Diminishing Affordability - Inescapable

Quantifying the Relationship Between Population Growth and Multifamily Rental Affordability

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- Nationally, the percentage of multifamily rental units that are affordable to households making 50% of area median income (AMI) fell from 55.7% in 2010 to 39.1% in 2017
- During this period, 85.9% of metros experienced a loss of affordable units
- The fastest growing metros lost their affordable rental stock at a rate that was roughly twice as high as the national average
- Slower growing metros tended to lose affordable units at a slower pace
- One driving cause of shrinking affordability is that rent growth has outstripped income growth

Difficulty in finding affordable multifamily rental units is not an issue that is isolated to gateway markets like New York City and Miami where residents have long paid high proportions of their income on housing. In recent years, metros across the nation have experienced worsening rental affordability to varying degrees. In this report, we explore the loss of affordable units nationwide and examine the relationship between this loss and population growth. Our basic finding is that population growth is negatively correlated with an area's ability to preserve affordable housing. That is, metros with higher rates of population growth tend to lose affordable units at a faster pace. In the nation's fastest growing areas, the issue is alarming.

In this paper, we track multifamily rental affordability at the unit level by comparing area median income (AMI) data from the Federal Housing Finance Agency (FHFA) with rent data from the American Community Survey (ACS)[i]. Our primary focus is to show how rental affordability has changed since 2010, both nationally and in select metros, and to show how population growth is correlated with the change in the rate of affordable multifamily rental housing. Although the intent of our analysis is not to conclude a causal relationship, the findings are consistent with intuition.

Measuring the affordability of an area's rental stock is not a straightforward exercise. We recognize that input data is not always sufficient for understanding the issue, but we try to look at what is available from multiple perspectives to better understand the issue. Reasons for difficulties in assessing affordability include limited availability of reliable, timely and geographically granular data, and debate regarding how exactly affordability should be measured. Because of this, the intent of this report is not to conduct a study that comprehensively documents affordability measures[ii], but is instead to show that rental affordability continues to be a national issue that is most pronounced in fast growing areas.

[i] For more information on the methodology and data sets used, please see the "Methodology and Notes" section at the end of the document.
[ii] We recently released a report that compares affordability measures compiled by other prominent institutions in the industry. To see this report, please visit this link: https://mf.freddiemac.com/docs/rental_burden_by_metro.pdf

