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Navigating Volatility in the U.S. Residential New Construction Sector

Tailwinds to sweep through
near-term turbulence



Abstract

Over the course of 2018, factors impacting supply and demand for housing in the U.S. trended negatively, causing a shift away from prior expectations of a steady and strong growth environment in residential new construction. Wells Fargo Securities and L.E.K. Consulting analyze these factors, among others, against historical housing activity to assess the potential impact of a near-term housing down-cycle. We put into context current residential new construction activity relative to long-term averages and quantify the level of pent-up demand in household formation, most notably from the millennial generation. Our view of the data suggests a positive outlook despite current fears of near-term softness.

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Are we heading into a down-cycle in housing? What are the biggest near-term tailwinds for residential new construction?

- Since 1970, there has been no instance of total housing starts turning negative prior to reaching the long-term average. Current total housing starts of 1.256 million are 13% below the long-term average of 1.438 million starts. A housing cycle peak at this level would be unprecedented, and we anticipate any down-cycle in housing would produce a relatively modest decline in starts, if one were to occur at all.
- Housing market fundamentals are positive as the consumer remains healthy and the market undersupplied.
- While sharp declines in housing affordability captured headlines in late 2018, subsiding expectations for rate hikes paint a brighter picture for homebuyers in 2019.

If we do go into a near-term down-cycle in housing, what is the expected impact on single-family vs. multifamily?

- Depth and duration of housing down-cycles are heavily influenced by starts levels relative to long-term averages at the inception of a downturn. We view the 1994 and 1999 housing cycle peaks as helpful guides to our current environment, as these cycles peaked at low starts levels relative to the long-term average. In these down-cycles, the average year one decline was 6%, less than half of the decline in year one for the remaining down-cycles dating back to 1970.
- As a result, we would expect a near-term down-cycle (if one occurred at all) to be mild in both depth and duration but with noticeable differences for single-family and multifamily activity.
 - Single-family housing experienced a slower recovery since the last trough, with current housing starts still 22% below the long-term single-family average. We believe it would be resilient in a downturn scenario and is most likely to resemble the 1999 housing down-cycle, in which single-family starts declined a modest 5% over a single year before returning to robust growth.
 - Multifamily construction typically sees a faster recovery than single-family construction after a housing down-cycle, as lenders prefer institutional owners over individuals during periods of tight credit markets. Our current recovery has followed this pattern, with multifamily starts rebounding to 13% over the long-term average. Thus, we would expect a housing down-cycle to have a moderately greater impact on this segment of the market, with a near term down-cycle most likely to resemble a typical correction that declines a cumulative 20% over three years before returning to growth.

What has held new housing demand below the long-term median (1.438 million starts) in the current recovery? What will support growth in the long term?

- A weak labor market post the Great Recession, unprecedented student loan balances and other behavioral factors have delayed millennial household formation. We anticipate an unwinding of this delayed demand as the millennial generation ages and closes the gap to prior generations' headship rates.
- The underproduction of homes due to the slow recovery in housing over the past decade, coupled with upcoming millennial demand, has created a healthy supply/demand environment that is supportive of steady growth regardless of noise around the health of the broader economy.
 - In 2009, the market had an excess inventory of 740,000 new and existing homes, relative to the long-term average. It took three years of recovery to work through this excess inventory to reach normalized levels. Currently, inventory of new and existing homes is 529,000 homes; 21.6% below the long-term average.

How can industry participants be positioning themselves in the current environment?

- Now may be an attractive time for both organic and inorganic investment in the industry — in capabilities and capacity. In fact, the recent pullback could help create attractive entry points for opportunistic investments.
- Millennials are likely to fuel a significant portion of future growth as they age — industry participants should evaluate opportunities to serve the outsized growth by aligning themselves to millennial demand in terms of style and price point.
- Opportunities to serve the single-family market (particularly first-time buyers) are likely to provide greater growth and more resilient demand.

Introduction

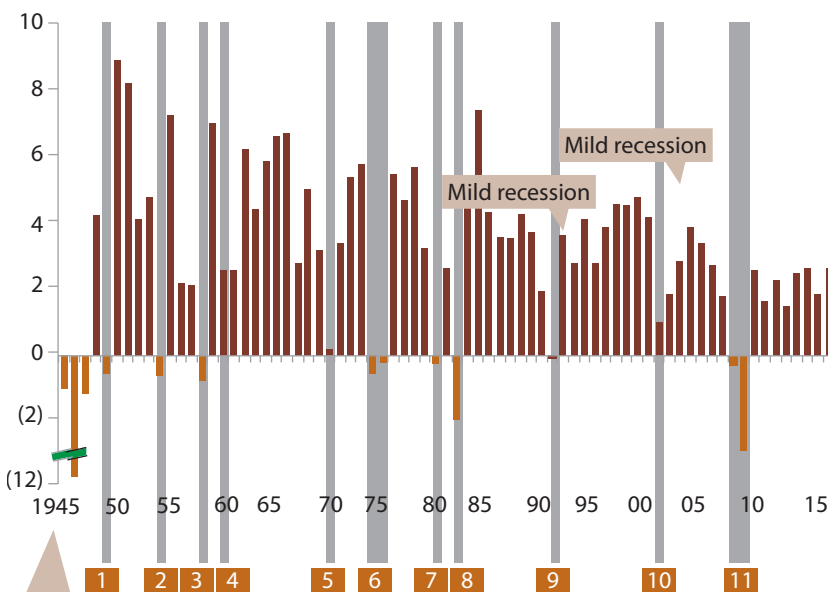
In the second half of 2018, rising mortgage rates, all-time-high home prices, and broad business cycle concerns negatively affected growth expectations for the residential new construction market. The headwinds resulted in a broad reduction of the consensus outlook for housing starts in 2019. In this paper, we analyze past housing down-cycles and economic recessions in the U.S. to frame the current fundamental demand for housing and to evaluate the near-term consequences of a down-cycle. Finally, we highlight tailwinds that are supportive of longer-term growth in residential new construction.

Since 1945, the average duration of an economic up-cycle is approximately five years, with the following down-cycle (peak to trough) lasting an average of one year (see Exhibit 1 below). As we approach the 10th consecutive year of economic recovery following the Great Recession, market dynamics are shifting. Given that pundits and investors have increasingly acknowledged the likelihood of a recession in the near term, we aim to cover the possible depth and duration of a potential pull-back in residential new construction and understand what underlying demand fundamentals suggest for long-term growth.

Exhibit 1: Prior Recessions — Depth and Duration

U.S. Real GDP YoY growth (1945 – 2017)

Percent



Post-1945 recessions

#	Peak month	Trough month	Duration (peak to trough) (in months)	Duration (trough to peak)* (in months)
1	Nov. 1948	Oct. 1949	11	37
2	Jul. 1953	May 1954	10	45
3	Aug. 1957	Apr. 1958	8	39
4	Apr. 1960	Feb. 1961	10	24
5	Dec. 1969	Nov. 1970	11	106
6	Nov. 1973	Mar. 1975	16	36
7	Jan. 1980	Jul. 1980	6	58
8	Jul. 1981	Nov. 1982	16	12
9	Jul. 1990	Mar. 1991	8	92
10	Mar. 2001	Nov. 2001	8	120
11	Dec. 2007	Jun. 2009	18	73
Average duration (1945 – 2009 11 cycles)			11.1 (~1 year)	58.4 (~5 years)

The U.S. is **past due** for a recession (last recession ended 2009) based on historical averages

*Durations shown are from prior recession trough to peak leading into the recession (e.g., 73 months from Nov. 2001 trough to Dec. 2007 peak)

Sources: Bureau of Economic Analysis, National Bureau of Economic Research

Recent growth in U.S. residential new construction has decelerated, potentially foreshadowing a slowdown in the broader U.S. economy. However, in our view, any near-term negative impact should be muted relative to longer-term growth in housing. The core evidence of near-term resilience in housing includes (1) the current level of housing starts (specifically in single-family) relative to the long-term average, (2) low levels of housing inventory due to the slow pace of recovery, and (3) a healthy U.S. consumer. Beyond the next 12 – 24 months, housing activity will be supported by a demographic shift as millennials continue to form households at an accelerated rate. Together, these factors likely outweigh near-term concerns around a potential pause in demand caused by rising mortgage rates pressuring affordability. Likewise, homebuilders are unlikely to oversupply the market due to input cost inflation, scarce labor, and lot availability.

