Documenting the Long-Run Decline in Low-Cost Rental Units in the US by State

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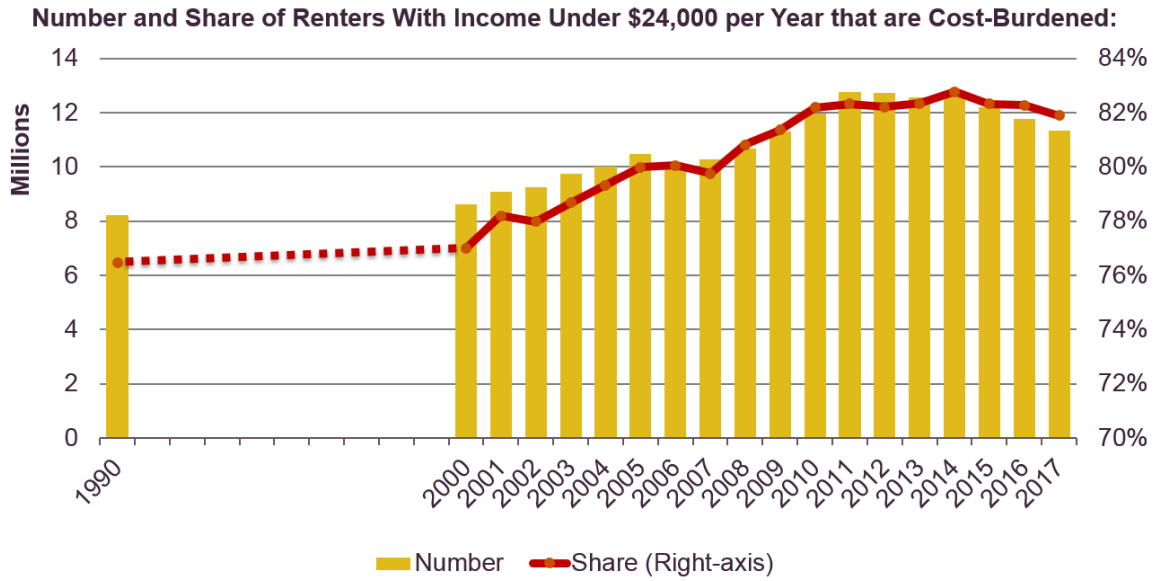
Abstract

Housing affordability has been a growing concern across the US over the past three decades. Indeed, between 1990 and 2017, the number of units renting for under $600 inflation-adjusted per month (the maximum affordable rent for a household earning $24,000 per year) dropped by nearly 4.0 million. The drop brought down the share of low-cost units at this rent level from fully 46 percent of the rental stock in 1990 to just 25 percent by 2017. Across the US, low-cost units (defined at various rent thresholds) were a declining share of the housing stock in every state, while all but a few states also had declines in the absolute number of low-cost units—highlighting an upward shift in the distribution of rental units. This paper shows the extent and timing of declines in the low-cost rental stock by state and for the nation. Low-income renters are particularly impacted by diminishing low-cost supply, as evidenced by a strong correlation at the US state level between the extent of losses of low-cost rentals and rising housing cost burdens for low-income households between 1990 to 2017.

Introduction

Lack of low-cost rental housing remains a major factor behind the nation's housing affordability challenges. According to the National Low Income Housing Coalition, for every 100 very low-income renter households there are only 58 rental units affordable and available to them.[1] With so few opportunities to live affordably, millions of low-income renter households are spending large shares of their incomes on rent. As costs rise faster than incomes, increased scarcity of affordable options increases pressure and adds to the ranks of the cost-burdened. In 1990, for example, 76 percent of low-income renters (earning under $24,000 in inflation-adjusted terms) were cost-burdened, but by 2017, this share had risen to fully 82 percent **(Figure 1)**. Market forces making it difficult to build new, low-cost units and the lack of 'downward filtering' of higher-rent units shifting from higher to lower rent levels over time add to the scarcity.

Figure 1: Four in Five Low-Income Renters Face Housing Cost Burdens



Note: Income adjusted by the CPI-U to 2017 dollars. Housing cost-burdened is defined as paying more than 30 percent of income for housing.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

This research brief answers the following questions: 1) Has the number of low-cost rental units indeed declined since 1990, and if so, by how much? 2) Over which periods of time did this decline take place? and 3) Are there any differences in the size and timing of losses across US states? To check the robustness of our results, we defined the "low-cost" stock using several alternative rent cutoffs—ranging from $400 to $1,000 in $100 increments—and checked the sensitivity of our results against an alternative inflation adjustor **(Appendix B)**. Finally, we also explore the relationship between losses of low-cost rental units and the rise of housing cost burdens among low-income households by state.

Data & Methods

US and state-level data for this analysis came from the 1990 and 2000 US Census Bureau Decennial Censuses and the 2000-2017 American Community Survey (ACS) 1-Year Estimates, downloaded by way

[1] Refers to renter households with incomes at or below 50 percent of AMI; includes extremely low-income renters. https://reports.nlihc.org/sites/default/files/gap/Gap-Report_2019.pdf

of IPUMS-USA.[2] The analysis included all rental units—including both occupied and vacant rentals. Contract rents, rather than gross rents, were used mainly because utilities costs are not reported for vacant units, but also because excluding utility costs focused the analysis more directly on changes in the shelter costs of renting. Given our focus on shifts in low-cost housing supply, and our desire to approximate the number of affordable market-rate units, we excluded units labelled as having "no cash rent" (or a rent of zero), which comprise approximately 6 percent of the rental stock.[3]

The period of change measured within this analysis (1990-2017) required using two different Census Bureau surveys that are not entirely consistent in their measurements and definitions. For example, the 1990 and 2000 Decennial Censuses did not report rents for single-family homes on 10 acres or more. While this exclusion affected only a small number of units, the American Community Surveys (covering data from 2000 through 2017) included all units. Another fundamental difference between the two surveys regards how they make determinations of occupancy, known as 'residence rules,' with the Decennial Census following the concept of the 'usual residence' of the respondent and the ACS following 'current residence' at the time of survey.[4] To minimize the impact of these discrepancies between the ACS and Decennial Censuses, stock changes were calculated *within* each respective survey and then summed *across* surveys to enable analysis of *cumulative net changes* from 1990-2017. Specifically, changes in the number of units between 1990 and 2000 were calculated using the Decennial Censuses and were added to changes from 2000 onwards, which were calculated from ACS data.[5]

Results and Findings

Magnitude of National Loss

There was a sizeable decline in the number of low-cost rental units in the US between 1990 and 2017 under various definitions of "low-cost" or, equivalently in this paper, "low-rent." The largest drop occurred when defining "low-rent" units at less than $600 per month, which, at the 30 percent of income affordability standard, is the maximum rent affordable to a household earning $24,000 a year **(Figure 2)**.[6] Indeed, the number of units renting for less than $600 in inflation-adjusted terms (based on CPI-less shelter) declined by 4.0 million between 1990 and 2017—the largest decline of any "low-rent" threshold that we looked at for the nation **(Table 1)**.[7] This decline was in sharp contrast with the 10.9 million-unit overall growth in the rental stock over the same period; the contrast indicates that all net growth in the rental housing stock was at higher levels of the rent distribution. Indeed, the number of units renting for more than $1,000 per month rose by 10.3 million over 1990–2017, driving about 95 percent of all rental stock growth for the same period.

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[2] Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas, and Matthew Sobek. IPUMS USA: Version 8.0 [dataset]. Minneapolis, MN: IPUMS, 2018. https://doi.org/10.18128/D010.V8.0

[3] The overall number of no-cash (zero rent) rental units also declined slightly over this period, from 6.8 percent in 1990 to 5.9 percent in 2017.

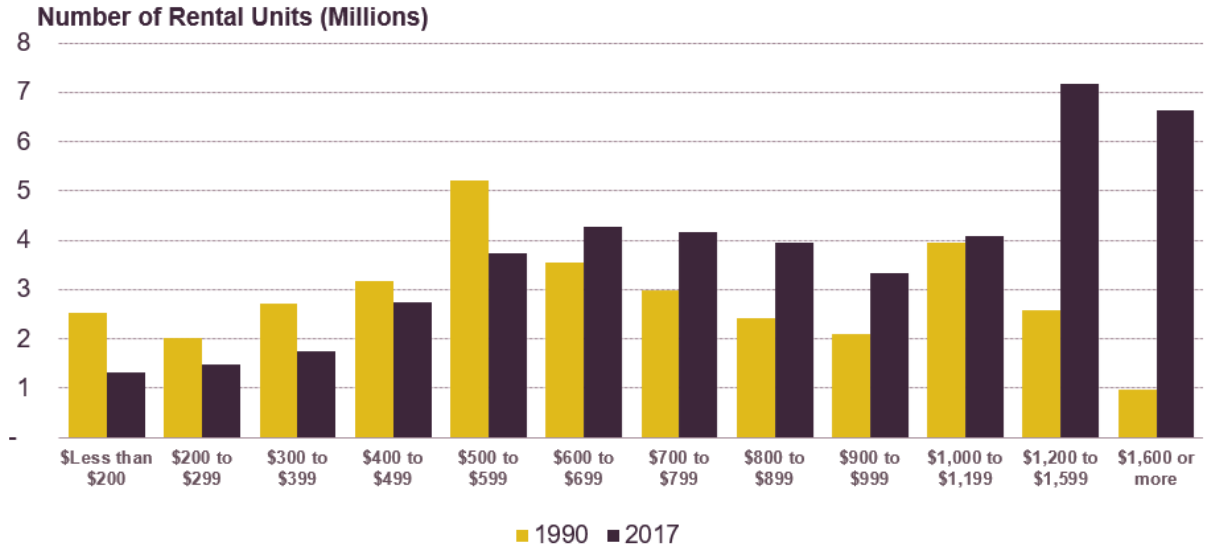
[4] For more on residence rules and other differences, see US Census Bureau, "Differences between the ACS and Decennial Census," https://www.census.gov/content/dam/Census/library/publications/2018/acs/acs_general_handbook_2018_ch09.pdf.