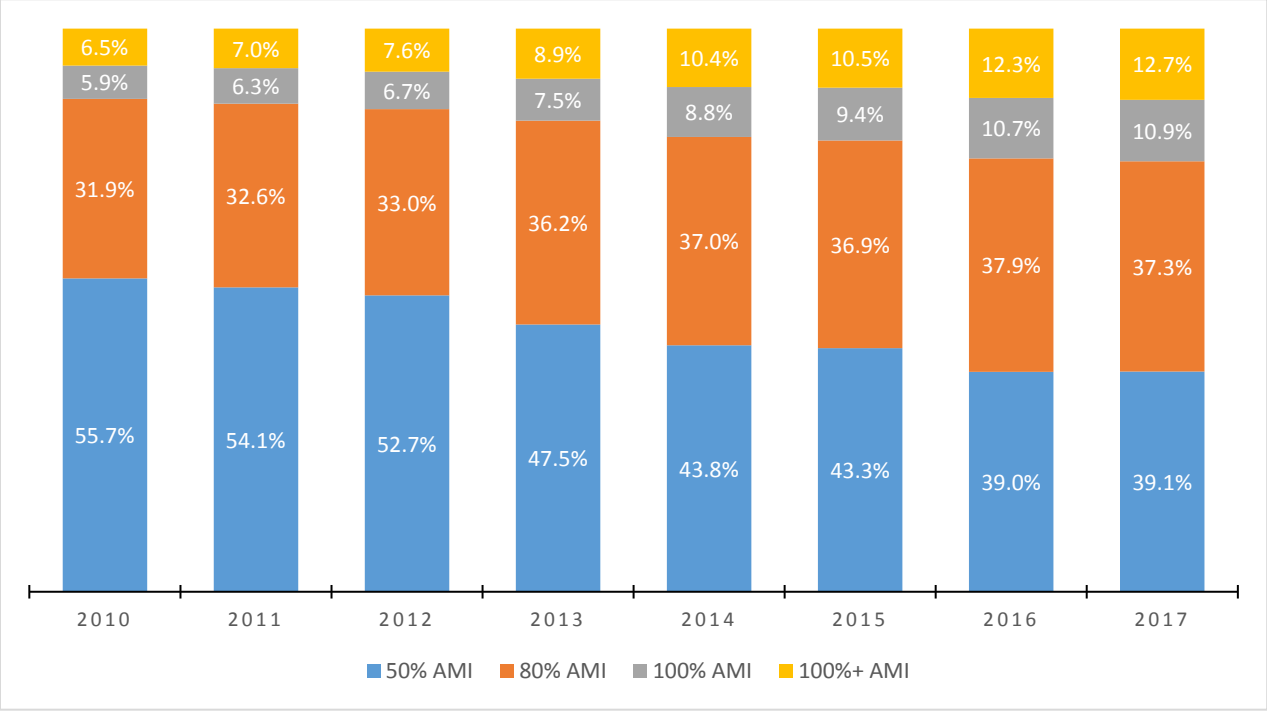
National Analysis

The proportion of multifamily rental units considered affordable to very low-income (VLI) households has steadily decreased in the years following the Great Recession. Exhibit 1 shows the decline in the affordable housing stock across all metro areas in the country. The blue section represents the percentage of multifamily units that are affordable to households making 50% or less of AMI (i.e., VLI households). In 2010, 55.7% of rental units in the U.S. were considered affordable to households earning half of the AMI. This percentage fell meaningfully to 39.1% in 2017. This equates to losing approximately 2.4 million VLI affordable units.

While 39.1% of units (about 7.5 million units) are still affordable to VLI households, not all of these are occupied by a household making 50% of AMI. Higher income renters may occupy these units which means that there are fewer available for VLI households. In addition, this 39.1% figure counts units that are affordable to households making exactly 50% of AMI. Renters with incomes below 50% AMI will naturally have a lower percentage of units available to them.

The top yellow section represents rental units that are not affordable to households making at or below 100% AMI. Since this category does not have an upper limit, it contains units that may not be affordable to households making well above the median income. Of the 376 metro areas for which data is available, 323 (85.9%) experienced a reduction in the proportion of units considered to be affordable for VLI households.

Exhibit 1: Metro-Level Multifamily Housing Supply by Affordability Category



Source: Freddie Mac tabulations of 2010-2017 American Community Survey PUMS data. AMI stands for area median income.

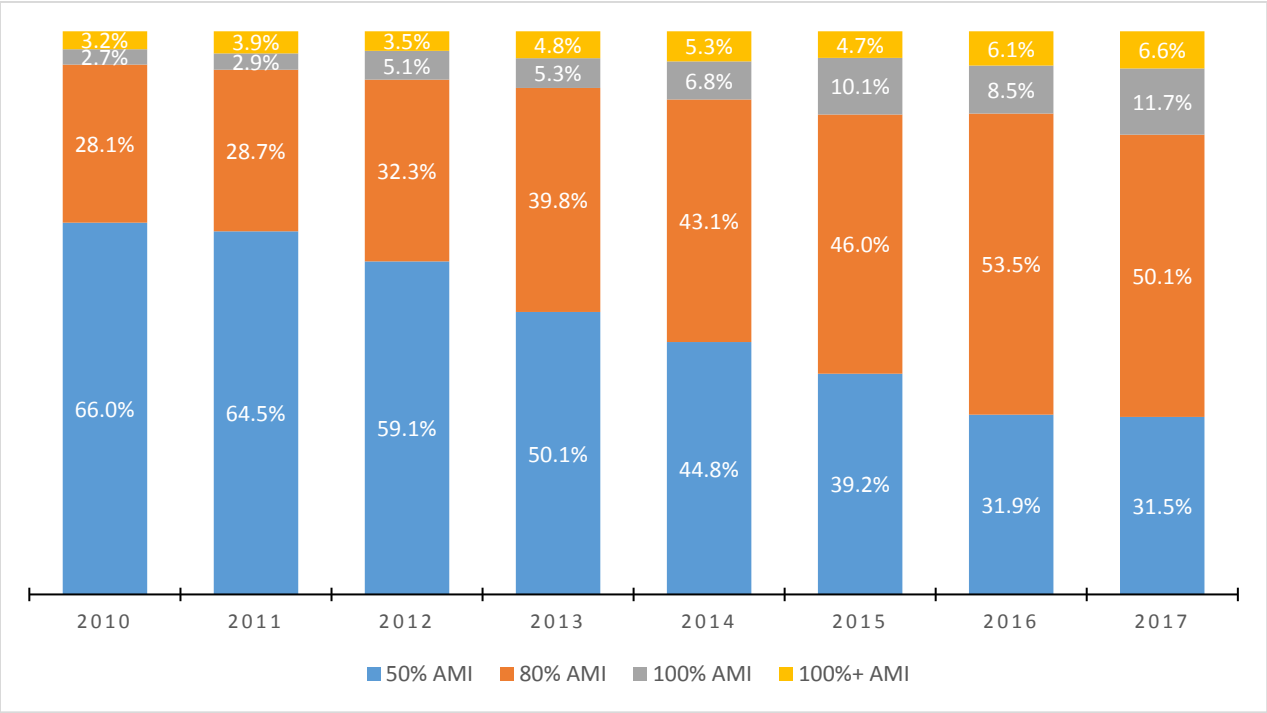
There has been a steady decline in the percentage of units affordable to VLI households, while the percentage of units unaffordable to households making at or below 100% AMI has increased. While there are many factors that contribute to this trend, the core driver is that rent growth has outpaced income growth in most areas across the country. During this time period, the increase in median rent for

multifamily units nationwide was 27%, while median income grew by only 6.1%[iii]. If rent and income grew at the same rate, then the percentage makeup of each category would remain largely unchanged from year to year.