A Blend of Consumer Psychology and Housing Supply/Demand Fundamentals

Historical analysis suggests a housing down-cycle at current starts levels would be unlikely, with past benchmarking pointing to muted depth and duration if a down-cycle were to occur in the near term. We pair that historical analysis with a review of current consumer psychology to provide a more complete picture on the near-term outlook for residential new construction activity.

Consumer psychology

Increasing concern over business cycle risk, geopolitical noise, and volatility in the stock market likely contributed to the decline in the health of consumer-related economic indicators in 2018. Despite the 11% decline in the Housing Affordability Index and a 24% decline in the NAHB/Wells Fargo Housing Market Index over the course of 2018, overall consumer health appears strong. As shown in Exhibit 2 below, key metrics measuring consumer psychology are above long-term averages despite the decline from recent peaks.

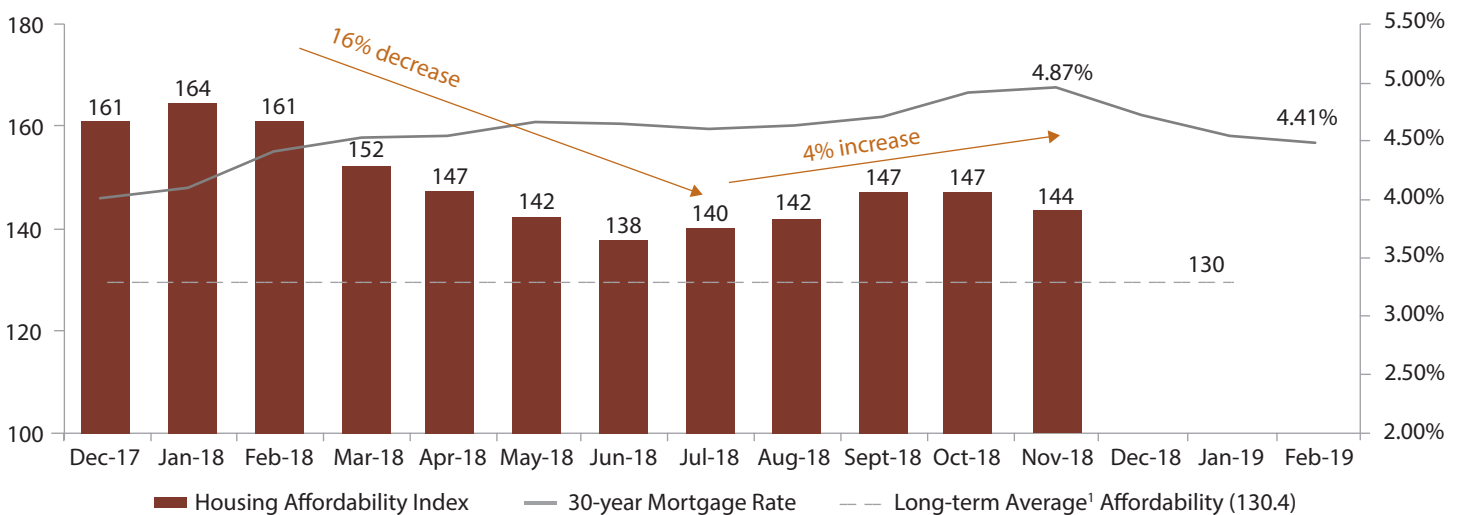
Exhibit 2: Metrics Influencing Consumer Psychology

Statistic	Most Recent	RECENT PEAK		LONG-TERM AVERAGE*	
		Reading	Most Recent vs. Trend	Reading	Most Recent vs. Trend
Housing Affordability Index	Nov. 2018 — 144.0	Jan. 2018 — 164.3	● (Red)	130.4	● (Green)
NAHB/Wells Fargo Housing Market Index	Dec. 2018 — 56.0	Dec. 2017 — 74.0	● (Red)	54.3	● (Green)
Wage Growth	Nov. 2018 — 3.10%	Oct. 2018 — 3.20%	● (Green)	2.40%	● (Green)
30-Year Fixed Rate Mortgage	Feb. 2019 — 4.41%	Nov. 2018 — 4.87%	● (Green)	10.30%	● (Green)
Unemployment Rate	Nov. 2018 — 3.80%	Nov. 2017 — 4.10%	● (Green)	6.40%	● (Green)
Consumer Confidence Index	Nov. 2018 — 120.2	Oct. 2018 — 137.9	● (Red)	97.2	● (Green)
GDP Growth YoY	Nov. 2018 — 3.40%	Jun. 2018 — 4.20%	● (Yellow)	3.30%	● (Green)

*Long-term average represents 1980 – 2000 median, or closest available data
Sources: National Association of Realtors, National Association of Home Builders, U.S. Bureau of Labor Statistics, Federal Housing Finance Board, The Conference Board, U.S. Bureau of Economic Analysis

Overall, the recent decline in consumer psychology has already begun to reverse course. The number of 2019 expected rate hikes has decreased from four as of mid-2018 to two as of early 2019, easing affordability pressures from rising mortgage rates. The sharp increase in mortgage rates (off a low base) was a key negative headwind for housing demand in 2018. 30-year mortgage rates did, however, peak in November 2018 at 4.87%, with the most recent rates down to 4.41%. As a result, the Housing Affordability Index bottomed at 138 in June 2018 and is currently at 144 (see Exhibit 3 below). As moderately higher rates season and the economy continues to show strong employment and wage growth, a recovery in consumer psychology provides greater support for near-term housing demand.

Exhibit 3: Housing Affordability Index vs. Mortgage Rates



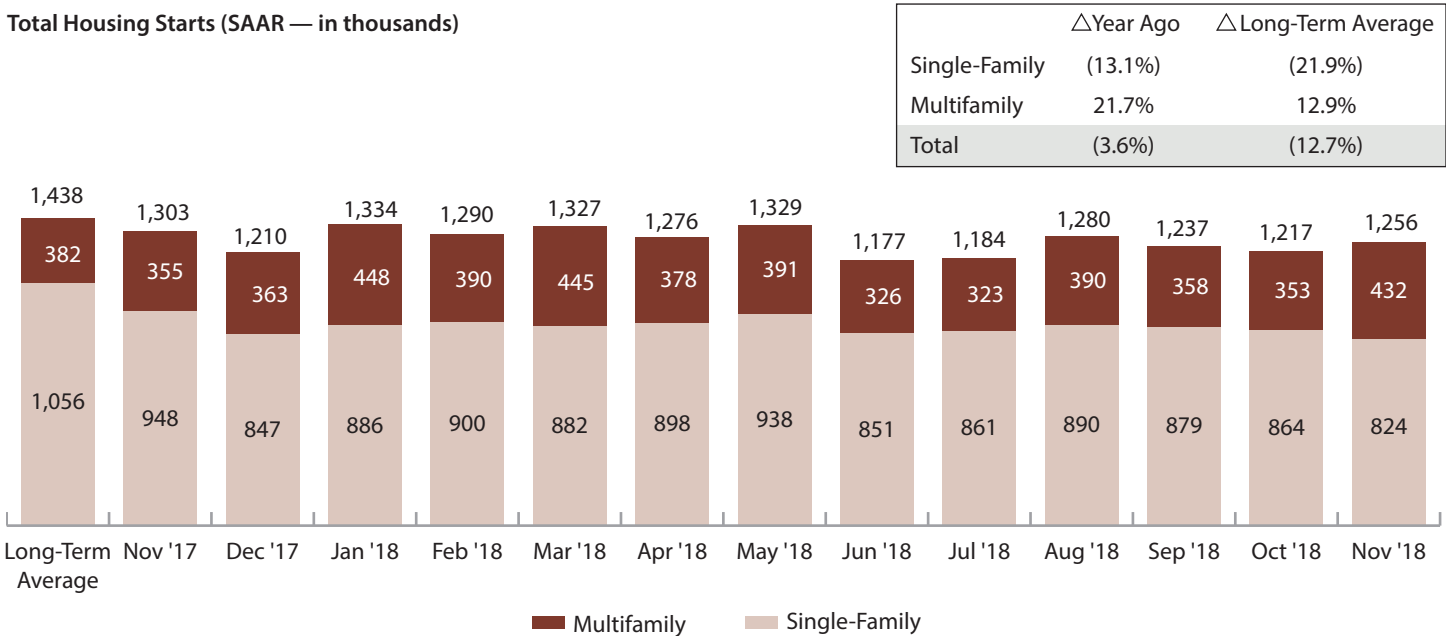
¹Long-Term Average reflects 1988 – 2000 data
Note: A Housing Affordability Index value of 100 means that a family with the median income has exactly enough income to qualify for a mortgage on a median-priced home
Sources: National Association of Realtors, Federal Housing Finance Agency, Freddie Mac

