10.3	15.8	721	1.1
Oklahoma City, OK	3.4	-0.4	4.1	$ 55,060	5.3	3.7	3.3	1,389	0.3
Tulsa, OK	3.7	-0.7	4.6	$ 54,625	5.7	2.7	-11.8	995	0.3
Portland-Vancouver-Hillsboro, OR-WA	3.6	-0.3	6.1	$ 69,364	4.4	2.9	18.1	2,488	1.2
Austin-Round Rock, TX	3.0	0.1	4.3	$ 66,250	5.7	8.4	13.2	2,153	1.3
Dallas-Plano-Irving, TX	3.5	0.1	5.1	$ 76,315	5.8	5.4	1.5	4,997	1.3
El Paso, TX	4.2	0.0	7.8	$ 43,680	3.9	2.8	4.7	860	1.5
Fort Worth-Arlington, TX	3.6	0.0	5.0	$ 56,880	5.4	3.6	-1.0	2,532	1.4
Houston-The Woodlands-Sugar Land, TX	4.3	-0.5	5.6	$ 72,428	8.3	5.6	12.3	7,014	1.4
McAllen-Edinburg-Mission, TX	6.5	-0.6	11.0	$ 30,907	5.6	3.5	22.8	876	1.4
San Antonio-New Braunfels, TX	3.4	0.1	4.8	$ 53,303	5.0	3.3	7.9	2,517	1.4
Birmingham-Hoover, AL	3.8	0.1	5.2	$ 52,110	4.2	2.4	-1.6	1,153	0.2
Little Rock-North Little Rock-Conway, AR	3.2	-0.1	4.8	$ 51,593	3.3	2.4	-21.8	743	0.5
Phoenix-Mesa-Scottsdale, AZ	4.0	-0.1	5.1	$ 51,459	6.5	5.0	10.6	4,878	2.4
Tucson, AZ	4.2	-0.1	5.2	$ 43,932	5.8	3.7	21.8	1,053	2.5
Anaheim-Santa Ana-Irvine, CA	2.9	-0.5	5.0	$ 93,717	5.1	1.5	0.8	3,228	1.0
Bakersfield, CA	8.1	-0.9	10.9	$ 54,521	7.1	2.6	-6.4	904	0.9
Fresno, CA	7.7	-0.8	11.9	$ 57,207	7.3	2.2	0.3	1,001	0.9
Los Angeles-Long Beach-Glendale, CA	4.5	-0.1	7.4	$ 77,926	5.5	0.6	9.5	10,284	1.0
Oakland-Hayward-Berkeley, CA	3.0	-0.6	5.8	$ 72,160	6.4	1.3	-9.9	2,844	1.0
Oxnard-Thousand Oaks-Ventura, CA	3.5	-0.6	6.4	$ 63,893	5.7	1.2	-21.5	864	1.0
Riverside-San Bernardino-Ontario, CA	4.0	-0.8	7.5	$ 45,532	7.3	2.9	14.1	4,634	0.9
Sacramento--Roseville--Arden-Arcade, CA	3.8	-0.6	6.5	$ 66,167	6.4	3.0	3.6	2,352	0.9
San Diego-Carlsbad, CA	3.3	-0.6	5.7	$ 78,041	6.6	0.9	-28.7	3,377	1.0
San Francisco-Redwood City-South San Francisco, CA	2.3	-0.4	4.8	$ 139,198	6.2	0.2	-14.9	1,675	1.0
San Jose-Sunnyvale-Santa Clara, CA	2.6	-0.5	5.7	$ 114,981	6.8	1.2	-18.6	2,022	1.0
Stockton-Lodi, CA	6.0	-0.8	10.2	$ 47,240	7.4	3.8	31.2	754	0.9
Washington-Arlington-Alexandria, DC-VA-MD-WV	3.4	-0.3	4.3	$ 83,957	5.6	2.0	-19.3	4,943	0.6
Wilmington, DE-MD-NJ	4.1	-0.6	5.2	$ 89,496	3.8	2.0	-8.6	731	0.7
Cape Coral-Fort Myers, FL	3.2	-0.5	5.5	$ 39,690	6.1	7.1	11.5	757	1.9
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	3.4	-0.3	5.5	$ 52,164	5.7	0.8	-4.3	1,983	2.0
Jacksonville, FL	3.4	-0.3	5.3	$ 53,304	8.3	6.7	4.1	1,541	1.9
Lakeland-Winter Haven, FL	4.1	-0.4	6.6	$ 35,972	5.2	6.9	4.5	703	1.8
Orlando-Kissimmee-Sanford, FL	3.4	-0.3	5.3	$ 56,921	6.2	6.0	5.8	2,570	1.9
Tampa-St. Petersburg-Clearwater, FL	3.5	-0.3	5.5	$ 52,100	6.2	4.4	5.7	3,165	1.9
Atlanta-Sandy Springs-Roswell, GA	3.6	-0.7	5.6	$ 63,681	6.3	4.3	0.1	5,964	1.0
Urban Honolulu, HI	2.0	-0.1	4.1	$ 70,232	5.4	0.9	-9.4	992	0.4
Chicago-Naperville-Arlington Heights, IL	3.9	-1.3	6.5	$ 73,798	4.6	0.7	9.7	7,332	0.2
Lake County-Kenosha County, IL-WI	4.1	-0.1	5.5	$ 69,038	4.2	1.1	8.2	874	0.2
Gary, IN	4.5	-0.2	6.2	$ 46,831	4.2	2.9	6.9	704	0.3
Indianapolis-Carmel-Anderson, IN	3.2	-0.1	4.9	$ 66,425	5.6	4.0	18.7	2,034	0.2
Louisville-Jefferson County, KY-IN	4.1	-0.1	5.5	$ 58,291	5.2	2.4	-14.0	1,298	0.2