Metro Focus: Austin

Metro areas with a faster rate of population growth generally experienced a sharper decline in the proportion of affordable rental units. An example of this is Austin, Texas where the population grew by 22.5% from 2010 to 2017 – the fastest rate among the Top 50 metro areas in the nation. Exhibit 2 shows the same breakout as Exhibit 1 but is specific to the Austin metro area. In 2010, the metro had a higher proportion of rental units affordable to VLI households than the U.S. as a whole at 66%. Since this time, however, the rate of affordable housing decline was comparatively steep and by 2017, the proportion dropped to 31.5% – more than seven percentage points lower than the national average, indicating that the metro now has a relatively low proportion of affordable units.

Exhibit 2: Multifamily Housing Supply by Affordability Category in Austin, TX



Source: Freddie Mac tabulations of 2010-2017 American Community Survey PUMS data. AMI stands for area median income.

This loss of affordability is particularly noteworthy because it was during a time period of significant growth in overall rental housing supply. During the same 7-year period, the total number of rental units in Austin increased by 16.4%. The number of *multifamily* rental units grew more quickly at 19.9%, but the total number of VLI affordable multifamily units dropped by -42.7%. This means that even with an increasing number of units overall, the number of affordable units still declined. In this way, the drop was not only in relative terms but also in absolute.

[iii] Most sources show that income actually grew much faster than 6.1%. This rate is computed from income figures provided to us by the FHFA. In addition, most rent data from third-party vendors indicates that rent grew faster than government sources suggest, and data from these vendors generally indicates that rent growth exceeded income growth during this period. For more information on the methodology and data sets used, please see the "Methodology and Notes" section at the end of the document.

The supply of multifamily housing in Austin grew faster than the nation during this period from 2010 to 2017. In this metro, 23.6% of units were built after 2009, which is more than two and a half times the national figure of 8.9%. With the relatively high percentage of new rental units in Austin, more units are less affordable. The latest figures for Austin indicate that only 18.3% of units built since 2010 were considered VLI affordable, as opposed to 35.6% of units built prior to 2010.

While VLI affordable units dropped significantly, Exhibit 2 shows that units affordable to low-income households (LI – 80% AMI) actually grew quite substantially. However, the increase is primarily attributed to units transitioning from being affordable to VLI households. Many of those units would impose heavy rent burdens on VLI households but still can be affordable to LI households without exceeding 30% of household income. This may indicate that rent growth is exceeding income growth in the bottom segment of the market. When the VLI and LI categories are examined together, the percentage considered affordable to the combined population of the two groups drops from 94.1% to 81.6%.

Slowest Growing Metros

When examining the Top 50 metro areas in the United States[iv], there is a clear link between population growth and the rate of affordable housing decline. Exhibit 3 shows the slowest growing metro areas in the country and how their rental housing affordability has changed relative to the national average.

Exhibit 3: VLI Loss of the Bottom 10 Population Growers of the Top 50 Metros

Metro	2010-2017			2016-2017	
	Population Growth	VLI Change	VLI % Change	VLI Change	VLI % Change
Philadelphia, PA	2.1%	-11.8%	-20.3%	1.5%	3.3%
Memphis, TN	1.7%	-17.9%	-26.9%	-3.6%	-6.9%
Milwaukee, WI	1.3%	-8.1%	-11.6%	0.5%	0.9%
Providence, RI	1.2%	-6.5%	-9.5%	3.1%	5.2%
Chicago, IL	0.7%	-14.7%	-25.4%	3.1%	7.7%
St. Louis, MO-IL	0.6%	-13.8%	-17.4%	2.4%	3.8%
Detroit, MI	0.5%	-23.0%	-29.3%	-2.2%	-3.8%
Hartford, CT	-0.3%	-5.1%	-6.9%	7.7%	12.8%
Cleveland, OH	-0.8%	-8.3%	-11.0%	2.6%	4.1%
Pittsburgh, PA	-1.0%	-5.8%	-8.2%	-0.2%	-0.3%
Bottom 10 Average	**0.6%**	**-11.5%**	**-16.7%**	**1.5%**	**2.7%**
National Average	**5.3%**	**-16.5%**	**-29.7%**	**0.1%**	**0.2%**

Sources: Census Bureau, Freddie Mac tabulations of 2010-2017 American Community Survey PUMS data

In the table above, 'VLI Change' refers to the absolute change in the percentage of units affordable to VLI households. For example, the percentage of units affordable to VLI households in Philadelphia dropped from 58.2% of units in 2010 to 46.4% of units in 2017, signifying a drop of -11.8 percentage points.

$$VLI\ Change = 46.4\% - 58.2\% = -11.8\%$$

"VLI % Change" refers to the percentage drop of this same rate. For Philadelphia, the calculation is:

[iv] Top 50 is determined by the number of multifamily units, not by population. The metros included in each list are almost identical.

$$VLI\ \%\ Change = \left(\frac{46.4\%}{58.2\%} - 1\right) = -20.3\%$$

The affordability decline in some metros was fairly modest, such as in the case of Hartford and Pittsburgh which have both historically had a relatively abundant supply of affordable housing. In other cases, such as Detroit and Chicago, affordability issues have worsened considerably even in the absence of high population growth.