Current housing supply/demand fundamentals

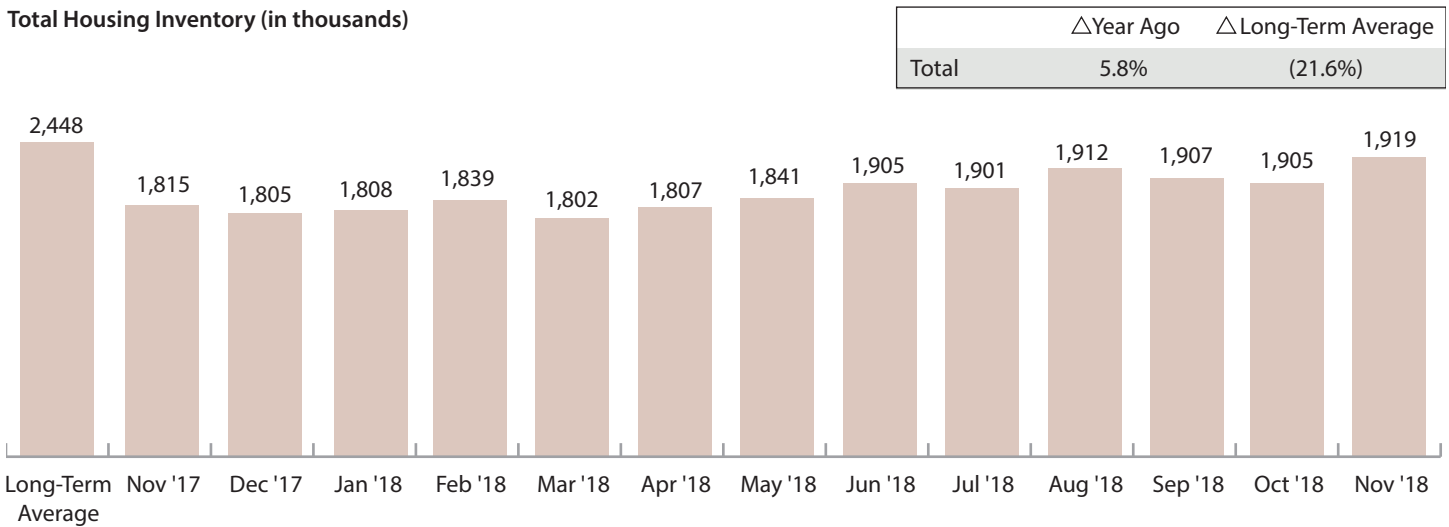
While we believe the U.S. consumer is relatively healthy and supportive of demand in the near term, we also analyzed key supply metrics in relation to long-term averages to gauge the health of supply in the market. Exhibit 4 below details the current status of housing starts and inventory levels relative to long-term averages. We note that both of these key metrics are significantly below the long-term average with a gap of 12.7% and 21.6% for total housing starts and total housing inventory, respectively. This low level of starts and inventory is supportive of the potential increase in near-term supply.

Exhibit 4: Housing Activity and Inventory Relative to Long-Term Averages

Total Housing Starts (SAAR — in thousands)



Total Housing Inventory (in thousands)



Note: Long-term average of Housing Starts reflects 1980 – 2000 data; long-term average of Total Inventory reflects 1982 – 2000 data
Sources: U.S. Census Bureau, National Association of Realtors

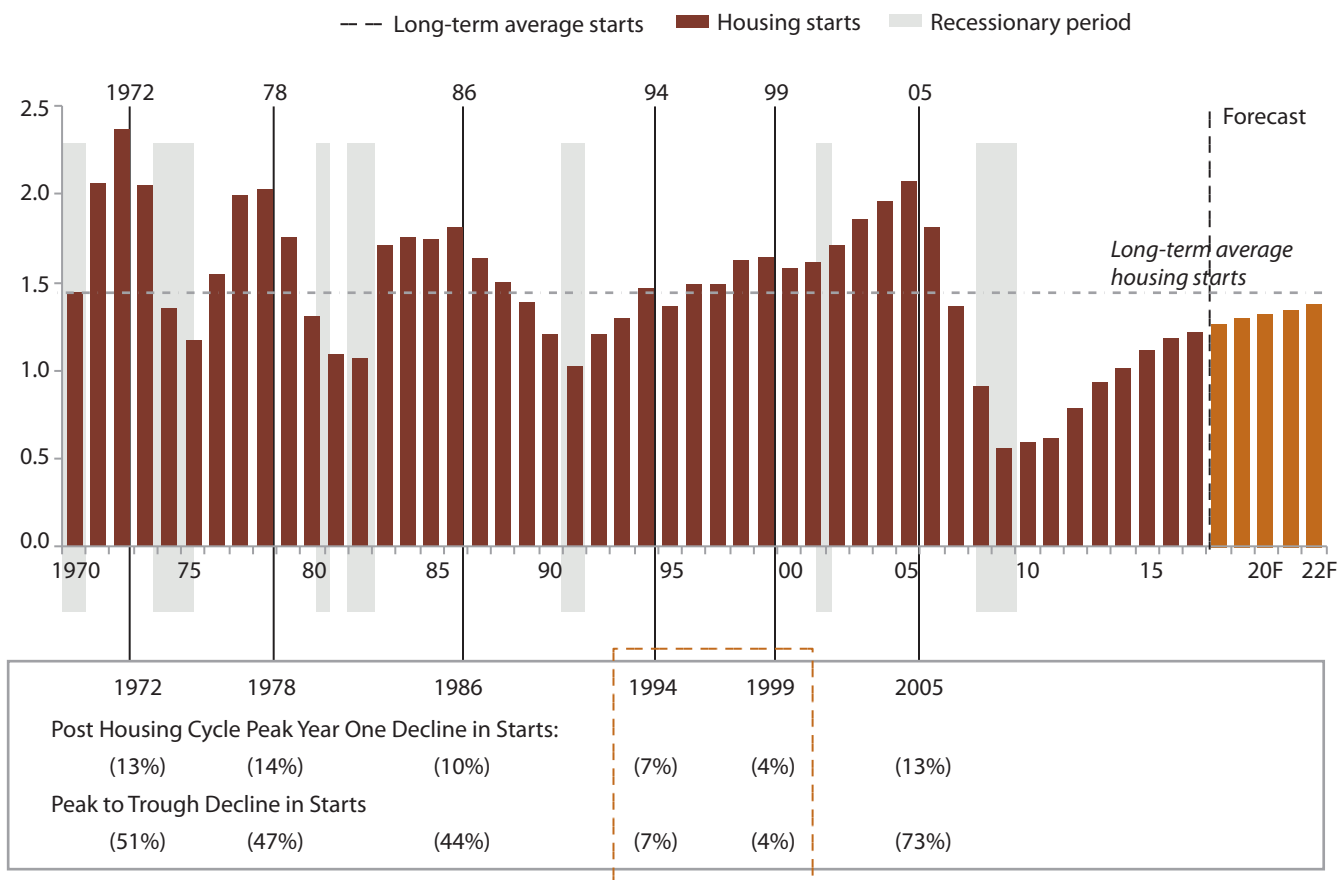
Analyzing housing starts levels at the inception of a downturn

As current housing starts are 13% below their long-term average, we analyze the relationship between historic down-cycles and housing activity at the inception of each cycle. At the inception of a down-cycle, year one declines in total housing starts are directionally more severe the greater starts are above the long-term average. Total depth and duration of declines in total housing starts following a peak are further impacted by the recessionary economic environment that typically follows. Given this insight, we frame current and forecasted housing starts levels by historic year one declines to assess their health and vulnerability in the current environment – Exhibit 5.