[5] If we instead calculate straight differences from 1990 to 2017 (with no adjustments for changing samples), our calculated losses of low-cost housing would have been *larger* since a smaller universe of rental units was covered in the 1990 Decennial Census compared to the 2017 ACS. Adjusting for the differences between samples is thus more conservative in measuring the magnitude of loss in low-cost rental units.

[6] Households earning less than $24,000 comprised 29 percent of all cash renters in both 1990 and 2017 (with incomes being adjusted by CPI-U).

[7] For a definition of CPI-less shelter and related discussion, see **Appendix B.**

Figure 2: Most Stock Losses Since 1990 Occurred Under $600 Rent Threshold



Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Table 1: Declines in "Low-Rent" Units According to Various Definitions of "Low-Rent": 1990-2017

Millions of units

	Less than							$800 or More	$1,000 or More	Total
	$400	$500	$600	$700	$800	$900	$1,000			
1990 (Decennial)	7.3	10.4	15.7	19.2	22.2	24.6	26.7	12.0	7.5	34.2
2000 (Decennial)	6.2	10.0	14.0	18.9	22.3	26.0	28.2	14.1	8.1	36.3
2000 (ACS)	5.8	9.4	13.4	18.3	21.6	25.3	27.7	14.2	8.2	35.9
2010 (ACS)	5.5	9.2	13.9	17.8	22.2	26.0	29.2	19.4	12.5	41.7
2017 (ACS)	4.6	7.3	11.0	15.3	19.5	23.4	26.8	25.2	17.9	44.7
Change, 1990-2000	-1.1	-0.4	-1.6	-0.3	0.1	1.4	1.5	2.0	0.6	2.1
Change, 2000-2017	-1.2	-2.1	-2.4	-3.0	-2.2	-1.9	-0.9	11.0	9.7	8.8
Cumulative net change, 1990-2017	**-2.3**	**-2.5**	**-4.0**	**-3.3**	**-2.1**	**-0.5**	**0.6**	**13.0**	**10.3**	**10.9**

Notes: Totals may not sum due to rounding. Includes vacant units but excludes no-cash renters and vacant units with zero rent. Rent cutoffs are based on real contract rents adjusted to constant 2017 dollars using the CPI-less shelter. Cumulative net change is the sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).
Source: JCHS tabulations of US Census Bureau Decennial Census, American Community Surveys, IPUMS.

With declines in low-cost units and growth in higher-cost units, low-cost units have also become a much smaller share of the US rental stock at every low-rent cutoff we examined. **Table 2** shows, for example, that the share of units renting for less than $600 declined by fully 21 percentage points from 46 percent of all rental units in the 1990 Decennial Census to just 25 percent in the 2017 ACS. The share of units renting for less than $800 fell by a similar amount, from 65 percent of the rental stock in 1990 to just 44

percent in 2017. Even under the highest low-rent threshold we considered, the share of units renting for less $1,000 per month still fell by 18 percentage point—from 78 percent of the stock to 60 percent.[8]

Table 2: Change in Distribution of Rental Units Under Various Definitions of "Low-Rent": 1990-2017

Percent of Units

	Less than							$800 or More	$1,000 or More	Total
	$400	$500	$600	$700	$800	$900	$1,000			
1990 (Census)	21	30	46	56	65	72	78	35	22	100
2000 (Census)	17	28	39	52	61	72	78	39	22	100
2000 (ACS)	16	26	37	51	60	71	77	40	23	100
2010 (ACS)	13	22	33	43	53	62	70	47	30	100
2017 (ACS)	10	16	25	34	44	53	60	56	40	100
Change, 1990-2017	-11	-14	-21	-22	-21	-20	-18	21	18	-

Source: JCHS tabulations of US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Timing of the Losses

While a sizable decline in low-rent units took place in the 1990s, the steepest decline in both the size and share of the low-cost rental stock occurred over the last five years (2012-2017). **Figure 3** illustrates the particularly steep declines in this period, when the number of units renting for less than $600 per month dropped from 14 million to 11 million, and the share of low-cost rentals at the same threshold dropped from 40 percent of the rental stock to just 25 percent. These declines occurred following a post-recessionary surge in low-cost rental supply resulting from the foreclosure crisis and housing downturn which, between 2009 and 2012, added 1.3 million net new units renting for under $600 per month. When rental markets rebounded after 2012, however, this trend quickly reversed and the number and share of low-cost rentals fell well below even pre-recession levels.[9] The majority of these losses since 2012 were units in the $400 to $700 per month price range. As a result, the net number of units renting for less than $700 declined by 3.9 million over just five years (2012-2017).

Variations Across States

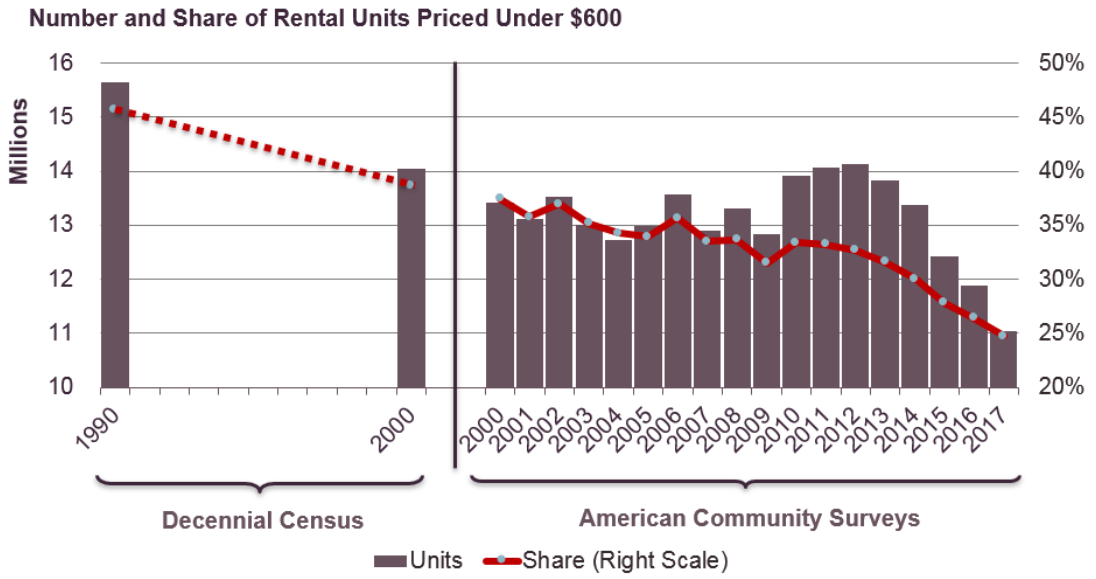
While the greatest absolute loss in "low-rent" units took place at the $600-and-under threshold for the nation (a total loss of 4 million units), different US states had their largest decline in both the number and the share of low-rent units at varying rent cutoffs depending on the overall shape of their rent distribution. In other words, "low-rent" means different things in different places. In a high-cost state like California, for example, low-rent units are effectively priced at a higher level than in other states given that the rent distribution there is weighted toward higher-cost units **(Figure 4).** California and many other high-cost states therefore witnessed lower-than-average losses of units at the $600-and-under threshold, but higher-than-average losses at higher thresholds (e.g., $1,200-and-under, in the

[8] Similar results are obtained when restricting our sample to look only at occupied units, or only vacant units, indicating that these trends were not due to any shifts in vacant rental stock between 1990 or 2017. Indeed, the US rental vacancy rate averaged 7.2 percent in both 1990 and in 2017, according to the Housing Vacancy Survey.

[9] The low-cost supply tends to be more concentrated in single-family and other small structures compared to the overall rental stock. For example, 39 percent of the stock renting for under $600 in 2017 were single-family or mobile homes, compared to 36 percent of the overall stock; likewise, 33 percent of units renting for under $600 were units in buildings with 2 to 10 units, compared to 29 percent of the overall stock. Most of the losses in this low-cost stock from 2012–2017 were also concentrated in buildings with fewer than 10 units (fully 73 percent).