Fastest Growing Metros

The fastest growing metros presented a different, more ominous picture of shrinking affordability. Exhibit 4 focuses on the Top 10 fastest growing metro areas in the country.

Exhibit 4: VLI Loss of the Top 10 Population Growers of the Top 50 Metros

Metro	2010-2017			2016-2017	
	Population Growth	VLI Change	VLI % Change	VLI Change	VLI % Change
Austin, TX	22.5%	-34.5%	-52.2%	-0.4%	-1.2%
Raleigh, NC	17.4%	-40.1%	-48.9%	-0.3%	0.8%
Orlando, FL	17.3%	-25.4%	-74.4%	-3.5%	-28.3%
Houston, TX	15.9%	-22.7%	-35.9%	2.8%	7.6%
San Antonio, TX	14.9%	-21.3%	-39.0%	-2.2%	-6.2%
Dallas, TX	14.7%	-30.8%	-45.3%	-2.4%	-6.0%
Charlotte, NC	13.6%	-37.9%	-51.1%	2.2%	6.5%
Nashville, TN	13.6%	-38.7%	-56.7%	-5.3%	-15.1%
Denver, CO	13.1%	-46.7%	-64.3%	-3.5%	-11.8%
Las Vegas, NV	12.9%	-28.8%	-55.4%	-6.7%	-22.5%
Top 10 Average	**15.6%**	**-32.7%**	**-52.3%**	**-1.9%**	**-7.6%**
National Average	**5.3%**	**-16.5%**	**-29.7%**	**0.1%**	**0.2%**

Sources: Census Bureau, Freddie Mac tabulations of 2010-2017 American Community Survey PUMS data

Metro areas that grow faster than the national average generally lose affordable housing stock at a faster rate. While the percentage of rental units in the nation considered affordable to VLI households dropped by 16.5 percentage points, the fastest growing metros experienced a decline of nearly double that at 32.7 percentage points (as seen in the 2010-2017 'VLI Change' column). In 2017, the most recent year for which data is available, the affordable housing stock in the nation stayed relatively unchanged from a year prior, with the percentage of VLI affordable units increasing by a mere 0.1 percentage point. On the other hand, the fastest growing metros experienced a decline of -1.9 percentage points.

As discussed above, Austin has struggled with preserving its affordable housing stock, but it was not the most severe case. Orlando, Nashville, Denver and Las Vegas all experienced higher losses relative to their initial stock in 2010 (as seen in the 2010-2017 'VLI % Change' column).

The story for Denver is similar to Austin; both metros started off with a higher percentage of units affordable to VLI households than the national average but ended 2017 with a lower percentage. Denver contained about 167,000 VLI affordable units in 2010, but by 2017, this number dwindled to only 67,000. While income growth was fairly modest, rent grew at a tremendous rate of 69%. As a result, the current VLI affordability percentage of 25.9 is dwarfed by the rate of 72.6% from seven years earlier.

A 2017 survey conducted by Colorado Mesa University shows that the single greatest issue affecting Colorado residents was housing affordability. In addition, 62% of respondents do not believe that their community has adequate access to affordable housing.[1]