Exhibit 5: Housing Starts in Relation to Their Long-Term Average

U.S. housing starts — Single-Family and Multifamily (1970 – 2022F)

Millions of starts



Sources: National Association of Homebuilders, National Association of Realtors, National Bureau of Economic Research, U.S. Census Bureau, Consensus Estimates

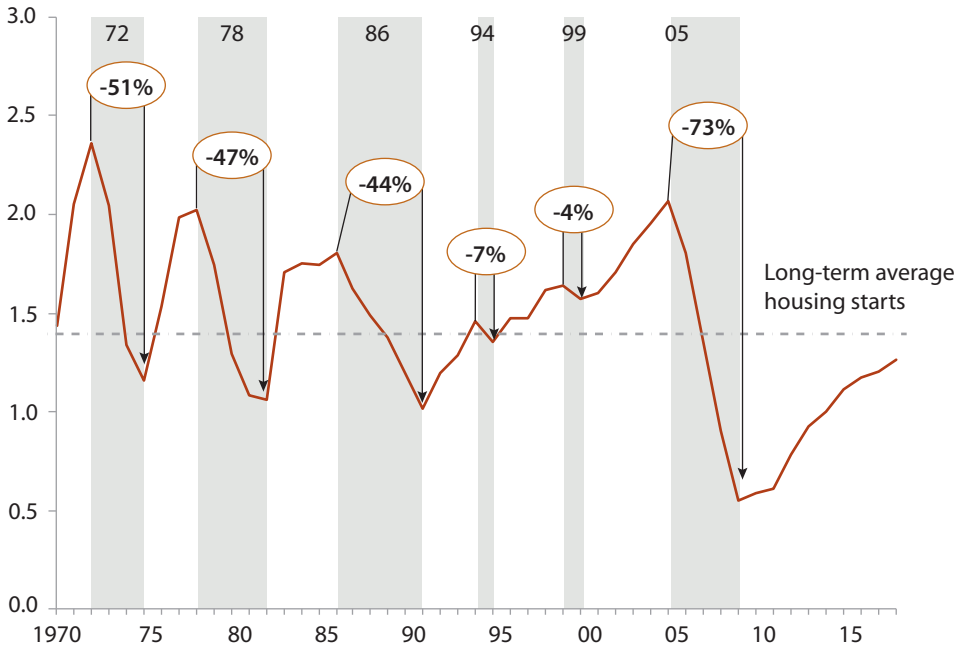
November’s seasonally adjusted annualized housing starts of 1.256 million were 13% below the long-term average (1980 – 2000) of 1.438 million, with consensus forward estimates for 2020 of 1.321 million implying a 9% gap. Thus, a housing cycle peak at this level would be unprecedented, and we anticipate any down-cycle in housing would produce a relatively modest decline in starts.

We view the 1994 and 1999 housing cycle peaks as helpful benchmarks for our current environment, given that these cycles peaked at low total housing starts levels relative to the long-term average. In these down-cycles, the average year one decline was 6%, less than half of the decline in year one for the other down-cycles we analyzed going back to 1970.

Exhibit 6: Cyclicity of Housing Starts

U.S. housing starts — Single-Family and Multifamily (1970 – 2018E)

Millions of starts



Cyclicity criteria	Value
Average peak-to-trough percent change	~38%
Average time to recover*	~3 years
Average time from trough to next peak	~4 years

*Recovery time is based on the time from trough back to the long-term average.

Sources: National Association of Home Builders, National Association of Realtors, NBER, U.S. Census Bureau

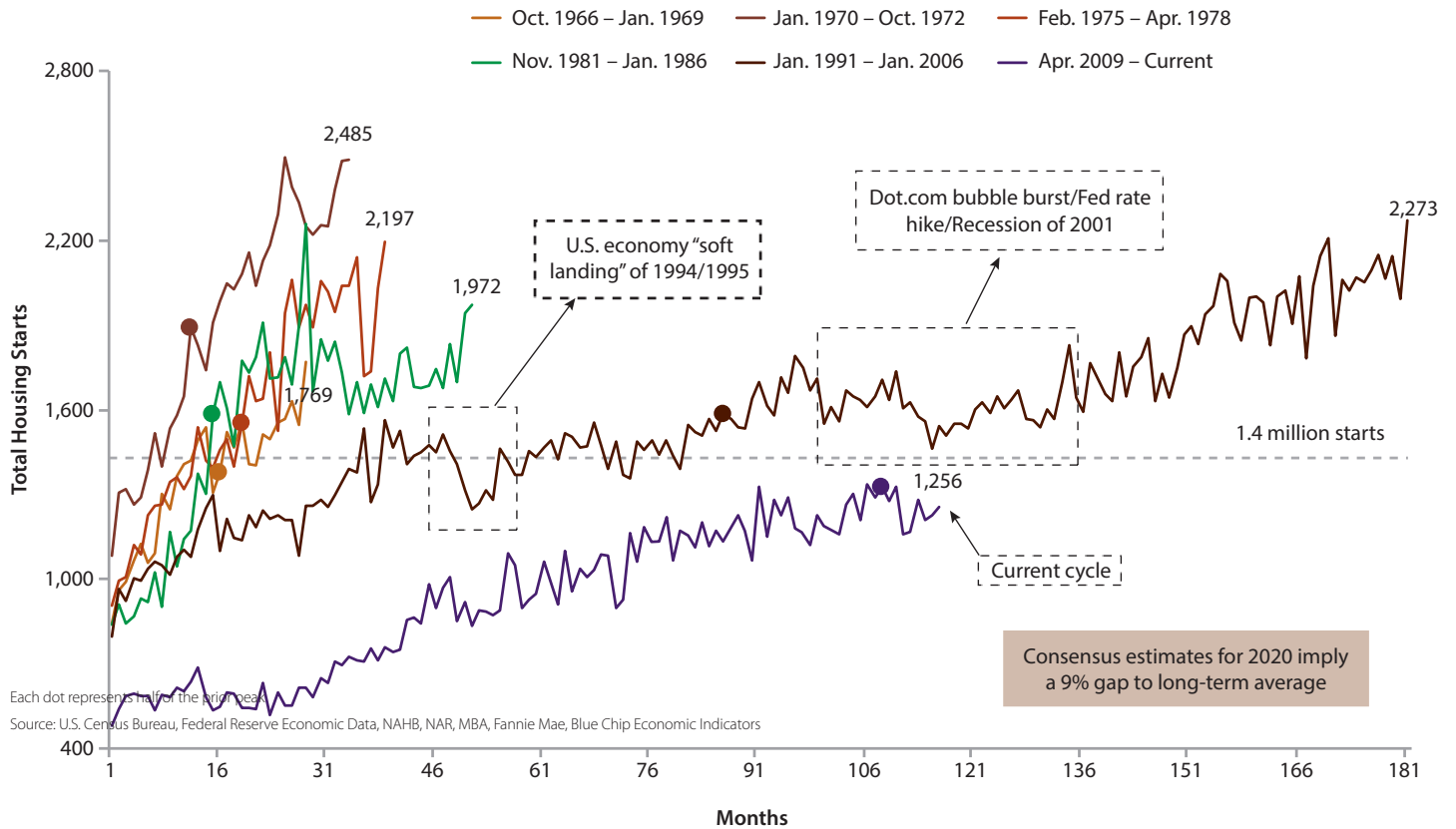
Since 1970, there is no instance of housing starts turning negative prior to reaching the long-term average. The nearest such example was in 1994, which yielded a decline in starts of just 7% that lasted only one year before trending steadily higher until the beginning of the Great Recession in 2005. This super-cycle of 15 years ceded only a modest decline in starts in 1999, on the heels of the "dot.com bubble," and produced the only instance in the observed period of positive starts growth during an economic recession in 2001.

While these past instances give us confidence around the limited downside for total housing starts in the near term, our current recovery is unique from past cycles because of the extended duration of recovery since the 2009 trough. Our analysis of past cycles reveals the average time for starts to go from trough to the long-term average is approximately three years. The current recovery in housing starts is unique given that we are almost 10 years from the trough of the Great Recession and are yet to reach the long-term average. Therefore, the current state of housing supply remains far from frothy and is well-positioned to maintain moderate growth.

Exhibit 7 shows prior periods of housing starts expansion over time and their relative duration. We view the current slow recovery as one poised for continued longer-term growth. Current consensus estimates for 2020 housing starts still imply a 9% gap to the long-term average.

Exhibit 7: Current Cycle Relative to Historic Peaks

Total housing starts (000s)



Slow Recovery and Demographic Tailwinds Support Sustained Growth




Two of the strongest tailwinds for medium to long-term housing demand should come from pent-up formation of households, primarily consisting of millennials, and from the cumulative underbuild in housing in the current recovery.

Millennial tailwind: Why the millennial generation is different

Collectively, millennials are “behind schedule” relative to the preceding generation in terms of household formation. Early millennials approached adulthood around the time of the Great Recession, amassing significant student debt¹ and entering a contracting labor force. As a result, these prime first-time homebuyers were less well-capitalized than prior generations while also having to cope with materially higher median home prices despite similar levels of income — Exhibit 8 below. Additionally, the millennial generation has displayed behavioral changes relative to prior generations, which have delayed major life events that typically correspond to household formation and homeownership. Millennials have exhibited lower marriage and fertility rates and a higher level of city living relative to their Generation X counterparts.