Arch MI Risk Index for the 100 Largest MSAs

100 LARGEST METROPOLITAN Statistical Areas Sorted by Risk Ranking, then State, then MSA	ST	RISK RANKING	ARCH MI RISK INDEX 2018Q3	ARCH MI RISK INDEX 1-YR. CHANGE	ARCH MI RISK INDEX LONG RUN AVG.	% HOME PRICE CHANGE 1-YR. 2018Q3	% HOME PRICE CHANGE 1-YR. 2017Q3
Baton Rouge, LA	LA	Minimal	10	-6	18	2.5	6.4
New Orleans-Metairie, LA	LA	Minimal	9	-4	20	2.5	3.8
Boston, MA	MA	Minimal	3	1	25	6.1	7.4
Cambridge-Newton-Framingham, MA	MA	Minimal	2	0	22	6.9	7.8
Worcester, MA-CT	MA	Minimal	2	0	25	6.9	6.3
Baltimore-Columbia-Towson, MD	MD	Minimal	7	2	22	3.6	2.9
Silver Spring-Frederick-Rockville, MD	MD	Minimal	7	2	22	3.9	3.6
Detroit-Dearborn-Livonia, MI	MI	Minimal	2	0	46	9.2	8.2
Grand Rapids-Wyoming, MI	MI	Minimal	2	0	24	7.7	10.2
Warren-Troy-Farmington Hills, MI	MI	Minimal	2	0	30	7.9	8.3
Minneapolis-St. Paul-Bloomington, MN-WI	MN	Minimal	2	0	24	7.5	7.6
Kansas City, MO-KS	MO	Minimal	3	1	20	8.0	7.8
St. Louis, MO-IL	MO	Minimal	5	3	20	5.3	4.5
Charlotte-Concord-Gastonia, NC-SC	NC	Minimal	3	1	14	7.9	9.3
Greensboro-High Point, NC	NC	Minimal	2	0	17	5.7	5.4
Raleigh, NC	NC	Minimal	2	0	13	6.9	7.9
Winston-Salem, NC	NC	Minimal	2	0	19	8.0	2.8
Omaha-Council Bluffs, NE-IA	NE	Minimal	2	0	10	7.4	6.3
Camden, NJ	NJ	Minimal	10	2	26	3.3	1.8
Newark, NJ-PA	NJ	Minimal	10	2	26	4.7	3.1
Albuquerque, NM	NM	Minimal	7	-4	22	2.5	4.7
Las Vegas-Henderson-Paradise, NV	NV	Minimal	5	3	26	18.1	11.2
Albany-Schenectady-Troy, NY	NY	Minimal	5	1	22	3.4	3.2
Buffalo-Cheektowaga-Niagara Falls, NY	NY	Minimal	5	1	10	7.6	6.3
Nassau County-Suffolk County, NY	NY	Minimal	5	1	31	6.9	6.0
New York-Jersey City-White Plains, NY-NJ	NY	Minimal	5	3	26	5.1	5.3
Rochester, NY	NY	Minimal	5	1	11	6.3	4.9
Akron, OH	OH	Minimal	2	0	21	7.3	4.8
Cincinnati, OH-KY-IN	OH	Minimal	2	0	18	6.2	6.2
Cleveland-Elyria, OH	OH	Minimal	2	0	27	5.5	6.0
Columbus, OH	OH	Minimal	2	0	16	7.4	8.2
Dayton, OH	OH	Minimal	2	0	20	8.7	4.9
Allentown-Bethlehem-Easton, PA-NJ	PA	Minimal	2	-18	22	5.7	4.6
Montgomery County-Bucks County-Chester County, PA	PA	Minimal	2	0	21	4.3	3.7
Philadelphia, PA	PA	Minimal	2	0	25	6.7	6.7
Pittsburgh, PA	PA	Minimal	2	0	9	6.2	3.5
Providence-Warwick, RI-MA	RI	Minimal	2	0	27	7.0	7.2
Charleston-North Charleston, SC	SC	Minimal	5	2	22	5.3	9.7
Columbia, SC	SC	Minimal	2	0	19	3.7	5.4
Greenville-Anderson-Mauldin, SC	SC	Minimal	2	0	16	9.3	5.8
Knoxville, TN	TN	Minimal	2	0	19	6.3	5.6
Memphis, TN-MS-AR	TN	Minimal	2	0	18	5.7	7.3
Nashville-Davidson--Murfreesboro--Franklin, TN	TN	Minimal	7	-16	16	9.9	10.3
Ogden-Clearfield, UT	UT	Minimal	3	1	17	11.5	10.4
Salt Lake City, UT	UT	Minimal	2	0	17	10.7	10.4
Richmond, VA	VA	Minimal	2	0	22	6.3	6.2
Virginia Beach-Norfolk-Newport News, VA-NC	VA	Minimal	2	0	24	2.9	2.6
Seattle-Bellevue-Everett, WA	WA	Minimal	10	8	19	10.4	14.1
Tacoma-Lakewood, WA	WA	Minimal	8	6	21	11.6	13.2
Milwaukee-Waukesha-West Allis, WI	WI	Minimal	2	0	21	6.0	5.6

Data sources are listed on page 15.