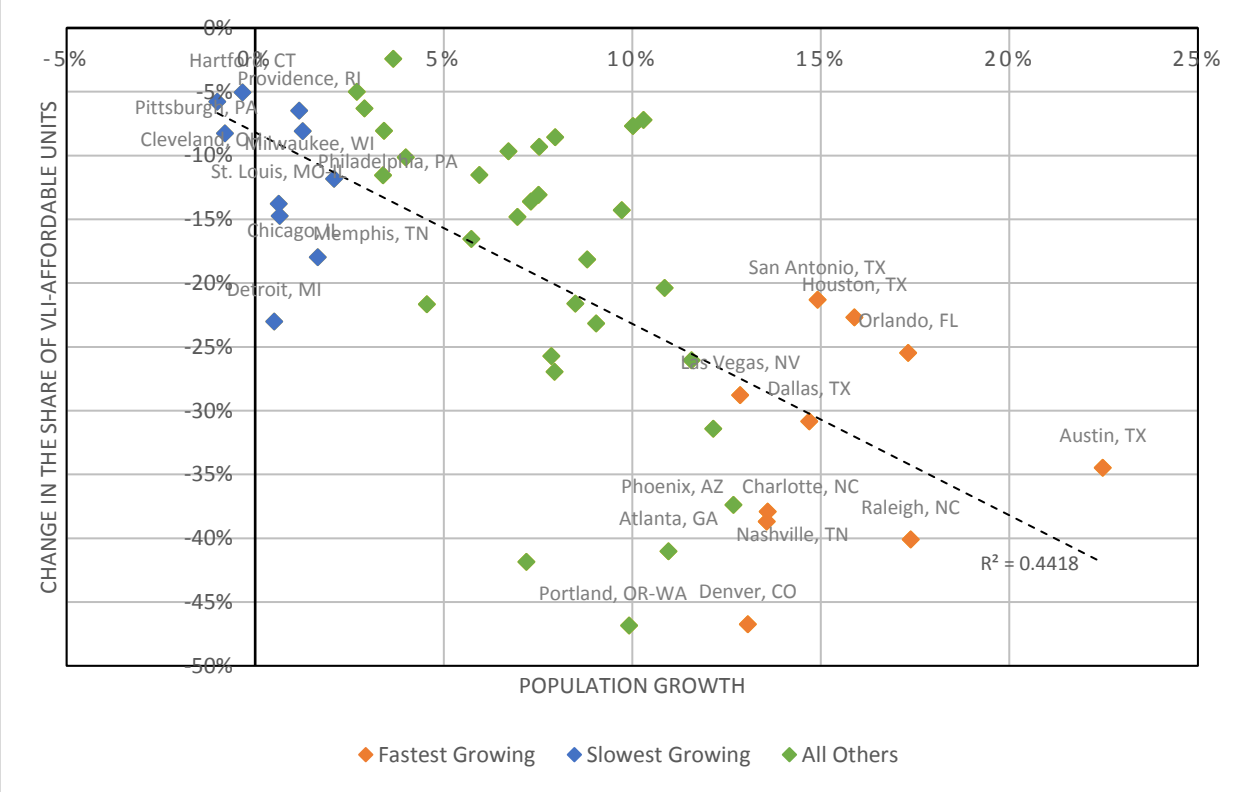
Denver acknowledges its own affordable housing difficulties. As a result, the city announced a first-of-its-kind program in 2017 that will help to address the immense affordability difficulties of this city. The Lower Income Voucher Equity program, commonly known as LIVE Denver, is a public-private partnership that places eligible renters (those making between 40% and 80% of AMI) into previously vacant market rate units. Tenants pay a maximum of 35% of their income on rent, and the program will set aside 5% of rent payments for a savings account that tenants receive when they exit the program.[2]

Denver cites that housing costs have increased by over 30% in the past five years while most employers can only afford to raise wages by 2%-3% annually.[2] The organizers of this program state that the growth of Denver has contributed to a lack of affordable housing. While the scope of the pilot program is small (only a few hundred units), it does showcase an innovative approach to tackling the housing crisis in an area that is prone to affordability issues because of high population growth.

All Top 50 Metros

Regardless of whether a metro is among the faster growers, the slowest growers, or somewhere in the middle, the same general trend is apparent: Higher population growth tends to bring about higher loss of affordable units. The scatter plot in Exhibit 5 shows a comprehensive view of the change in VLI affordable rental housing in the nation's Top 50 metros. The clear dichotomy of fast growing and slow growing metros is striking.

Exhibit 5: Change in the Share of VLI Affordable Units from 2010 to 2017 in the Top 50 Metros



Sources: Census Bureau, Freddie Mac tabulations of 2010-2017 American Community Survey PUMS data

The steep slope of the regression line captures the strong association between population growth and VLI affordability loss. This chart is helpful in visualizing the link between metro growth and affordable housing loss, but it is also helpful in determining how significant the relationship is. Although this analysis cannot, and is not intended to, conclude causality, the cause and effect relationship between these two variables fits intuition and is likely not completely explained by confounding variables.

Quantifying the strength and robustness of a statistical relationship is important, since almost any variable, even randomly generated ones, will produce some degree of correlation with VLI affordability. The high R^2 value of 0.4418 seen in Exhibit 5 suggests that the correlation is almost certainly real, since it implies that 44.18% of the variation in VLI affordability can be explained by population growth.

To determine the exact significance of this relationship, we need to first compute Pearson's r value:

$$Pearson's\ r = \frac{Cov(x,y)}{\sigma_x \sigma_y} = \frac{-0.446\%}{(12.170\%) * (5.389\%)} = -.6647$$

For this test, we'll state that the null hypothesis is that there's no relationship between these two variables and that the alternative hypothesis is that a relationship does exist. To gauge the possibility of the alternative hypothesis being correct, we'll use the r value to compute a test statistic:

$$Test\ Statistic = \frac{r\sqrt{N-2}}{\sqrt{1-R^2}} = \frac{-.6647\sqrt{50-2}}{\sqrt{1-0.4418}} = \frac{-4.6052}{0.7471} = -6.1634$$

This test statistic represents the number of standard errors that this r value is from zero. Being over six standard errors away from the mean is extremely rare in any statistical test. In this example, the probability of observing a correlation value that is this extreme or greater, given independence, is about 1 in 7.1 million. From this, we can conclude the relationship exists with near certainty.