Exhibit 8: Generation Comparison: Generation X vs. Millennials

Young adults in 2001 versus 2017

	Young adults (25 – 34 years)	Year 2001 (Generation X)	Year 2017 (Millennials)
Stage in life 	Marriage rate	54%	41%
	Children present	52%	42%
Cost of living independently 	Living in central city	29%	34%
	Median home price (2016 \$)	210,000	→ 270,000
Ability to pay this cost 	Bachelor's degree	34%	44%
	Per capita income (2016 \$)	37,800	→ 38,300
	Not in labor force	15%	18%

Key notable differences

- 1 Marriage and fertility rates have decreased.
- 2 More young adults live in higher-priced city centers.
- 3 Millennials are more educated.
- 4 No significant increase in per capita income.
- 5 The labor force participation has declined.

Source: U.S. Census Bureau

Millennial tailwind — sizing pent-up demand

Behavioral differences exhibited by millennials relative to prior generations has led to below-average household formations over the past 10 years. Given that millennials are the largest generation, any change in their headship rate will have a dramatic impact on housing demand in the future.

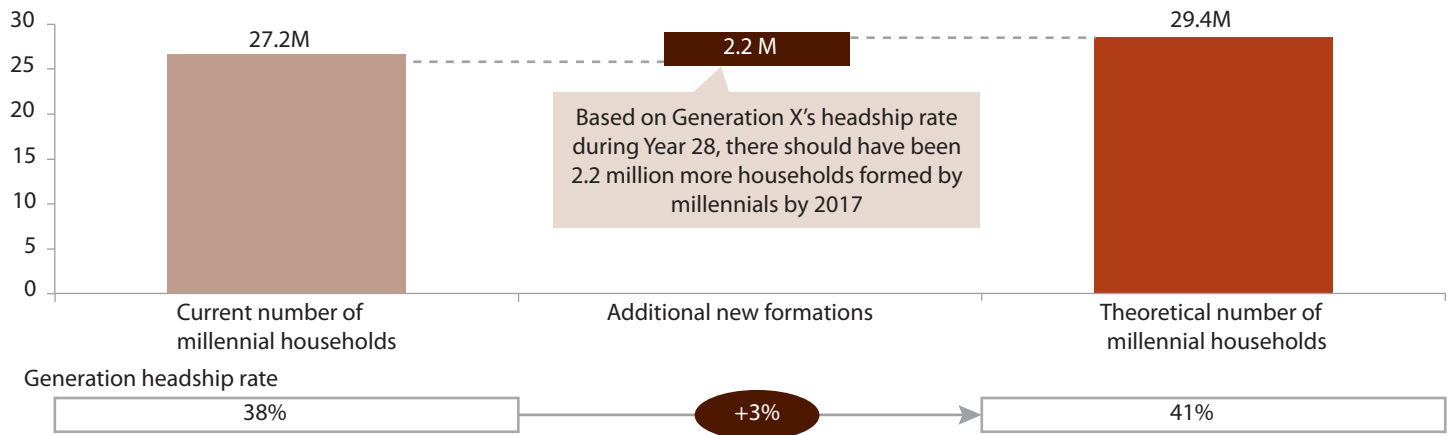
2017 represented the 28th year for the millennial generation, a cohort of over 70 million people in the United States. The millennial headship rate in 2017 approached 38%, meaning there were 27.2 million millennial households formed by 2017. If we apply the Generation X headship rate in year 28 of 41% to the current millennial population, we can quantify a gap of 2.2 million delayed households due to the relatively lower headship rate — see Exhibit 9.

1. According to Federal Reserve Economic Data, estimated total U.S. student debt is \$1.4 trillion, up from \$0.6 trillion in 2008.

Exhibit 9: Theoretical Number of Total Households — Millennials

Theoretical total number of households — millennials (Year 28 — 2017)

Millions of households



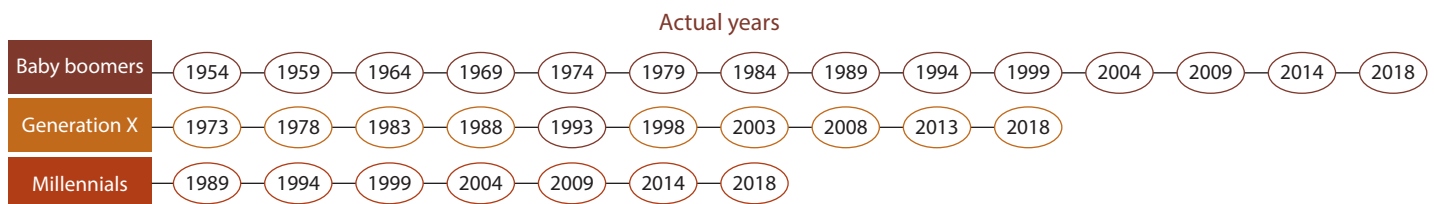
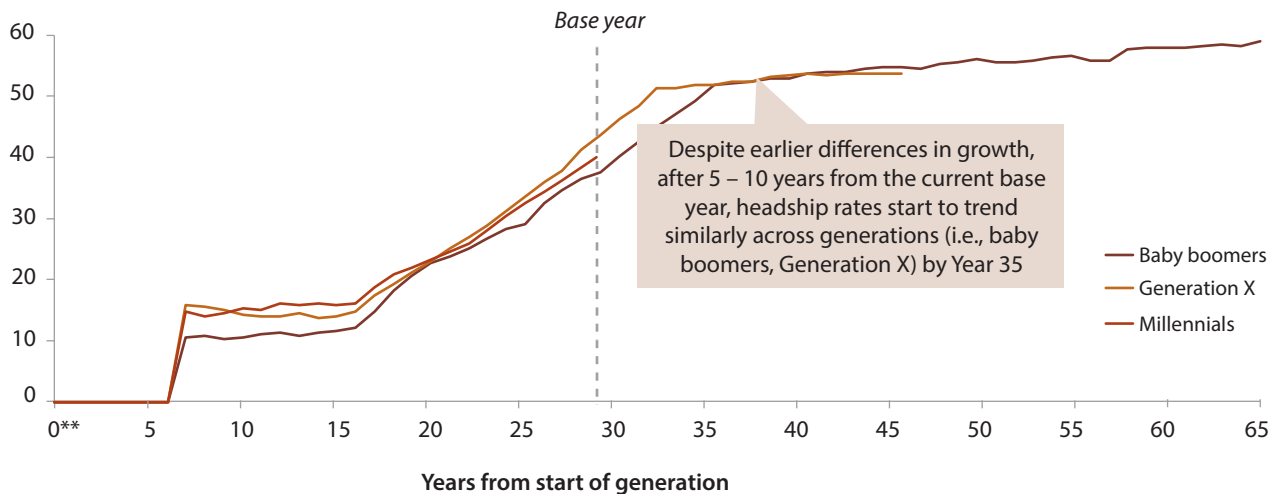
Source: U.S. Census Bureau

As prior generations reached age 35, approximately six years away for millennials, headship rates have historically approached 50%. Therefore, not only should millennial formations be a material driver of growth in the long term, but they could also do so at an accelerated rate given the current gap to the Generation X trend line, seen below in Exhibit 10. Should millennials track to the average headship rate of Gen X and baby boomers by 2023, this would imply 1.54 million millennial formations annually over the next five years. Despite the economic and behavioral dynamics that delayed millennials in forming households while in their 20s, we view the aging of millennials as a credible demand driver over the medium term.

Exhibit 10: Generational Headship Rates Over Time

Headship rates* across three generations — baby boomers, Generation X, millennials — years 0 – 60

Percent



*Headship rate is the number of households divided by population; **Year 0 represents the midpoint of the generation's birth years; as a result, generations are eligible to be the householder at Year 7 as the oldest of the generation turn 15 (based on the U.S. Census definition of householder)

Beyond millennials, we analyzed headship rates across the total U.S. population to get a broader view of pent-up demand. Applying long-term average headship rates (1980 – 2000) to the current population implies 131.1 million² households in the U.S. rather than the current actual households of 127.6 million. This suggests total pent-up formation of approximately 3.5 million households, as displayed in Exhibit 11 below.