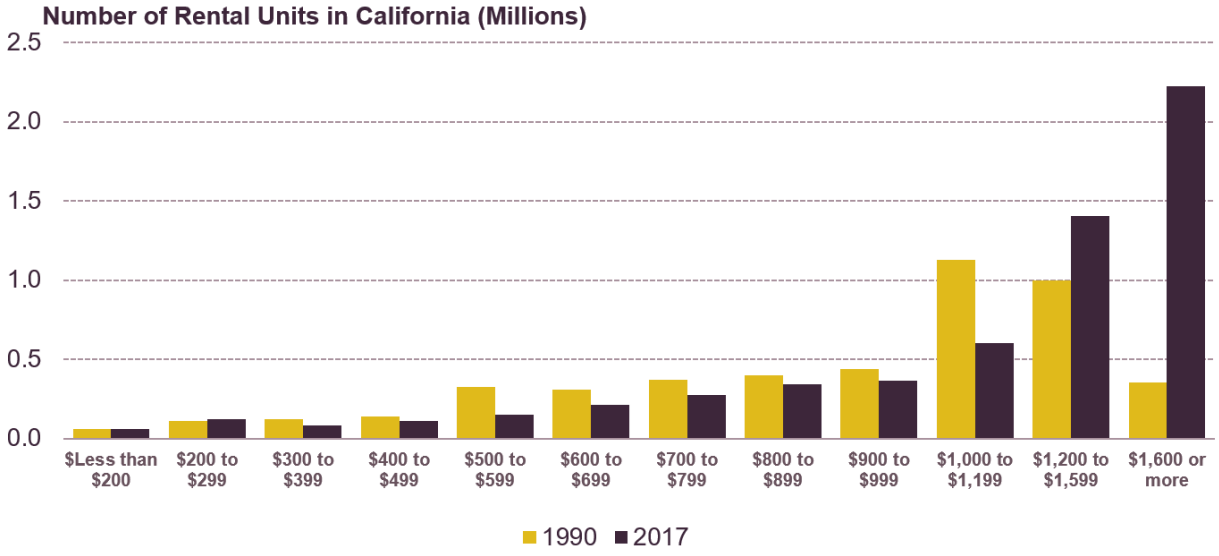
case of California). This is in contrast to lower-cost states, like Arkansas, whose rent distribution is heavily skewed in the other direction toward lower price points **(Figure 5)**. Arkansas thus saw its biggest rental unit losses at a much lower threshold of under $400 per month.

Figure 3: The Supply of Low-Cost Rental Units Has Declined Significantly Since 1990



Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; Integrated Public Use Microdata Series: Version 8.0. Minneapolis: University of Minnesota, 2018.

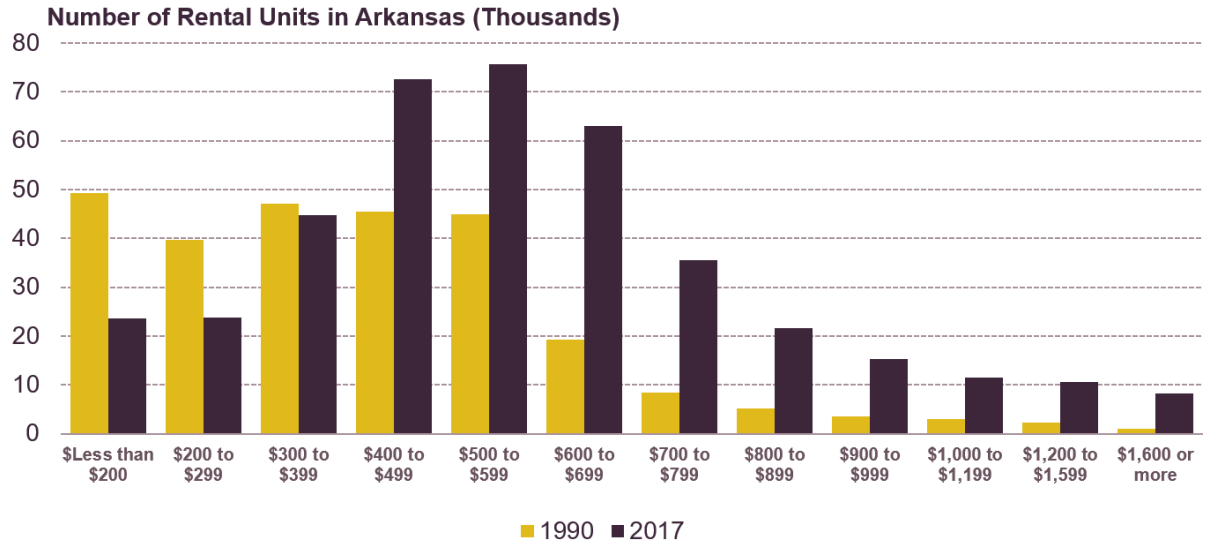
Figure 4: California Losses Occurred at Higher "Low-Rent" Level



Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Detailed data on the unit losses across each of these rent categories for all US states and DC over 1990-2017 is available in **Table 4** in **Appendix A.** In addition, **Table 5** in the same appendix identifies the specific "low-rent" cutoff in each state (ranging from $400 to $1,000 in $100 intervals) at which net unit losses were greatest over the same period. Finally, **Figure 12** in this appendix provides a visual summary showing how many states had their maximum rental unit losses (in terms of both number of units, and shares of units) at each cutoff we studied over 1990-2017. It shows, for example, that the $600 monthly rent cutoff was where most states experienced their biggest share-losses; again, this result is consistent with the fact that the US as a whole also saw its biggest unit losses under the $600 monthly rent threshold.

Figure 5: Arkansas Losses Occurred at Lower "Low-Rent" Level



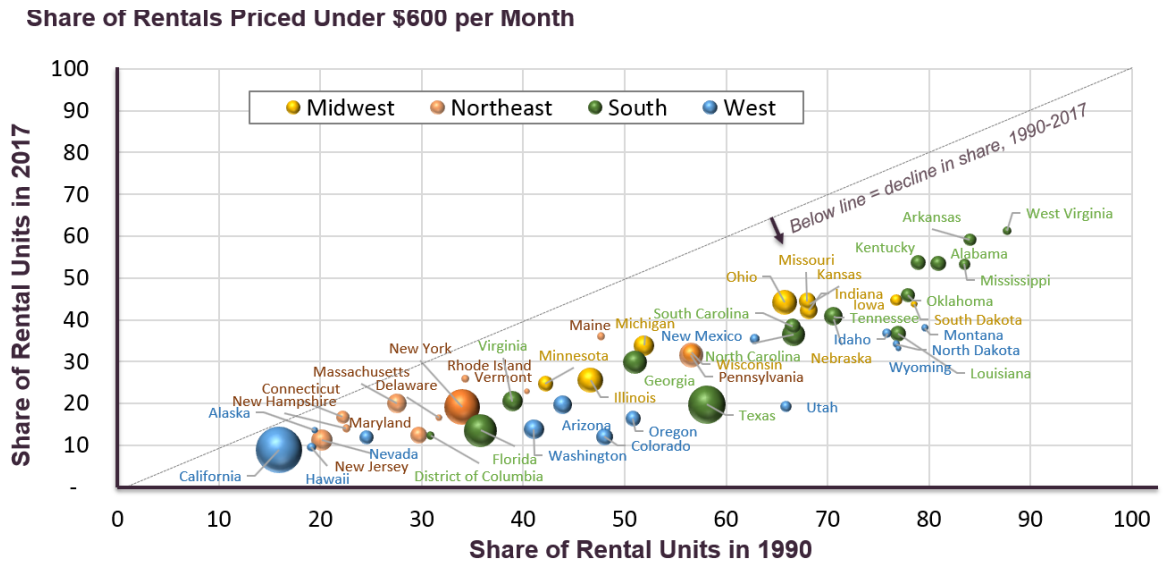
Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Despite these variations, all 50 states and DC had declining shares of units renting for less than $600 per month between 1990 and 2017 and, as a result, by 2017 the share stood at less than a third in 27 states and DC and at less than 20 percent in 16 states **(Table 3)**. **Figure 6** illustrates the geography of these dramatic trends at the $600 per month threshold. For example, it shows that several rural and affordable states—including many in the South and West—registered extremely high initial shares of units renting for less than $600 per month in 1990 (e.g., above 80 percent) and large net declines by 2017. In Utah, Wyoming, North Dakota, and Montana, the share dropped by over 40 percentage points. Other more populated states with major declines included Texas, where the share of units renting for less than $600 dropped from 58 percent in 1990 to just 20 percent in 2017, and Colorado, where the share fell from 48 percent to 12 percent. By 2017 only 5 states remained where at least half of rentals were priced under $600 per month—Alabama, Arkansas, Kentucky, Mississippi, and West Virginia—compared to 29 states in 1990.

In contrast to these trends, several high-cost states in the Northeast and West, such as California and New York, exhibited low initial shares of low-cost units in 1990, and smaller declines in share by 2017. While the decline in the share of units renting for $600 per month in 1990–2017 tended to be smaller in these high-cost states, this was due to the already low share of units under that threshold in those states so the decline in "low-rent" units still occurred higher up the rent distribution. **Figure 7** shows, for

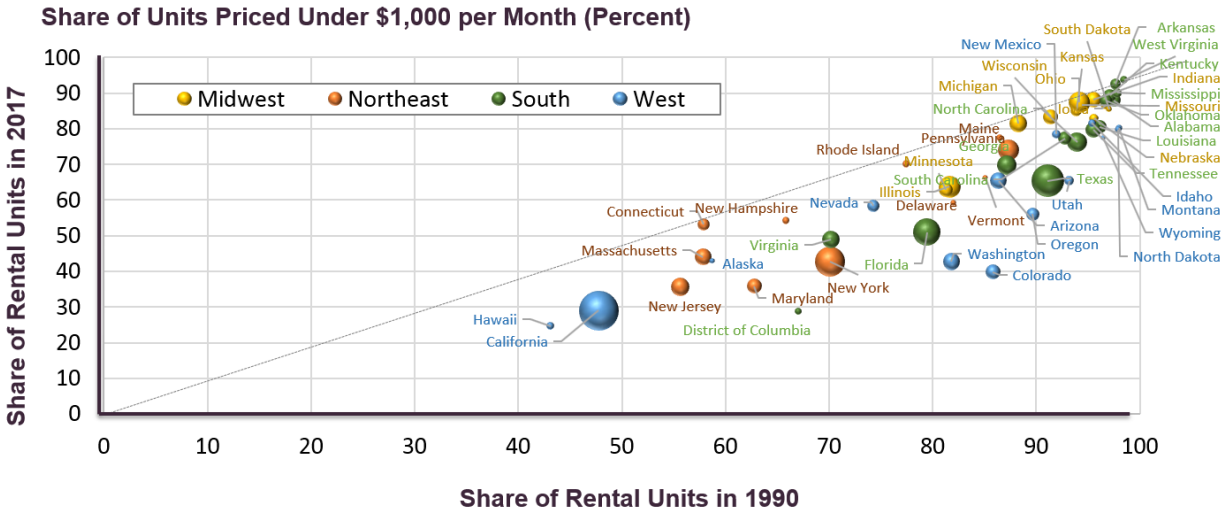
example, that these same geographies had larger relative declines at or below contract rents of $1,000 per month. In California, the share of units renting for less than $1,000 per month dropped by 19 percentage points from 48 percent in 1990 to just 29 percent in 2017. In DC the share fell from 67 percent to 29 percent. In contrast, many more affordable states which witnessed steep declines at the $600 per month threshold saw only minor declines at this higher cutoff.