100 LARGEST METROPOLITAN

Statistical Areas Sorted by Risk Ranking, then State, then MSA

	UNEMPLOYMENT RATE			GROSS METRO PRODUCT		SINGLE-FAMILY HOUSING STARTS		POPULATION	
	LATEST	1-YR. CHANGE	LONG RUN AVG.	PER CAPITA 2018Q3	1-YR. % CHANGE	PER 1000 PEOPLE 2018Q3	1-YR. % CHANGE	2018Q3 (THS.)	1-YR. % CHANGE
Baton Rouge, LA	4.4	0.2	5.7	$ 65,735	3.9	4.1	-4.0	835	0.2
New Orleans-Metairie, LA	4.7	0.1	6.0	$ 62,441	6.4	2.2	4.0	1,277	0.1
Boston, MA	3.4	-0.1	4.9	$ 105,299	5.7	1.0	-2.7	2,018	0.2
Cambridge-Newton-Framingham, MA	3.2	-0.1	4.6	$ 85,031	5.5	0.9	-18.5	2,394	0.2
Worcester, MA-CT	3.9	-0.1	5.5	$ 57,070	5.3	1.2	-32.8	945	0.1
Baltimore-Columbia-Towson, MD	4.3	0.1	5.3	$ 73,197	5.2	1.8	2.3	2,838	0.9
Silver Spring-Frederick-Rockville, MD	3.4	0.1	3.6	$ 79,076	5.0	2.0	-0.1	1,324	0.8
Detroit-Dearborn-Livonia, MI	5.0	-0.2	8.2	$ 51,909	3.9	0.7	14.7	1,756	0.1
Grand Rapids-Wyoming, MI	3.1	-0.6	5.5	$ 61,123	5.6	2.6	-2.7	1,060	0.0
Warren-Troy-Farmington Hills, MI	3.7	0.0	6.3	$ 63,921	5.1	2.0	-10.3	2,562	0.1
Minneapolis-St. Paul-Bloomington, MN-WI	2.7	-0.4	4.1	$ 71,335	5.0	2.8	15.9	3,632	0.7
Kansas City, MO-KS	3.3	-0.4	5.3	$ 59,847	5.3	2.8	6.1	2,136	0.2
St. Louis, MO-IL	3.4	-0.2	5.6	$ 57,547	4.6	2.0	5.7	2,818	0.3
Charlotte-Concord-Gastonia, NC-SC	3.6	-0.5	5.9	$ 61,498	6.9	6.0	-0.1	2,562	1.1
Greensboro-High Point, NC	4.0	-0.6	5.9	$ 58,702	5.0	2.4	-4.5	773	1.3
Raleigh, NC	3.4	-0.4	4.5	$ 60,963	6.9	7.8	-2.0	1,356	1.2
Winston-Salem, NC	3.7	-0.5	5.6	$ 44,074	5.1	4.5	4.6	678	1.3
Omaha-Council Bluffs, NE-IA	2.9	-0.1	3.6	$ 65,850	5.7	3.4	3.6	934	0.0
Camden, NJ	4.2	-0.5	5.9	$ 58,395	5.0	1.3	-12.4	1,257	0.4
Newark, NJ-PA	4.3	-0.4	5.7	$ 76,515	4.0	1.1	12.5	2,541	0.3
Albuquerque, NM	4.3	-1.3	5.4	$ 50,110	5.0	2.4	14.3	914	0.3
Las Vegas-Henderson-Paradise, NV	4.7	-0.5	6.6	$ 53,162	7.3	4.2	-7.7	2,269	2.4
Albany-Schenectady-Troy, NY	3.9	-0.4	4.7	$ 80,341	5.4	1.5	-16.4	885	-0.1