Exhibit 11: Implied Pent-Up Household Formations

Age	2018 Population (People in 000s)	2018 Households (in 000s)	Headship Rate 2018	1980 – 2000 Avg. Headship	Implied "Normalized" Households	Pent-Up Formation
18 – 24	30,760	6,306	20.5%	20.0%	6,147	(160)
25 – 34	45,552	20,325	44.6%	47.5%	21,622	1,297
35 – 44	41,064	21,732	52.9%	54.1%	22,230	498
45 – 54	42,570	23,054	54.2%	56.2%	23,913	859
55 – 64	42,189	24,027	56.9%	58.4%	24,620	594
65 – 74	29,820	18,440	61.8%	63.8%	19,015	575
75+	21,273	13,701	64.4%	63.6%	13,520	(181)
Total	253,228	127,586	50.4%	51.8%	131,067	3,489

Source: U.S. Census Bureau

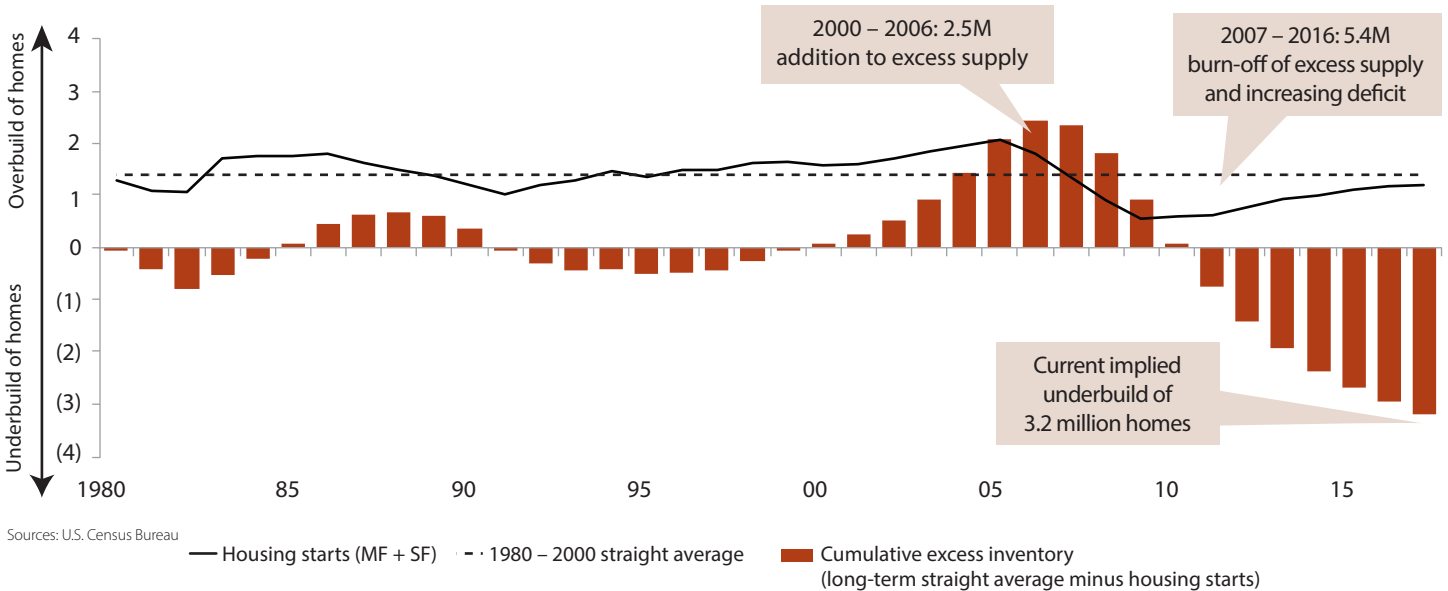
Cumulative underbuild as a long-term tailwind

With meaningful incremental demand set to enter the market, we analyzed the status of housing supply to get a holistic view of supply and demand fundamentals. Using the long-term average for housing starts (1980 – 2000) as a baseline, we can estimate the average overbuild or underbuild of houses in the U.S. by taking the difference between the amount of actual housing starts over that time and the amount predicted by the average. Exhibit 12 below illustrates the cumulative underbuild – where a positive figure represents an oversupply of houses and a negative figure represents a cumulative deficit or underbuild.

Exhibit 12: U.S. Housing Starts and Excess Inventory

U.S. housing starts and excess inventory (1980 – 2017)

Millions of houses



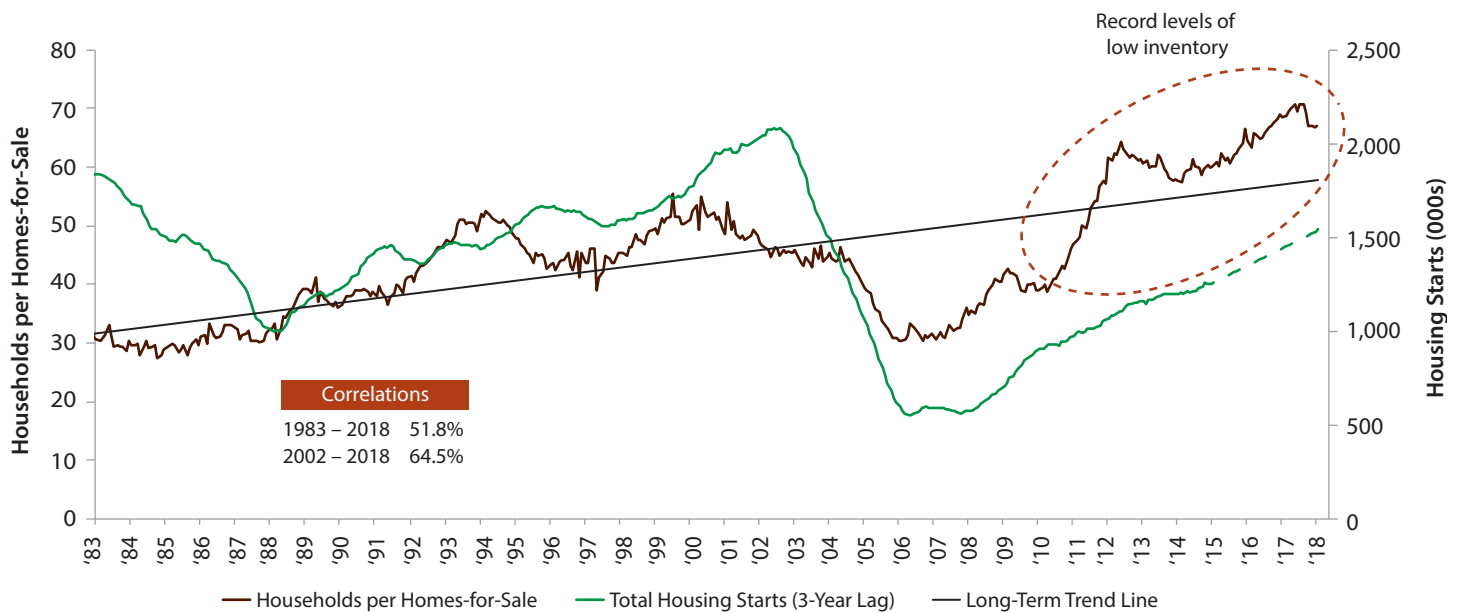
Sources: U.S. Census Bureau

2. Long-term headship rate of 51.8% and current U.S. adult population of 253 million, according to the U.S. Census Bureau.

As illustrated above, leading up to the Great Recession of 2008, housing starts far outpaced their long-term average, resulting in a significant cumulative oversupply of 2.5 million homes. Over the past decade, housing starts consistently remained below the long-term average, leading to an estimated cumulative underbuild of 3.2 million homes.

We further assess the health of new and existing home inventory by plotting it relative to the number of households in the U.S. over time. The analysis in Exhibit 13 below highlights the historically low availability of inventory in the current market. By plotting total households over total housing inventory and comparing it to the long-term trend, we imply a shortage of supply in the market (illustrated by a high Households per Homes-for-Sale reading). The results indicate that our current housing market should support incremental supply, as we are below the implied “healthy” level of inventory as predicted by the long-term trend line.

Exhibit 13: Assessing Healthy Inventory Levels — Households per Current Total Inventory Over Time



Note: Forecast of total housing starts implied by a linear regression
 Source: U.S. Census Bureau

We combine this analysis with historical housing starts data — a pair that is well-correlated (50% - 70%) on a three-year lag (as depicted above in Exhibit 13). That is, residential construction activity historically reacts to an oversupply/undersupply of inventory with a delay as it chases a moving target for market equilibrium. If the past relationship carries forward, the current undersupply in homes will likely guide housing starts to 1.5 million homes by 2021.