Other Notable Metros

Outside of the metros listed above, other notable metros include Portland, Oregon and Provo, Utah. Household income in Portland has grown at a healthy clip compared with the nation in the past few years but rent has grown at a much faster rate. Median rent in Portland grew by 57.1% during the 7-year period of our study which was among the highest in the nation. As a result, the proportion of affordable units dropped from 70.1% in 2010 to 23.3% in 2017 – the largest drop among all major metros.

Provo is not a Top 50 metro but has experienced tremendous population growth since 2010. The metro is a national leader in job growth and their gross metro product is growing at more than twice the national rate. Despite, or perhaps because of, these economic boons, Provo's rental housing conditions have worsened at a faster rate than the national average. From 2010 to 2017, the percentage of rental units that are unaffordable to those making 80% of AMI rose nearly nine percentage points, from 12.7% to 21.6%.

Although the nation as a whole experienced a shortfall of affordable units during this period, this was not the case for every metro. There were 53 metros in our study that increased their proportion of affordable units, including some that also experienced healthy population growth. An example of this is Columbia, Missouri. This metro grew 75% faster than the nation yet was able to increase its VLI affordable housing stock by 5.1 percentage points. Columbia is an unusual case, however, since 73.6% of metros that showed improved housing affordability grew at a slower rate than the nation.

Conclusion

This report uses income figures provided by the FHFA. Different income measures produce different results and all help to tell a unique story. Using this income measure paints a discernable picture of affordability that is directionally consistent with other industry research. In the near future, we will release another report that measures affordability using a different measure and we will explain why the results can be so different.

Every year, more and more VLI households spend a greater share of their income on housing. While all metros are susceptible to waning multifamily rental affordability, the problem is most severe for the nation's fastest growing metros. The spending increase among households nationwide is a consequence of the diminishing supply of affordable housing across the country, and our findings generally substantiate the assertion that every year, the rental housing affordability crisis in this country is becoming more urgent.

Localities, especially those in fast growing areas, must acknowledge the importance of providing and supporting affordable housing for all households to prevent this issue from becoming more severe and widespread. Although rapid population growth is generally an economic blessing, the adverse effect that it can have on an area's affordable housing stock is not trivial and must not be overlooked.

Methodology and Notes

Data Notes and MSA Classification

Our study uses ACS's Public Use Microdata Sample (PUMS) for almost all data points. This data is released annually and contains unit level data across the entire country. However, to protect privacy, the Census will randomize data to a small degree and top and bottom code certain numeric data points.

The geographic regions associated with PUMS are called Public Use Microdata Areas (PUMAs). There are over 2,300 PUMAs and each one contains at least 100,000 people. PUMAs are often not coterminous with county and MSA lines, and as a result, PUMA regions cannot perfectly align with all MSA boundaries, which creates a mismatch in data. We attempted to match MSAs with PUMAs as best as possible, but inexact results were unavoidable. To correct for this, we started by finding all intersections between PUMAs and MSA boundaries. For example, if a PUMA falls inside of two MSAs, then we'll generate two records for that PUMA for final determination of inclusion for either metro. A PUMA will be included for the calculation of an MSA if either of these criteria are true:

1. The intersection area of the PUMA and MSA accounts for at least 20% of the PUMA's population
2. The intersection area of the PUMA and MSA accounts for less than 20% of the PUMA's population, but at least 20% of the intersection area's population is included in the MSA

There are rare cases where this will result in two PUMAs being assigned to the same MSA. In this case, the one with the higher percentage composition gets assigned to the MSA, with preference given to first criteria. In all cases, if the intersection area is less than 100%, the weight of observations in these areas will be prorated by the intersection area percentage.

As an example, there are 22 PUMAs that fall within the Baltimore MSA boundaries. All but one of these PUMAs fall entirely in Baltimore and are therefore wholly counted. The one that is left has 27.9% of its population living in the Baltimore MSA. This PUMA is included but the weight of each observation is lessened to 27.9% of its value because it is less likely for a household in this region to actually be in this MSA. However, we don't want to completely exclude this area because it can still be informative of market

conditions in this area and more observations make for a more robust sample. Ideally, we could isolate the portion of this PUMA that is in Baltimore, but due to data constraints, we cannot.

Because of the PUMA and MSA mismatch, and the use of microdata instead of summary statistics, the MSA and national figures in this paper do not always match tabulations of Census data. Figures should be very close, but there are data constraints that make perfect matches impossible.

Affordability Calculation

To determine affordability buckets, the basic procedure is to compare the rent amount of each multifamily unit with a specific income threshold for the unit's respective metro area. This allows for us to determine, on a unit-level basis, whether or not a household at a given income level would be able to afford rent payments without spending over 30% of their income. If rent for a unit is affordable for a household making, for example, 50% of AMI, then the unit is included in the 50% AMI affordability bucket. This was done for all income levels to determine affordability buckets for each metro and the nation.