Figure 6: Losses Across All 50 States and DC at the $600/month Threshold



Notes: Low-cost rentals are defined here as those priced under $1,000 per month, excluding no-cash rental units. Includes vacant and occupied units. Size of dot corresponds to the relative size of each rental housing market. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Figure 7: Most High-Cost States Saw Bigger Losses at the $1,000/month Threshold



Notes: Low-cost rentals are defined here as those priced under $1,000 per month, excluding no-cash rental units. Includes vacant and occupied units. Size of dot corresponds to the relative size of each rental housing market. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Losses were also evident in the absolute number of low-cost units in the vast majority of, but not all, US states **(Table 3).** For example, at the $600 rent threshold, losses took place in fully 48 of the 51 states and DC In part owing to its large population, Texas saw the largest absolute decline in units renting for under $600, a drop of nearly 720,000 units between 1990 and 2017. This disappearance is particularly striking given that the overall rental stock in Texas nonetheless grew by over 1.3 million units during that time. Other states registering large absolute declines in rental units at this price point included New York, Pennsylvania, Florida, Illinois, Louisiana and California. In each of these states, declines in low-cost rentals contrasted with growth in their overall rental stock.

Even so, the absolute number of units priced less than $600 per month grew in three states between 1990 and 2017. Indeed, Arkansas, South Carolina, and Connecticut each saw net increases in units renting for less than $600 per month, while 19 additional states saw increases in units renting for less than $800 per month. In each of these states, however, the overall rental stock increased faster than the low-cost stock, so that the *share* of all rental unit classified as low-cost still declined, and in most cases, the shares fell by more than 10 percentage points even after adjusting for inflation.

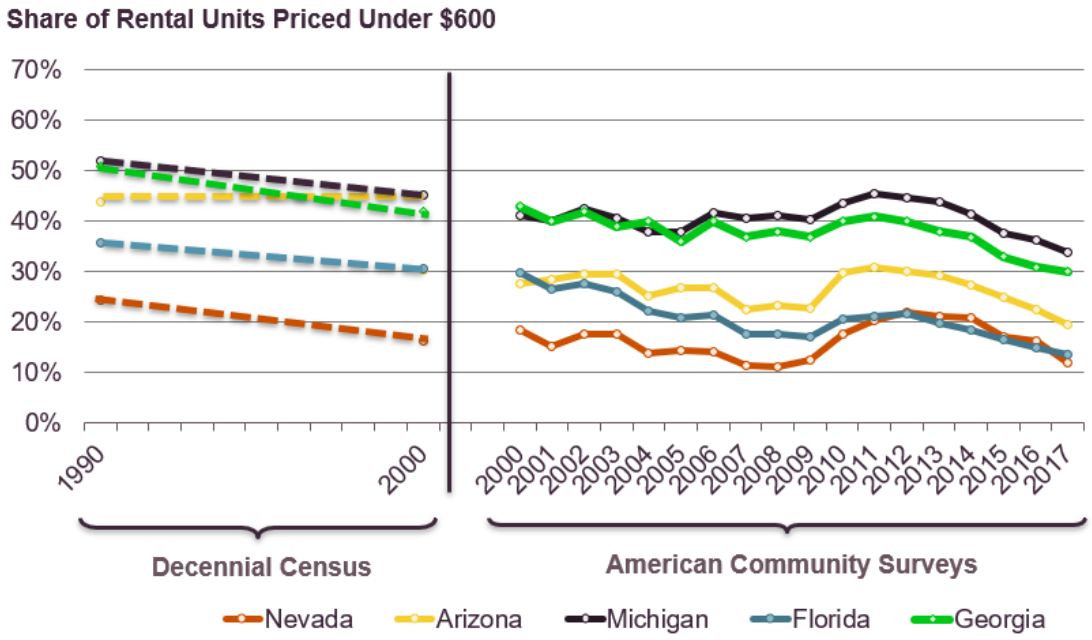
Finally, while many states saw net gains of units at higher rent levels, in several (mainly higher-cost) states unit losses were *even greater* at these higher rent thresholds **(Table 3)**. For example, in nine states plus DC, absolute losses to the low-cost stock were greater at the $1,000 per month rent threshold than for the $600 threshold. In California and New York, for example, some 414,000 and 716,00 units renting for less than $1,000 per month, respectively, were lost from the stock, more than twice the number of losses at the $600 threshold in each state, owing to these states' higher overall rent distributions. Their losses in share of low-cost rentals were also steepest at these higher rent thresholds, highlighting the tremendous variation in rental markets across the country.

Timing of State-Level Losses

Most US states saw their low-cost shares decline steadily over time, with the main exception being that several states, in accordance with the national trend, also saw slight elevations in share around 2010-12 before undergoing further steep declines through the past five years. Again, we attribute this pattern to the foreclosure crisis, which would have temporarily elevated the supply of units available for rent during the same period. Indeed, we also found that the same trend was even more pronounced in the nation's high- foreclosure states. For example, **Figure 8** exhibits this trend at the $600 per month rent threshold for Nevada, Arizona, Michigan, Florida and Georgia. In every case, growth in the share of units renting for under $600 per month during 2010-12 was pronounced but not long-lasting, and often disappeared within six years as rental markets faced swelling demand for more affordable rental units.

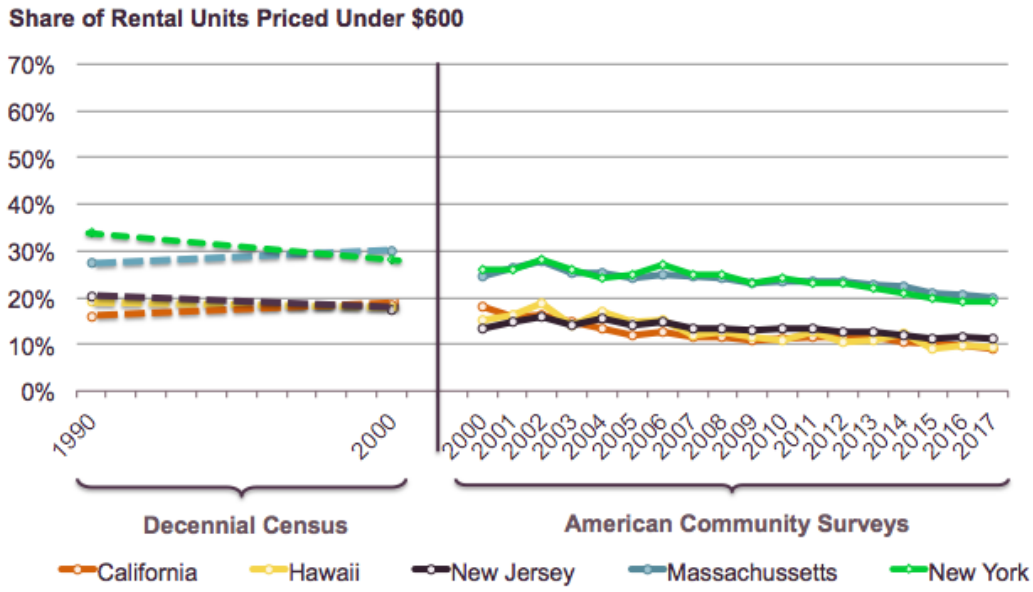
Meanwhile, in relatively high-cost states, where "low-cost" units were effectively priced at a higher level, we identified much less variation in the share of units priced under $600 per month, even during the foreclosure crisis. **Figure 9** illustrates this trend for California, Hawaii, New Jersey, New York and Massachusetts. In every case, the share of units renting for under $600 per month was already low in 1990 and continued to fall through 2017, albeit by a lesser amount. However when we extended the definition of "low-rent" units higher—to under $1,000 per month—we uncovered more variation over time **(Figure 10)**. In California, for example, we found a massive loss in the share of units renting for less than $1,000 per month—from 42 percent at the peak in 2012 to just 29 percent in 2017. Similarly, steep losses at the $1,000 cutoff are exhibited in other high-cost states including Hawaii, New Jersey and Massachusetts. Several of these states also evidenced elevations in share during the housing crisis.