Buffalo-Cheektowaga-Niagara Falls, NY	4.5	-0.7	5.9	$ 78,460	4.6	0.9	-17.0	1,136	-0.1
Nassau County-Suffolk County, NY	3.9	-0.6	4.8	$ 72,316	5.0	0.6	-24.9	2,860	-0.1
New York-Jersey City-White Plains, NY-NJ	4.1	-0.4	6.5	$ 87,268	5.3	0.5	-23.3	14,545	0.0
Rochester, NY	4.4	-0.7	5.3	$ 72,783	5.3	1.3	-0.9	1,077	-0.1
Akron, OH	4.6	-0.4	6.0	$ 58,464	5.0	1.6	29.8	703	-0.1
Cincinnati, OH-KY-IN	4.0	-0.3	5.5	$ 62,717	5.1	2.2	3.9	2,179	-0.1
Cleveland-Elyria, OH	5.1	-0.5	5.2	$ 65,407	4.5	1.3	6.0	2,057	-0.1
Columbus, OH	3.9	-0.2	5.0	$ 66,364	5.3	2.4	11.4	2,076	-0.2
Dayton, OH	4.4	-0.3	6.0	$ 57,424	5.9	1.4	9.9	803	-0.1
Allentown-Bethlehem-Easton, PA-NJ	4.3	-0.5	5.7	$ 54,587	5.4	1.4	-3.0	841	0.0
Montgomery County-Bucks County-Chester County, PA	3.3	-0.5	4.5	$ 79,643	4.8	1.8	-13.4	1,974	0.0
Philadelphia, PA	4.9	-0.8	6.8	$ 59,777	5.2	0.5	-24.2	2,146	0.0
Pittsburgh, PA	4.1	-0.8	5.6	$ 72,276	6.0	1.7	-1.4	2,335	0.1
Providence-Warwick, RI-MA	4.2	-0.3	6.5	$ 57,007	5.2	1.0	-24.9	1,625	0.2
Charleston-North Charleston, SC	2.9	-0.6	5.3	$ 51,391	5.5	6.2	8.4	782	0.6
Columbia, SC	3.3	-0.8	5.4	$ 54,509	5.1	5.2	-1.6	832	0.7
Greenville-Anderson-Mauldin, SC	3.1	-0.7	5.5	$ 49,856	6.0	5.3	9.6	903	0.6
Knoxville, TN	3.3	0.1	5.1	$ 51,845	5.5	3.9	-1.6	885	0.7
Memphis, TN-MS-AR	4.2	0.2	6.0	$ 56,805	5.9	2.2	-7.0	1,359	0.7
Nashville-Davidson--Murfreesboro--Franklin, TN	2.8	0.2	4.7	$ 64,853	5.8	6.7	-6.8	1,921	0.7
Ogden-Clearfield, UT	3.2	-0.1	4.5	$ 43,836	6.5	4.2	2.7	677	1.3
Salt Lake City, UT	3.0	-0.1	4.2	$ 74,463	6.5	4.3	0.2	1,224	1.4
Richmond, VA	3.2	-0.6	4.4	$ 67,231	5.2	3.4	-9.6	1,310	1.0
Virginia Beach-Norfolk-Newport News, VA-NC	3.3	-0.8	4.7	$ 61,314	4.9	2.3	-4.0	1,746	1.0
Seattle-Bellevue-Everett, WA	3.5	-0.4	5.0	$ 103,325	8.0	2.2	-14.4	3,038	1.2
Tacoma-Lakewood, WA	5.1	-0.2	6.8	$ 50,789	8.0	2.7	-22.0	891	1.2
Milwaukee-Waukesha-West Allis, WI	3.2	-0.3	5.2	$ 63,853	4.9	1.1	13.0	1,583	0.4