The income used for this analysis comes from the FHFA, our conservator and regulator. Their income figures are used to officially measure the affordability requirements for both Freddie Mac and Fannie Mae. Each year, both organizations must fund a certain number of units that are affordable at varying income levels, under the FHFA Housing Goals. These income figures are used to determine at which AMI level a financed unit is affordable. These figures are largely the same as those used by the Department of Housing and Urban Development for many federal housing programs.

FHFA income uses data from the ACS that is a few (normally three) years behind the current year. For example, 2017 FHFA income figures are based on the 2014 ACS. Figures are adjusted to the present by applying an inflation adjustment. FHFA uses family income.

Alternative Income Comparison

To see how robust the results were, we also compared unit-level rent with median household income computed directly from ACS to see how the results would differ. We found that the trends were directionally the same but not as severe. The percentage drop in the rate of VLI affordable units was only -6.9%, compared with -29.7% using FHFA income. For the alternative income, the effect was more severe for fast growing metros and less severe for slow growing metros, just like for the FHFA income.

We decided to use the FHFA income measure because it is the official income measure that Freddie Mac and Fannie Mae use to determine VLI affordability. The income figures that we calculated in the alternative analysis were calculated from the PUMAs described above and don't correspond exactly to any known income sources. Therefore, the numbers used for AMI do not correspond to any official AMI measure. While this alternative method of calculating AMI based on the microdata is not inherently problematic, we thought that it would be better to use a well-established income measure for this analysis.

Appendix Chart A: VLI Loss of the Top 50 Metros

Metro	2010 VLI %	2016 VLI %	2017 VLI %	2010-2017			2016-2017	
				Population Growth	VLI Change	VLI % Change	VLI Change	VLI % Change
Austin-Round Rock, TX	66.0%	31.9%	31.5%	22.5%	-34.5%	-52.2%	-0.4%	-1.2%
Raleigh, NC	81.9%	41.5%	41.8%	17.4%	-40.1%	-48.9%	0.3%	0.8%
Orlando-Kissimmee-Sanford, FL	34.2%	12.2%	8.7%	17.3%	-25.4%	-74.4%	-3.5%	-28.3%
Houston-The Woodlands-Sugar Land, TX	63.1%	37.6%	40.5%	15.9%	-22.7%	-35.9%	2.8%	7.6%
San Antonio-New Braunfels, TX	54.5%	35.4%	33.2%	14.9%	-21.3%	-39.0%	-2.2%	-6.2%
Dallas-Fort Worth-Arlington, TX	68.0%	39.6%	37.2%	14.7%	-30.8%	-45.3%	-2.4%	-6.0%
Charlotte-Concord-Gastonia, NC-SC	74.1%	34.0%	36.2%	13.6%	-37.9%	-51.1%	2.2%	6.5%
Nashville-Davidson--Murfreesboro--Franklin, TN	68.2%	34.8%	29.5%	13.6%	-38.7%	-56.7%	-5.3%	-15.1%
Denver-Aurora-Lakewood, CO	72.6%	29.4%	25.9%	13.1%	-46.7%	-64.3%	-3.5%	-11.8%
Las Vegas-Henderson-Paradise, NV	51.9%	29.9%	23.2%	12.9%	-28.8%	-55.4%	-6.7%	-22.5%
Phoenix-Mesa-Scottsdale, AZ	65.9%	31.9%	28.6%	12.7%	-37.4%	-56.7%	-3.4%	-10.5%
Seattle-Tacoma-Bellevue, WA	62.9%	33.3%	31.5%	12.2%	-31.4%	-50.0%	-1.8%	-5.5%
Jacksonville, FL	56.6%	34.8%	30.5%	11.6%	-26.0%	-46.0%	-4.3%	-12.4%
Atlanta-Sandy Springs-Roswell, GA	69.1%	32.2%	28.1%	11.0%	-41.0%	-59.4%	-4.1%	-12.7%
Tampa-St. Petersburg-Clearwater, FL	37.2%	21.3%	16.9%	10.9%	-20.4%	-54.7%	-4.4%	-20.7%
Miami-Fort Lauderdale-West Palm Beach, FL	20.7%	10.5%	13.5%	10.3%	-7.2%	-34.8%	3.0%	28.7%
Oklahoma City, OK	75.4%	72.4%	67.7%	10.0%	-7.7%	-10.2%	-4.7%	-6.4%
Portland-Vancouver-Hillsboro, OR-WA	70.1%	27.0%	23.3%	9.9%	-46.8%	-66.8%	-3.7%	-13.8%
Washington-Arlington-Alexandria, DC-VA-MD-WV	45.6%	35.8%	31.3%	9.7%	-14.3%	-31.3%	-4.5%	-12.7%
Columbus, OH	81.9%	59.8%	58.8%	9.0%	-23.2%	-28.3%	-1.0%	-1.7%
San Francisco-Oakland-Hayward, CA	42.2%	29.7%	24.1%	8.8%	-18.1%	-42.9%	-5.6%	-18.9%
San Jose-Sunnyvale-Santa Clara, CA	39.8%	19.0%	18.1%	8.5%	-21.6%	-54.3%	-0.8%	-4.3%
Riverside-San Bernardino-Ontario, CA	26.7%	19.3%	18.2%	8.0%	-8.5%	-32.0%	-1.2%	-6.0%
Sacramento--Roseville--Arden-Arcade, CA	60.0%	34.7%	33.0%	7.9%	-26.9%	-44.9%	-1.6%	-4.7%