Figure 8: Temporary Growth in Low-Cost Rentals in the Early 2010s in High-Foreclosure States



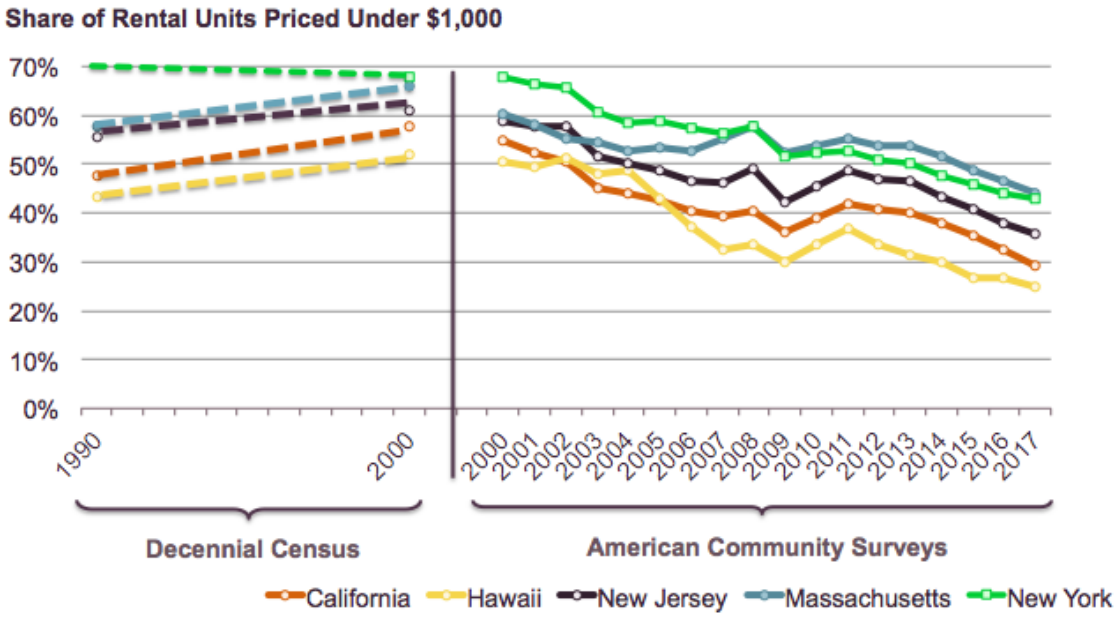
Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Figure 9: Supply Priced under $600 Shrunk Further in High-Cost Markets



Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Figure 10: High-Cost States Saw Major Shifts in Supply at Higher Rent Threshold



Note: Includes both vacant and occupied units. Excludes no-cash renters. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Link to Rising Cost Burdens

Losses of low-cost units are a particular concern to households at the bottom of the income distribution, as dwindling affordable supply often forces them to rent units outside of their budgets. We explored the correlation between losses of low-cost units and increases in cost burdens for low-income households over the long run (1990-2017) by US states, and found a strong correlation between these two trends (correlation coefficient=0.68).[10] Indeed, **Figure 11** illustrates that states with the steepest share-losses at the $600 rent cutoff between 1990 and 2017 typically also saw the greatest increases in cost burdens over the same time period at the corresponding income level of $24,000 (where a rent of $600 per month or lower might be affordable according to the 30 percent-of-income measure), and vice versa.

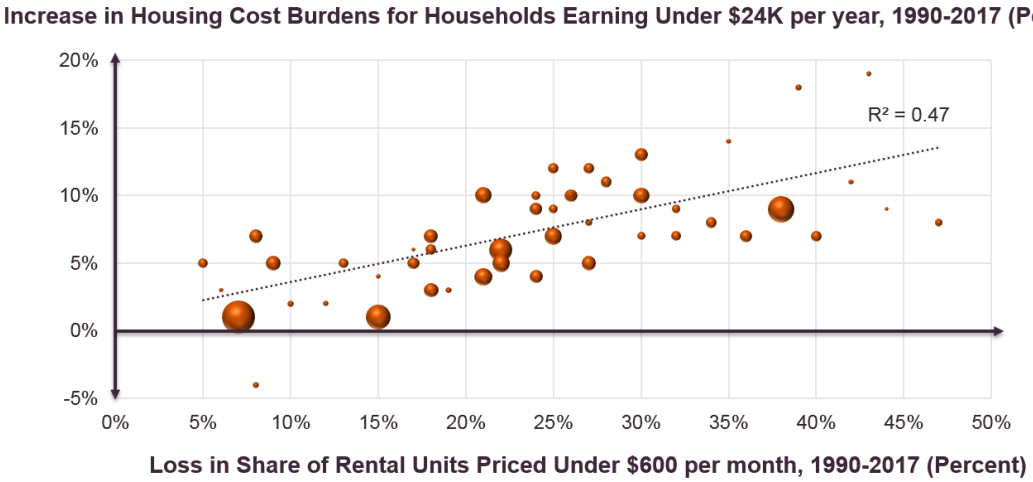
For example, Texas saw a large drop of 38 percentage points in its share of units priced under $600 per month between 1990 and 2017, and its cost burden rate for households earning less than $24,000 per year also rose sharply by 9 percentage points from 84 percent in 1990 to 92 percent in 2017. States with similarly large increases in both metrics included many in the West: North Dakota, Idaho, Montana, Wyoming, Utah; and in the South: Louisiana, Tennessee. In contrast, in a state like New Jersey, the share of low-cost units at that cutoff declined by only 9 percent, while cost burdens for households earning less than $24K annually rose by 5 percent over the period studied. Examples of other states with small increases in both metrics include California, New York, Alaska, Connecticut, Hawaii, Maine, and

[10] Similar to the rest of the analysis, we excluded from these calculations cash-free rental units (i.e., those with zero rent), as well as low-income households living in those units.

Delaware. Rhode Island was the only state to see declining cost burdens for low-income households, and also saw only a minor decline in low-cost units (share-loss of 8 percent for units priced under $600 between 1990 and 2017).

The line of best fit is shown on the chart and the R-square for this simple but intuitive modeled relationship is strong at 0.47, meaning that losses of low-cost units account for roughly half of the rise in cost burdens among low-income households over this period (the R-square is even higher, at 0.49, when looking at the rise of severe cost burdens for the same households). The strength of the relationship is striking given the diversity of economic and demographic conditions across states, where growth in low-income households may have been higher in some states than others, putting pressure on or, alternatively, relieving demand for low-income units. Indeed, other factors influencing the relationship, not included here, would be changes in the numbers of low-income households, changes in the numbers of higher-income households who may for various reasons be seeking lower-cost units, and limits on the change(s) in share due to its already being quite high in certain areas. Further research could explore this relationship further—to understand, for example, why a few states had large losses of low-cost units but lesser increases in housing cost burdens for low-income households.

Figure 11: Losses of Low-Cost Units Correlate with Rising Housing Cost Burdens



Notes: By US states and DC Excludes no-cash rental units and renters in those units. Includes vacant and occupied units. Dot size corresponds to the relative size of each rental housing market. Cash rent cutoffs adjusted by CPI-less shelter to 2017 dollars. Income is adjusted by CPI-U.
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Conclusions

Whether due to an inability to build new units at rents affordable to low-income renters, a lack of enough higher-cost units filtering down to lower rent levels with age, an abundance of units filtering up to higher rent levels through improvements or otherwise, or losses to demolition or tenure-shifts, the supply of low-cost rental housing is diminishing and contributing to the nation's growing affordable housing crisis. Since 1990 these losses have been significant and widespread across the country. Most states had absolute declines in the number of low-cost rentals since 1990, and all of those that did not still had declines in low-cost units as a share of their rental stocks. This paper details these changes to the low-cost rental supply for the country as a whole and for each state, finding a marked shift in the rental supply over the past three decades away from lower-cost units. As a result, lower-income households are forced to compete for fewer and fewer low-cost units.

Table 3: Change in Number and Share of Low-Cost Rentals by State: 1990-2017 (CPI-Less Shelter Adjusted)