Cautionary Statement: The Private Securities Litigation Reform Act of 1995 provides a "safe harbor" for forward-looking statements. This release or any other written or oral statements made by or on behalf of Arch Capital Group Ltd. and its subsidiaries may include forward-looking statements, which reflect our current views with respect to future events and financial performance. All statements, other than statements of historical fact included in or incorporated by reference in this release, are forward-looking statements.

Forward-looking statements can generally be identified by the use of forward-looking terminology such as "may," "will," "expect," "intend," "estimate," "anticipate," "believe" or "continue" or their negative or variations or similar terminology. Forward-looking statements involve our current assessment of risks and uncertainties. Actual events and results may differ materially from those expressed or implied in these statements. A non-exclusive list of the important factors that could cause actual results to differ materially from those in such forward-looking statements includes the following: adverse general economic and market conditions; increased competition; pricing and policy term trends; fluctuations in the actions of rating agencies and our ability to maintain and improve our ratings; investment performance; the loss of key personnel; the adequacy of our loss reserves, severity and/or frequency of losses, greater than expected loss ratios and adverse development on claim and/or claim expense liabilities; greater frequency or severity of unpredictable natural and man-made catastrophic events; the impact of acts of terrorism and acts of war; changes in regulations and/or tax laws in the United States or elsewhere; our ability to successfully integrate, establish and maintain operating procedures as well as integrate the businesses we have acquired or may acquire into the existing operations; changes in accounting principles or policies; material differences between actual and expected assessments for guaranty funds and mandatory pooling arrangements; availability and cost to us of reinsurance to manage our gross and net exposures; the failure of others to meet their obligations to us; and other factors identified in our filings with the U.S. Securities and Exchange Commission.

The foregoing review of important factors should not be construed as exhaustive and should be read in conjunction with other cautionary statements that are included herein or elsewhere. All subsequent written and oral forward-looking statements attributable to us or persons acting on our behalf are expressly qualified in their entirety by these cautionary statements. We undertake no obligation to publicly update or revise any forward-looking statement, whether as a result of new information, future events or otherwise.

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