Scenario Planning

As the housing market often serves as a leading indicator for the broader U.S. economy, the recent slowdown in estimated housing activity has been a cause for concern among market participants.

While the increase in mortgage rates and declining affordability weighed on demand in 2018, we believe this impact ought to be dampened in the near term. New mortgage rate levels will season with consumers, and the pace of expected rate hikes has slowed. This has already improved housing affordability and is supportive of the demand outlook in 2019 as consumer psychology and sentiment inflect positively.

Given the low present levels of housing supply and starts meaningfully below long-term averages, a near-term down-cycle in housing seems unlikely. Despite the low probability, we have constructed three possible scenarios to help industry participants scenario plan. If a housing downturn were to occur, we would expect it to be mild in both depth and duration. Given the slower recovery in single-family new construction relative to multifamily, we believe single-family new construction would be more resilient in a downturn scenario, which we highlight in Exhibit 14 below.

Exhibit 14: Near-Term Downturn Scenarios — Single-Family Housing Starts

		Most likely given where U.S. activity is relative to long-term average		
		Scenario A	Scenario B	Scenario C
Single-family housing starts characteristics	Severity	Mild	Medium	Severe
	Description	Similar to the 1999 cycle	Based on straight average of medium cycles	Based on straight average of severe cycles
	Duration of peak-to-trough housing cycle	1 year	3 years	5 years
	Total decline in starts from peak to trough	(5%)	(24%)	(65%)
	Peak-to-trough CAGR	(5%)	(12%)	(18%)
	Trough-to-peak CAGR	7%	12%	14%

New multifamily construction typically sees an earlier recovery than single-family after a housing down-cycle, as lenders prefer institutional owners over individuals during periods of tight credit markets. The current recovery has followed this pattern, with multifamily starts rebounding well ahead of single-family. Multifamily starts reached the long-term average of 382,000 in 2015 and are currently 13% above the long-term average. Thus, we would expect a down-cycle to have a moderately greater impact on this segment of the market.

Exhibit 15: Near-Term Downturn Scenarios — Multifamily Appears More Volatile

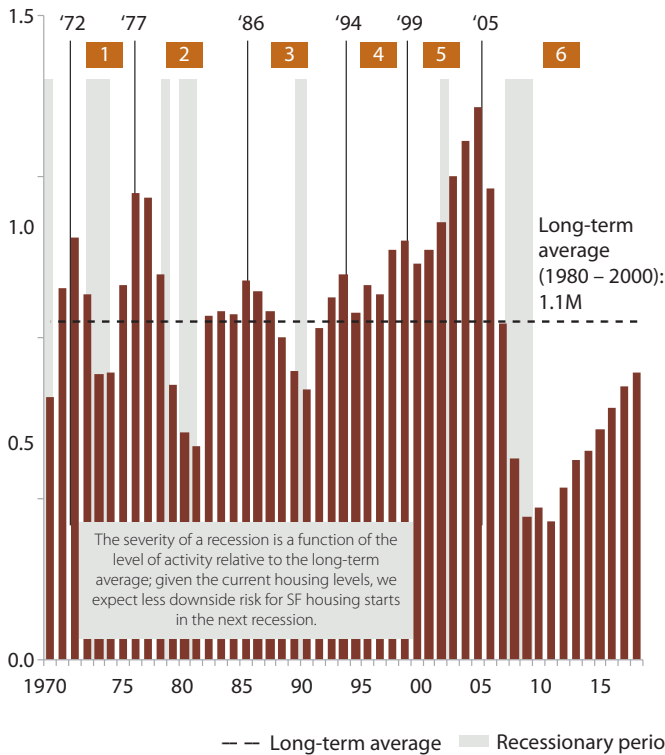
		Most likely given where U.S. activity is relative to long-term average		
		Scenario A	Scenario B	Scenario C
Multifamily housing starts characteristics	Severity	Mild	Medium	Severe
	Description	Similar to the 1998 cycle	Based on straight average of medium cycles	Based on straight average of severe cycles
	Duration of peak-to-trough housing cycle	3 years	3 years	5 years
	Total decline in starts from peak to trough	(5%)	(20%)	(73%)
	Peak-to-trough CAGR	(2%)	(8%)	(26%)
	Trough-to-peak CAGR	2%	9%	23%

The slow recovery in residential new construction created a cumulative underbuild that points to steady long-term growth when combined with strong expected demand from aging millennials. As millennials close the gap in headship rates with previous generations, meaningful incremental demand will likely enter the market. As a result, we are confident in steady growth and a return to long-term averages for total housing starts.

Appendix A: Supplemental Exhibits

Exhibit 14b: Historic Cycles — Single-Family Housing Starts

U.S. single-family housing starts (1970 – 2018E)
Millions of houses



SF housing starts cycles

#	Starting peak year	Duration [^]		Total decline from peak to trough	Peak-to-trough CAGR	Trough-to-peak CAGR
		Peak to Trough	Trough to Peak			
1	1972	2	3	(32%)	(18%)	18%
2	1977	5	4	(54%)	(15%)	16%
3	1986	5	3	(29%)	(7%)	13%
4	1994	1	4	(10%)	(10%)	5%
5	1999	1	5	(5%)	(5%)	7%
6	2005	6	*	(75%)	(21%)	11%
Medium avg (1, 3, 4)		3	4	(24%)	(12%)	12%
Severe avg (2, 6)		5	5	(65%)	(18%)	14%

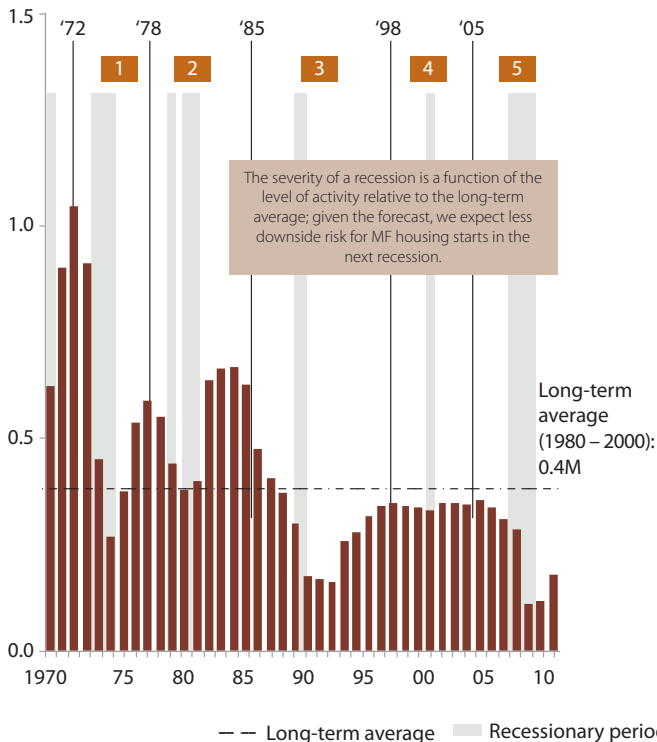
Recessionary period: Impact on SF housing starts

Cycle #	Duration of recession (years [^])	% change during recession	% change p.a. during recession
1	2	(21%)	(11%)
2	2	(22%)	(11%)
3	1	(6%)	(6%)
4	n/a	n/a	n/a
5	1	7%	7%
6	2	(57%)	(29%)
Average	1.6	(20%)	(10%)

Note: [^]Calendar years

Exhibit 15b: Historic Cycles — Multifamily Housing Starts

U.S. multifamily housing starts (1970 – 2018E)
Millions of houses



MF housing starts cycles

#	Starting peak year	Duration [^]		Total decline from peak to trough	Peak-to-trough CAGR	Trough-to-peak CAGR
		Peak to Trough	Trough to Peak			
1	1972	3	3	(74%)	(36%)	30%
2	1978	3	4	(35%)	(14%)	15%
3	1985	8	5	(76%)	(16%)	16%
4	1998	3	4	(5%)	(2%)	2%
5	2005	4	6	(69%)	(25%)	24%
Medium avg (2, 4)		3	4	(20%)	(8%)	9%
Severe avg (1, 3, 5)		5	5	(73%)	(26%)	23%