	Rental units < $600				Rental units < $800				Rental units < $,1000			
	Change, 1990-2017	Share, 1990 (%)	Share, 2017 (%)	Change in share, 1990-17	Change, 1990-2017	Share, 1990 (%)	Share, 2017 (%)	Change in share, 1990-17	Change, 1990-2017	Share, 1990 (%)	Share, 2017 (%)	Change in share, 1990-17
US	-3,991,906	46	25	-21	-2,060,050	65	44	-21	612,663	78	60	-18
Alabama	-30,353	81	53	-27	71,915	93	76	-17	123,179	97	88	-9
Alaska	-4,436	19	14	-6	-14,035	39	23	-16	-9,308	59	43	-16
Arizona	-43,771	44	20	-24	-15,933	71	42	-30	125,430	86	65	-21
Arkansas	9,964	84	59	-25	73,375	94	83	-11	104,034	98	93	-5
California	-204,084	16	9	-7	-350,838	30	17	-13	-413,617	48	29	-19
Colorado	-121,388	48	12	-36	-170,006	73	24	-49	-147,150	86	40	-46
Connecticut	7,919	22	17	-5	9,632	37	31	-6	19,337	58	53	-5
Delaware	-1,253	32	17	-15	-11,868	57	34	-23	106	82	59	-23
DC	-25,492	31	12	-19	-45,730	52	19	-33	-52,272	67	29	-38
Florida	-255,329	36	14	-22	-193,328	61	31	-30	-19,828	79	51	-28
Georgia	-22,087	51	30	-21	110,387	72	51	-21	217,924	87	70	-17
Hawaii	-4,978	19	10	-10	-9,997	30	14	-16	-10,844	43	25	-18
Idaho	-7,237	76	37	-39	28,968	91	63	-28	65,006	95	82	-14
Illinois	-244,753	47	26	-21	-257,469	67	45	-22	-149,341	82	64	-18
Indiana	-79,504	68	42	-26	85,806	88	74	-14	148,567	96	88	-7
Iowa	-69,850	77	45	-32	-14,260	92	74	-18	13,623	97	87	-10
Kansas	-31,909	68	44	-24	25,330	86	71	-15	59,316	94	85	-9
Kentucky	-7,656	79	54	-25	64,531	93	77	-15	127,461	97	89	-8
Louisiana	-214,018	77	37	-40	-127,462	92	64	-27	-53,246	96	81	-16
Maine	-5,824	48	36	-12	-5,896	71	59	-12	3,026	86	77	-9
Maryland	-95,704	30	12	-17	-118,430	46	22	-24	-114,582	63	36	-27
Massachusetts	-10,191	28	20	-8	-8,504	41	31	-11	-45,655	58	44	-14
Michigan	-107,980	52	34	-18	-17,644	75	63	-12	15,880	88	82	-7
Minnesota	-27,102	42	25	-18	-13,874	65	43	-22	25,332	81	63	-18
Mississippi	-33,427	83	53	-30	11,683	94	77	-17	41,906	98	90	-8
Missouri	-70,112	68	44	-24	24,106	87	72	-15	97,299	94	87	-8
Montana	-27,583	80	38	-42	-9,671	95	64	-31	10,697	98	80	-18
Nebraska	-28,187	71	40	-30	-642	89	68	-20	23,689	96	83	-13
Nevada	-100	25	12	-13	56,119	51	34	-17	123,962	74	58	-16
New	-2,710	23	14	-9	-7,902	43	30	-14	-862	66	54	-12
New Jersey	-24,954	20	11	-9	-102,931	36	19	-17	-98,867	56	36	-20
New Mexico	-29,213	63	35	-27	3,843	83	61	-22	33,567	92	78	-13
New York	-338,580	34	19	-15	-591,712	54	31	-23	-716,135	70	43	-27
North Carolina	-1,819	67	37	-30	199,748	86	60	-25	351,058	94	76	-18
North Dakota	-10,136	77	34	-43	12,662	93	62	-31	29,874	98	80	-18
Ohio	-178,691	66	44	-22	36,601	86	73	-13	164,314	94	87	-7
Oklahoma	-68,801	78	46	-32	1,089	92	74	-18	54,104	97	88	-9
Oregon	-113,291	51	16	-34	-150,818	78	34	-44	-52,236	90	56	-34
Pennsylvania	-280,610	57	32	-25	-123,352	75	57	-19	20,271	87	74	-13
Rhode Island	-4,934	34	26	-8	-14,114	58	45	-13	-2,516	77	70	-7
South Carolina	7,989	67	39	-28	69,399	85	62	-23	132,814	93	77	-15
South Dakota	-12,814	79	44	-35	6,632	93	72	-21	18,516	97	86	-12
Tennessee	-34,229	71	41	-30	29,203	89	64	-25	142,894	96	80	-16
Texas	-719,768	58	20	-38	-373,116	81	44	-37	186,925	91	65	-26
Utah	-47,987	66	19	-47	-17,320	86	44	-42	27,983	93	65	-28
Vermont	-8,840	40	23	-17	-8,584	68	44	-24	-4,676	85	66	-19
Virginia	-84,298	39	21	-18	-66,076	57	34	-22	4,845	70	49	-21
Washington	-145,247	41	14	-27	-182,685	66	27	-38	-155,254	82	43	-39
West Virginia	-8,624	88	61	-26	25,929	96	86	-10	33,194	98	94	-5
Wisconsin	-113,524	57	32	-24	16,732	80	64	-16	106,632	91	83	-8
Wyoming	-14,400	77	33	-44	457	91	64	-27	6,287	96	77	-19

Source: US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Notes: Based on real contract rent adjusted by CPI-less shelter; includes vacant units but excludes no-cash renters and vacant units with zero rent. Change in share is calculated as the simple change from the 1990 Decennial Census to the 2017 ACS. Change in units is the cumulative sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).

Appendix A: State-Level Stock Losses Under Various Definitions of "Low-Rent"

Table 4: Net Change in Rentals, 1990-2017

Thousands of Units

	$Less than $200	$200 to $299	$300 to $399	$400 to $499	$500 to $599	$600 to $699	$700 to $799	$800 to $899	$900 to $999	$1K to $1,199	$1,2K to $1,599	$1,6K or more	All
US	(1,157.6)	(327.0)	(792.9)	(239.3)	(1,475.1)	694.6	1,237.2	1,537.4	1,135.3	(9.9)	4,577.9	5,737.1	10,917.7
Alabama	(46.8)	(29.5)	(14.6)	39.0	21.6	58.4	43.8	21.2	30.1	22.9	31.1	14.8	192.0
Alaska	(2.4)	(1.3)	(0.2)	(0.2)	(0.4)	(5.3)	(4.3)	1.6	3.1	(3.8)	10.7	19.0	16.6
Arizona	0.9	4.3	(2.5)	(1.1)	(45.4)	(10.7)	38.5	62.8	78.5	67.1	130.4	52.0	375.0
Arkansas	(35.5)	(6.0)	10.4	32.8	8.2	34.5	28.9	16.4	14.3	8.9	8.7	7.7	129.3
California	9.3	22.6	(30.1)	(34.5)	(171.4)	(75.4)	(71.4)	2.3	(65.1)	(590.2)	363.6	1,806.7	1166.4
Colorado	(6.8)	(2.3)	(10.6)	(25.5)	(76.3)	(34.4)	(14.2)	3.5	19.4	21.9	198.1	149.6	222.4
Connecticut	(6.8)	2.7	4.3	13.4	(5.6)	(1.7)	3.4	10.7	(1.0)	(45.5)	31.5	38.9	44.2
Delaware	(0.5)	1.6	0.7	(0.4)	(2.6)	(4.7)	(5.9)	5.6	6.4	10.4	15.3	2.6	28.4
DC	(4.5)	0.8	1.3	(3.5)	(19.6)	(12.2)	(8.0)	(6.8)	0.2	(16.0)	11.8	63.8	7.3
Florida	(38.5)	1.1	(43.4)	(48.6)	(126.0)	(10.9)	72.9	70.7	102.8	133.3	562.3	376.6	1052.4
Georgia	(73.0)	(12.9)	(15.1)	51.1	27.9	53.7	78.7	43.8	63.7	67.1	196.3	83.7	565.0
Hawaii	0.0	(0.0)	2.6	0.1	(7.6)	(4.3)	(0.7)	(1.5)	0.7	(13.3)	9.7	68.0	53.6
Idaho	(2.7)	(5.9)	(8.8)	(0.5)	10.6	20.4	15.8	20.4	15.6	9.4	14.3	4.9	93.6
Illinois	(56.2)	(35.1)	(42.0)	(18.7)	(92.8)	(8.3)	(4.4)	66.7	41.4	(19.0)	164.7	172.3	168.7
Indiana	(26.2)	(31.3)	(34.8)	12.9	(0.2)	88.5	76.8	51.6	11.2	16.9	38.6	14.3	218.3
Iowa	(27.9)	(34.5)	(17.6)	4.3	5.8	26.1	29.5	20.7	7.2	11.5	17.9	12.4	55.5
Kansas	(19.6)	(15.0)	(15.2)	13.7	4.1	29.5	27.7	25.7	8.3	10.9	16.7	13.5	100.5
Kentucky	(50.2)	(10.8)	6.2	24.6	22.5	34.7	37.5	37.2	25.7	13.3	19.5	11.0	171.2
Louisiana	(50.3)	(23.0)	(40.7)	(35.9)	(64.2)	40.5	46.0	47.4	26.8	29.9	48.0	19.4	44.1
Maine	(10.7)	3.9	3.3	5.3	(7.6)	2.5	(2.6)	6.9	2.0	(6.7)	12.6	7.4	16.3
Maryland	(14.8)	1.3	(9.0)	(25.8)	(47.4)	(12.5)	(10.3)	(9.0)	12.8	(66.7)	135.3	179.0	133.1
Massachusetts	(25.0)	21.0	(6.1)	9.7	(9.9)	12.9	(11.2)	6.3	(43.4)	(118.9)	18.6	208.5	62.6
Michigan	(8.8)	(2.6)	(50.0)	(7.9)	(38.7)	49.6	40.7	43.4	(9.9)	(4.1)	44.2	47.1	103.0
Minnesota	(20.1)	15.7	(1.7)	0.1	(21.2)	(6.6)	19.8	32.6	6.6	12.8	84.2	52.3	174.6
Mississippi	(33.6)	(10.5)	0.9	0.8	9.0	18.5	26.6	19.7	10.5	13.7	12.2	7.3	75.1
Missouri	(33.9)	(22.2)	(24.6)	11.7	(1.1)	35.3	58.9	48.0	25.2	21.0	29.5	19.7	167.6
Montana	(13.3)	(4.5)	(5.4)	(3.1)	(1.2)	5.7	12.2	12.8	7.6	7.7	9.7	6.2	34.3
Nebraska	(17.6)	(12.0)	0.0	8.1	(6.7)	0.9	26.6	11.4	13.0	14.3	21.4	6.5	65.9
Nevada	(5.5)	0.6	0.3	5.2	(0.8)	22.8	33.4	36.8	31.0	36.0	101.7	28.9	290.6
New Hampshire	(4.9)	(1.1)	1.6	4.3	(2.6)	1.1	(6.3)	0.2	6.8	(12.9)	23.3	14.1	23.8
New Jersey	(6.6)	26.6	(3.6)	(9.0)	(32.3)	(42.5)	(35.4)	11.8	(7.7)	(69.8)	145.0	229.1	205.4
New Mexico	(9.7)	(2.9)	(5.4)	5.3	(16.5)	12.6	20.4	17.3	12.4	13.4	18.2	6.9	72.1
New York	(13.7)	1.3	(55.4)	(67.7)	(203.1)	(144.1)	(109.0)	(54.5)	(69.9)	(119.3)	370.2	797.9	332.7
North Carolina	(50.2)	(4.7)	(26.3)	51.1	28.2	94.5	107.1	75.3	76.0	72.0	142.7	60.6	626.4
North Dakota	(6.1)	0.9	(3.1)	(2.9)	1.1	7.6	15.2	10.6	6.6	12.1	8.8	4.4	55.1
Ohio	(74.6)	(17.1)	(74.2)	21.0	(33.9)	138.5	76.8	71.5	56.2	14.5	75.2	38.1	292.1
Oklahoma	(28.7)	(1.3)	(38.5)	(16.7)	16.3	34.1	35.8	36.4	16.6	22.3	24.5	11.5	112.4
Oregon	(13.1)	(8.2)	(16.8)	(18.0)	(57.2)	(45.7)	8.2	41.5	57.1	36.4	101.5	78.0	163.6
Pennsylvania	(80.3)	(22.4)	(72.4)	(44.1)	(61.4)	75.8	81.5	84.7	59.0	16.0	135.2	95.1	266.5
Rhode Island	(2.4)	7.9	(0.4)	(1.3)	(8.8)	(8.0)	(1.2)	12.0	(0.4)	(6.4)	11.0	9.8	11.9
South Carolina	(22.4)	(16.6)	7.5	28.2	11.3	32.7	28.7	38.1	25.3	29.8	49.7	28.8	241.1
South Dakota	(8.2)	(1.3)	(2.9)	(1.7)	1.2	9.1	10.3	5.9	5.9	5.6	6.3	2.6	33.0
Tennessee	(55.4)	(10.5)	5.9	17.6	8.2	22.1	41.3	64.9	48.8	43.5	81.5	42.8	310.7
Texas	(86.9)	(49.6)	(82.8)	(183.0)	(317.4)	88.7	257.9	302.1	257.9	245.2	564.1	340.8	1337.1
Utah	(1.1)	(4.0)	(11.2)	(13.4)	(18.3)	3.3	27.4	22.1	23.2	24.6	43.7	16.3	112.6
Vermont	(1.4)	(0.3)	(1.6)	(1.6)	(3.9)	(0.5)	0.8	2.4	1.6	0.7	13.2	1.8	11.0
Virginia	(24.9)	(4.9)	(5.5)	(4.9)	(44.1)	(1.6)	19.8	28.7	42.2	(24.4)	110.9	206.9	298.2
Washington	(5.7)	(6.6)	(30.1)	(32.9)	(70.0)	(27.1)	(10.3)	(3.8)	31.3	20.6	231.7	230.0	326.9
West Virginia	(21.3)	(16.7)	1.1	14.4	13.8	21.8	12.7	3.6	3.6	3.4	6.6	0.2	43.4
Wisconsin	(17.9)	(10.3)	(32.8)	(7.9)	(44.7)	68.6	61.7	55.0	34.9	14.2	49.0	24.2	194.0
Wyoming	(1.2)	(1.4)	(4.1)	(3.3)	(4.3)	6.0	8.9	3.0	2.9	3.8	7.3	2.8	20.2