Madison, WI	82.2%	54.7%	56.5%	7.9%	-25.7%	-31.3%	1.7%	3.2%
San Diego-Carlsbad, CA	22.4%	11.0%	13.1%	7.5%	-9.3%	-41.6%	2.0%	18.5%
Omaha-Council Bluffs, NE-IA	82.5%	67.5%	69.4%	7.5%	-13.1%	-15.8%	1.9%	2.9%
Minneapolis-St. Paul-Bloomington, MN-WI	78.9%	60.4%	65.3%	7.3%	-13.6%	-17.2%	4.8%	8.0%
Indianapolis-Carmel-Anderson, IN	79.7%	55.9%	37.8%	7.2%	-41.8%	-52.5%	-18.1%	-32.4%
Richmond, VA	63.2%	43.2%	48.4%	7.0%	-14.8%	-23.4%	5.2%	12.0%
New Orleans-Metairie, LA	48.0%	37.9%	38.3%	6.7%	-9.7%	-20.2%	0.4%	1.1%
Boston-Cambridge-Newton, MA-NH	55.4%	41.1%	43.9%	5.9%	-11.5%	-20.8%	2.8%	6.9%
Kansas City, MO-KS	79.8%	63.9%	63.3%	5.7%	-16.5%	-20.7%	-0.6%	-1.0%
Louisville/Jefferson County, KY-IN	82.0%	69.3%	60.4%	4.6%	-21.6%	-26.4%	-8.9%	-12.8%
Los Angeles-Long Beach-Anaheim, CA	20.6%	13.3%	10.4%	4.0%	-10.1%	-49.3%	-2.9%	-22.0%
New York-Newark-Jersey City, NY-NJ-PA	42.6%	32.7%	40.2%	3.7%	-2.4%	-5.6%	7.5%	23.1%
Baltimore-Columbia-Towson, MD	57.2%	42.3%	49.1%	3.4%	-8.0%	-14.1%	6.8%	16.1%
Urban Honolulu, HI	37.3%	28.6%	25.7%	3.4%	-11.5%	-31.0%	-2.9%	-10.1%
Cincinnati, OH-KY-IN	83.6%	68.6%	77.3%	2.9%	-6.3%	-7.5%	8.7%	12.7%
Virginia Beach-Norfolk-Newport News, VA-NC	44.0%	34.3%	39.0%	2.7%	-5.0%	-11.3%	4.7%	13.8%
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	58.2%	44.9%	46.4%	2.1%	-11.8%	-20.3%	1.5%	3.3%
Memphis, TN-MS-AR	66.7%	52.4%	48.8%	1.7%	-17.9%	-26.9%	-3.6%	-6.9%
Milwaukee-Waukesha-West Allis, WI	69.5%	60.9%	61.4%	1.3%	-8.1%	-11.6%	0.5%	0.9%
Providence-Warwick, RI-MA	68.3%	58.8%	61.9%	1.2%	-6.5%	-9.5%	3.1%	5.2%
Chicago-Naperville-Elgin, IL-IN-WI	58.1%	40.2%	43.3%	0.7%	-14.7%	-25.4%	3.1%	7.7%
St. Louis, MO-IL	79.2%	63.0%	65.4%	0.6%	-13.8%	-17.4%	2.4%	3.8%
Detroit-Warren-Dearborn, MI	78.3%	57.5%	55.3%	0.5%	-23.0%	-29.3%	-2.2%	-3.8%
Hartford-West Hartford-East Hartford, CT	73.1%	60.3%	68.1%	-0.3%	-5.1%	-6.9%	7.7%	12.8%
Cleveland-Elyria, OH	74.8%	63.9%	66.5%	-0.8%	-8.3%	-11.0%	2.6%	4.1%
Pittsburgh, PA	70.1%	64.5%	64.3%	-1.0%	-5.8%	-8.2%	-0.2%	-0.3%
Nation	**55.7%**	**39.0%**	**39.1%**	**5.3%**	**-16.5%**	**-29.7%**	**0.1%**	**0.2%**

Sources: Census Bureau, Freddie Mac tabulations of 2010-2017 American Community Survey PUMS data

[1] https://www.coloradomesa.edu/social-research-center/documents/centennial-state-survey-april-2017.pdf
[2] http://livedenver.org/