Recessionary period: Impact on MF housing starts

Cycle #	Duration of recession (years [^])	% change during recession	% change annualized during recession
1	2	(71%)	(35%)
2	2	(9%)	(5%)
3	1	(42%)	(42%)
4	1	5%	5%
5	2	(65%)	(32%)
Average	1.6	(36%)	(22%)

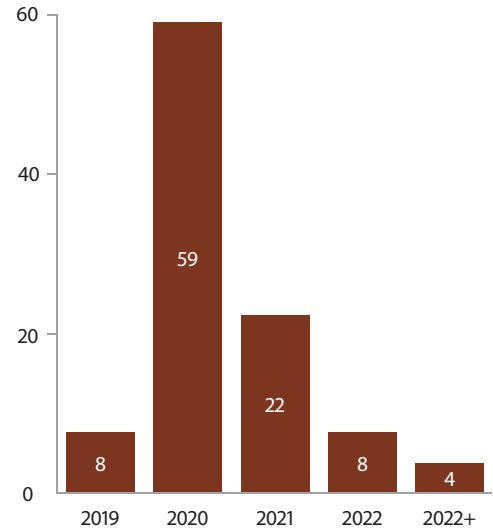
Note: [^]Calendar years

Exhibit 16: Economist Predictions of the Next Recession

Economic observer highlights

Source	Comments	Next recession
Economic Intelligence Unit	The economy will grow steadily before a business-cycle downturn hits in 2020 – June 2018	2020
Wall Street Journal	Most economists said they thought the next recession would arrive in 2020 but, for now, they expect the expansion will continue – June 2018	2020
John Burns Real Estate Consulting	JBREC is calling for a modest housing hiccup in 2020/2021 – Nov 2018	2020 – 2021
National Association for Business Economists	Fifty-six percent of participants anticipate the next recession will begin in 2020; one-third of respondents believes the next recession will begin in 2021 or later – Oct 2018	2020 – 2021
Zillow	The U.S. will likely enter the next recession in 2020; monetary policy is the likeliest cause of the next recession – May 2018	2020

Economist predictions — Likelihood of next recession* (May 2018)
Percent likelihood



Source: L.E.K. research and analysis

*Wall Street Journal Survey of Economists (May 2018)

Appendix B: Interpreting the Housing Affordability Index

As mortgage rates continue to increase from historic lows, the potential impact of declining affordability has become an area of focus for market participants looking to gauge the health of the consumer and overall housing demand. The Housing Affordability Index aims to measure the state of the housing market in a single metric by taking into account three variables: median income, mortgage rates, and median home sale prices. A value of 100 indicates a household earning the median income has exactly enough income to qualify for a mortgage (assuming a 20% down payment) on a median-priced home. A value greater than 100 signifies that the median income level exceeds the amount needed for a mortgage on the current median-priced home. For example, an index of 120 indicates that median income is 20% higher than “qualifying income.”

Exhibit 17 below maps the potential outputs of the index by flexing the three variables. The current Housing Affordability Index reading of 144 (in light blue) is shown below with prior periods highlighted. Affordability levels peaked at 210 in 2012, falling to 121 in 2001 and to 102 during the 2008 recession. While the index has come down 6% thus far in 2018, affordability is still comfortably above prior troughs.

Exhibit 17: Three-Way Sensitivity of the Housing Affordability Index

Housing Affordability Index Sensitivity														
Effective Mortgage Rates	4.40%	4.55%	4.70%	4.85%	4.87%	4.95%	5.10%	5.25%	5.40%	5.55%	5.70%	5.85%	6.00%	
Median Home Sale Price	\$243,600	\$248,600	\$253,600	\$258,600	\$260,500	\$268,600	\$273,600	\$278,600	\$283,600	\$288,600	\$293,600	\$298,600	\$303,600	
Qualifying Income														
	\$46,842	\$48,653	\$50,506	\$52,401	\$52,907	\$55,054	\$57,044	\$59,076	\$61,152	\$63,272	\$65,436	\$67,644	\$69,897	
Median Income	\$91,500	195	188	181	175	173	166	160	155	150	145	140	135	131
	\$90,000	192	185	178	172	170	163	158	152	147	142	138	133	129
	\$88,500	189	182	175	169	167	161	155	150	145	140	135	131	127
	\$87,000	186	179	172	166	164	158	153	147	142	138	133	129	124
	\$85,500	183	176	169	163	162	155	150	145	140	135	131	126	122
	\$84,000	179	173	166	160	159	153	147	142	137	133	128	124	120
	\$82,500	176	170	163	157	156	150	145	140	135	130	126	122	118
	\$81,000	173	166	160	155	153	147	142	137	132	128	124	120	116
	\$79,500	170	163	157	152	150	144	139	135	130	126	121	118	114
	\$78,000	167	160	154	149	147	142	137	132	128	123	119	115	112
	\$76,500	163	157	151	146	145	139	134	129	125	121	117	113	109
	\$76,186	163	157	151	145	144	138	134	129	125	120	116	113	109
	\$74,500	159	153	148	142	141	135	131	126	122	118	114	110	107
	\$73,000	156	150	145	139	138	133	128	124	119	115	112	108	104
	\$71,500	153	147	142	136	135	130	125	121	117	113	109	106	102
	\$70,000	149	144	139	134	132	127	123	118	114	111	107	103	100
	\$68,500	146	141	136	131	129	124	120	116	112	108	105	101	98
	\$67,000	143	138	133	128	127	122	117	113	110	106	102	99	96
	\$65,500	140	135	130	125	124	119	115	111	107	104	100	97	94
\$64,000	137	132	127	122	121	116	112	108	105	101	98	95	92	
\$62,500	133	128	124	119	118	114	110	106	102	99	96	92	89	
\$61,000	130	125	121	116	115	111	107	103	100	96	93	90	87	
\$59,500	127	122	118	114	112	108	104	101	97	94	91	88	85	
\$58,000	124	119	115	111	110	105	102	98	95	92	89	86	83	
\$56,500	121	116	112	108	107	103	99	96	92	89	86	84	81	

Sources: National Association of Realtors, U.S. Census Bureau, FHFB, Wells Fargo Securities

 Current (Nov. 2018) Affordability Index Level	 2001 Recession Trough (+3% or -3%)
 Dec. 2017 Affordability Index Level	 2008 Recession Trough (+3% or -3%)

The three components of the index are interdependent and even inversely correlated to some degree. Intuitively, this tends to normalize any sharp movement in any one of the three components as the market looks to find equilibrium. For example, declines in buyer purchasing power (rising mortgage rates or declining median incomes) could be met with lower home sale prices over time.

Exhibit 18 below illustrates how far any single variable must move to return the Housing Affordability Index to 2001 trough levels while holding the remaining two components of the index constant. While a bit impractical given that these variables do not operate in a vacuum, the method gives context to how far from prior downturns we are today.

Exhibit 18: One-Way Sensitivity of the Housing Affordability Index

Flexing Variables (to 2001 Trough)					
	Current	2001 Trough	2001 Trough	2001 Trough	% Change
Sale Price of Existing Homes (U.S.)	260,500	303,738	260,500	260,500	16.6%
Monthly Mortgage Rate	4.87%	4.87%	6.26%	4.87%	139 bps
Median Income	76,186	76,186	76,186	65,341	(14.2%)
Index Output	144.0	123.5	123.5	123.5	

Takeaways:

- Holding Mortgage Rates and Median Income constant, Home Prices would have to rise 16.6% or \$43,238 to \$303,738
- Holding Home Prices and Median Income constant, Mortgage Rates would have to rise 1.4% to 6.3%
- Holding Home Prices and Mortgage Rates constant, Median Income would have to fall 14.2% or \$10,845 to \$65,341

Sources: National Association of Realtors, U.S. Census Bureau, Federal Housing Finance Board

Flexing Variables (to 2008 Trough)					
	Current	2008 Trough	2008 Trough	2008 Trough	% Change
Sale Price of Existing Homes (U.S.)	260,500	365,255	260,500	260,500	40.2%
Monthly Mortgage Rate	4.87%	4.87%	8.11%	4.87%	324 bps
Median Income	76,186	76,186	76,186	54,366	(28.7%)
Index Output	144.0	102.7	102.7	102.7	

Takeaways:

- Holding Mortgage Rates and Median Income constant, Home Prices would have to rise 40.2% or \$104,755 to \$365,255
- Holding Home Prices and Median Income constant, Mortgage Rates would have to rise 3.2% to 8.1%
- Holding Home Prices and Mortgage Rates constant, Median Income would have to fall 28.7% or \$21,850 to \$54,366

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