Notes: Includes vacant units but excludes no-cash renters and vacant units with zero rent. Rent cutoffs are based on real contract rents adjusted to constant 2017 dollars using the CPI-less shelter. Cumulative net change is the sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).

Source: JCHS tabulations of US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Table 5: Cumulative Net Change in "Low-Cost" Rentals by US State, 1990-2017

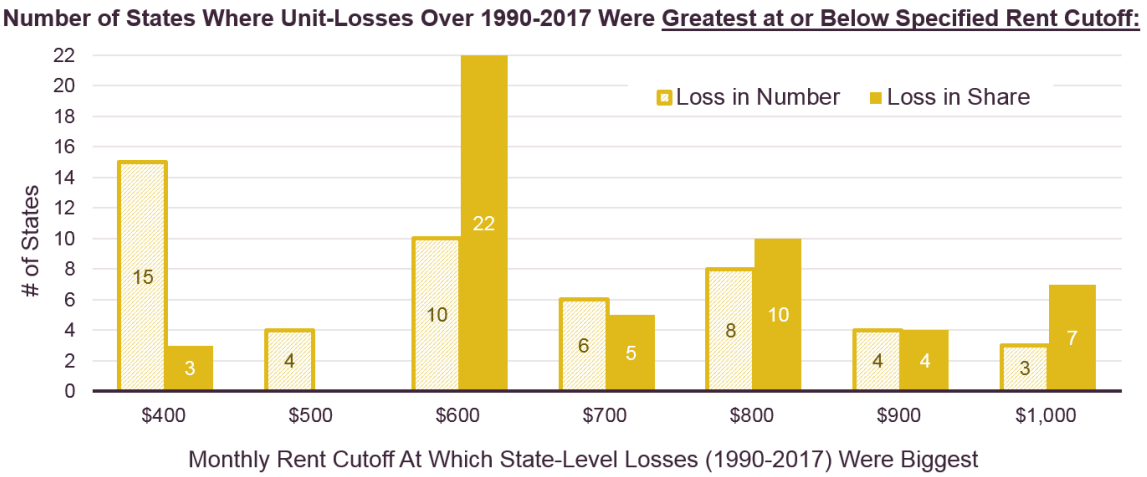
Thousands of units

	Less than						
	$400	$500	$600	$700	$800	$900	$1,000
Alabama	(91.0)	(51.9)	(30.4)	28.1	71.9	93.1	123.2
Alaska	(3.9)	(4.1)	(4.4)	(9.7)	(14.0)	(12.4)	(9.3)
Arizona	2.7	1.6	(43.8)	(54.4)	(15.9)	46.9	125.4
Arkansas	(31.1)	1.7	10.0	44.5	73.4	89.8	104.0
California	1.7	(32.7)	(204.1)	(279.5)	(350.8)	(348.5)	(413.6)
Colorado	(19.6)	(45.1)	(121.4)	(155.8)	(170.0)	(166.5)	(147.2)
Connecticut	0.1	13.5	7.9	6.2	9.6	20.3	19.3
Delaware	1.7	1.3	(1.3)	(6.0)	(11.9)	(6.3)	0.1
DC	(2.4)	(5.9)	(25.5)	(37.7)	(45.7)	(52.5)	(52.3)
Florida	(80.7)	(129.3)	(255.3)	(266.3)	(193.3)	(122.6)	(19.8)
Georgia	(101.1)	(50.0)	(22.1)	31.7	110.4	154.2	217.9
Hawaii	2.6	2.7	(5.0)	(9.3)	(10.0)	(11.5)	(10.8)
Idaho	(17.4)	(17.9)	(7.2)	13.2	29.0	49.4	65.0
Illinois	(133.2)	(151.9)	(244.8)	(253.0)	(257.5)	(190.8)	(149.3)
Indiana	(92.2)	(79.3)	(79.5)	9.0	85.8	137.4	148.6
Iowa	(80.0)	(75.6)	(69.9)	(43.8)	(14.3)	6.4	13.6
Kansas	(49.8)	(36.1)	(31.9)	(2.4)	25.3	51.0	59.3
Kentucky	(54.7)	(30.1)	(7.7)	27.1	64.5	101.7	127.5
Louisiana	(114.0)	(149.8)	(214.0)	(173.5)	(127.5)	(80.1)	(53.2)
Maine	(3.6)	1.8	(5.8)	(3.3)	(5.9)	1.0	3.0
Maryland	(22.5)	(48.3)	(95.7)	(108.2)	(118.4)	(127.4)	(114.6)
Massachusetts	(10.0)	(0.3)	(10.2)	2.7	(8.5)	(2.2)	(45.7)
Michigan	(61.4)	(69.3)	(108.0)	(58.4)	(17.6)	25.8	15.9
Minnesota	(6.0)	(5.9)	(27.1)	(33.7)	(13.9)	18.7	25.3
Mississippi	(43.2)	(42.4)	(33.4)	(14.9)	11.7	31.4	41.9
Missouri	(80.7)	(69.0)	(70.1)	(34.8)	24.1	72.1	97.3
Montana	(23.2)	(26.3)	(27.6)	(21.9)	(9.7)	3.1	10.7
Nebraska	(29.6)	(21.5)	(28.2)	(27.3)	(0.6)	10.7	23.7
Nevada	(4.6)	0.7	(0.1)	22.7	56.1	93.0	124.0
New Hampshire	(4.4)	(0.1)	(2.7)	(1.6)	(7.9)	(7.7)	(0.9)
New Jersey	16.3	7.4	(25.0)	(67.5)	(102.9)	(91.2)	(98.9)
New Mexico	(18.1)	(12.8)	(29.2)	(16.6)	3.8	21.1	33.6
New York	(67.8)	(135.5)	(338.6)	(482.7)	(591.7)	(646.2)	(716.1)
North Carolina	(81.1)	(30.0)	(1.8)	92.7	199.7	275.1	351.1
North Dakota	(8.4)	(11.3)	(10.1)	(2.5)	12.7	23.3	29.9
Ohio	(165.8)	(144.8)	(178.7)	(40.2)	36.6	108.1	164.3
Oklahoma	(68.4)	(85.1)	(68.8)	(34.7)	1.1	37.5	54.1
Oregon	(38.0)	(56.1)	(113.3)	(159.0)	(150.8)	(109.3)	(52.2)
Pennsylvania	(175.1)	(219.2)	(280.6)	(204.8)	(123.4)	(38.7)	20.3
Rhode Island	5.2	3.9	(4.9)	(13.0)	(14.1)	(2.1)	(2.5)
South Carolina	(31.5)	(3.3)	8.0	40.7	69.4	107.5	132.8
South Dakota	(12.3)	(14.0)	(12.8)	(3.7)	6.6	12.6	18.5
Tennessee	(60.0)	(42.4)	(34.2)	(12.1)	29.2	94.1	142.9
Texas	(219.3)	(402.3)	(719.8)	(631.0)	(373.1)	(71.0)	186.9
Utah	(16.3)	(29.7)	(48.0)	(44.7)	(17.3)	4.7	28.0
Vermont	(3.3)	(5.0)	(8.8)	(9.4)	(8.6)	(6.2)	(4.7)
Virginia	(35.3)	(40.2)	(84.3)	(85.9)	(66.1)	(37.4)	4.8
Washington	(42.4)	(75.2)	(145.2)	(172.4)	(182.7)	(186.5)	(155.3)
West Virginia	(36.9)	(22.4)	(8.6)	13.2	25.9	29.6	33.2
Wisconsin	(61.0)	(68.9)	(113.5)	(44.9)	16.7	71.7	106.6
Wyoming	(6.8)	(10.1)	(14.4)	(8.4)	0.5	3.4	6.3

Notes: Lowest net change for each state is highlighted in grey. Includes vacant units but excludes no-cash renters and vacant units with zero rent. Rent cutoffs are based on real contract rents adjusted to constant 2017 dollars using the CPI-less shelter. Cumulative net change is the sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).

Source: JCHS tabulations of US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Figure 12: Most States Saw Greatest Relative Losses Over 1990-2017 at Rent Cutoff of $600 Per Month



Notes: Based on real contract rent adjusted by CPI-less shelter; includes vacant units but excludes no-cash renters and vacant units with zero rent. Change in share is calculated as the simple change from the 1990 Decennial Census to the 2017 ACS. Change in units is cumulative sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).
Source: JCHS tabulations of US Census Bureau, Decennial Census and American Community Surveys; *Integrated Public Use Microdata Series: Version 8.0*. Minneapolis: University of Minnesota, 2018.

Appendix B:

Discussion of Inflation-Adjustments for Rents

Before performing this analysis, we first inflation-adjusted all historical contract rents to constant 2017 dollars using the Consumer Price Index for all urban consumers: All items less shelter, or CPI-less shelter. This is a quality-adjusted benchmark of prices for a representative basket of consumer goods *excluding* housing. An alternative method would be to inflation-adjust the cost of rental housing over time using the Consumer Price Index for all urban consumers, or CPI-U, which includes housing costs. To check the sensitivity of our results against this alternative measure of inflation, we also performed our calculations using the CPI-U index.

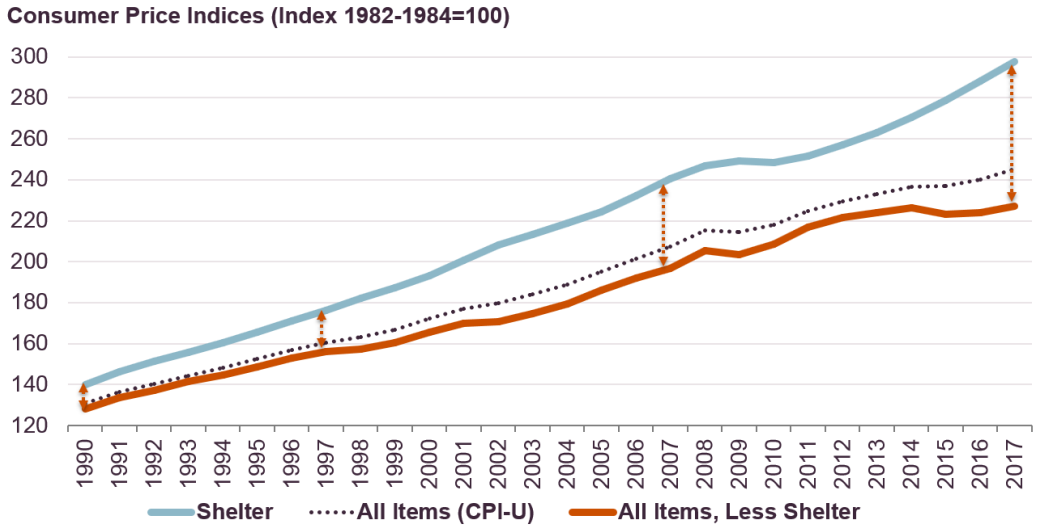
This choice of deflator matters because between 1990 and 2017—and particularly since the Great Recession—increases in the cost of housing have outpaced inflation in other goods **(Figure 13)**. Indeed, the growing cost of shelter, which rose 113 percent between 1990 and 2017, helped push up CPI-U for all items by 88 percent over the period, while CPI for all items excluding shelter rose just 77 percent. As a result, housing now accounts for a larger share, or nearly a third, of overall average consumer expenditures, compared to just 27 percent back in 1990.

When adjusting for inflation using the CPI-U index, losses of low-cost units between 1990 and 2017 were slightly lower than when adjusting for inflation using the CPI-less shelter index. At the $600 rent threshold, for example, inflating using CPI-U resulted in a loss of nearly 2.5 million low-cost units, compared to the 4.0 million unit loss when using CPI-U less shelter **(Table 7)**. Meanwhile the share of low-rent units declines significantly regardless of the choice of rent cutoff or inflation adjustor **(Table 8).**[11] Again, the difference

[11] The decline in the number and share of rental units by state using the alternative measure of inflation is also shown in **Table 9**. Even when using the CPI-U for all items to adjust rent for inflation, the number of units renting for under $600 increased in only 12 states. Net increases in low-rent units were more common at higher rent thresholds, yet the share of low-rent units overwhelmingly declines in all states regardless of the choice of deflator or rent threshold chosen.

between these two inflation-adjustment approaches relates to how they deal with constant quality increases in the price of housing, which outpaced inflation in other goods during this period. Adjusting for inflation with the CPI-less shelter index treats the disproportionate increase in housing costs as a contributor to the loss of low-cost units, excluding it from the inflation adjustments applied to the data. Alternatively, adjusting for inflation with the CPI-U for all items index would treat the disproportionate increase in housing costs as a component of general inflation, including it in the inflation adjustments applied to the data. The sensitivity of the estimates to this choice is shown in **Tables 7** and **8.**

Figure 13: Rising Housing Costs Are Outpacing Inflation in Other Goods & Services



Source: US Bureau of Labor Statistics.

Appendix C: Exploring the Impact of Using a Different Inflation Adjustor, CPI-U, on our Estimates of Low-Cost Stock Loss

Table 6: Change in Number of Rental Units by Rent Level, and Inflation Adjustor (Millions of units)

Inflation Adjustor	CPI-Less Shelter									CPI-U									n/a
Contract Rent Cutoff	Less than							$800 or More	$1,000 or More	Less than							$800 or More	$1,000 or More	All Units
	$400	$500	$600	$700	$800	$900	$1,000			$400	$500	$600	$700	$800	$900	$1,000			
Change, 1990-2000	-1.1	-0.4	-1.6	-0.3	0.1	1.4	1.5	2	0.6	-1.3	-0.7	-0.8	-0.5	0.5	1.3	2.0	1.6	0.1	2.1
Change, 2000-2017	-1.2	-2.1	-2.4	-3.0	-2.2	-1.9	-0.9	11	9.7	-1.0	-1.9	-1.7	-1.3	-1.3	-0.8	-0.6	10.1	9.4	8.8
Cumulative net change, 1990-2017	-2.3	-2.5	-4.0	-3.3	-2.1	-0.5	0.6	13	10.3	-2.3	-2.5	-2.5	-1.8	-0.8	0.5	1.4	11.7	9.5	10.9

Source: US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Notes: Includes vacant units but excludes no-cash renters and vacant units with zero rent. Cutoffs are based on real contract rents. Cumulative net change is the sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).

Table 7: Share of All Rental Units by Rent Level, and Inflation Adjustor (%)

Inflation Adjustor	CPI-Less Shelter									CPI-U									n/a
Contract Rent Cutoff	Less than							$800 or More	$1,000 or More	Less than							$800 or More	$1,000 or More	All Units
	$400	$500	$600	$700	$800	$900	$1,000			$400	$500	$600	$700	$800	$900	$1,000			
1990 Census	21	30	46	56	65	72	78	35	22	21	30	41	51	61	69	76	39	24	100
2017 ACS	10	16	25	34	44	52	60	56	40	10	16	25	34	44	52	60	56	40	100
Change in share, 1990-2017	-11	-14	-21	-22	-21	-20	-18	21	18	-11	-14	-16	-17	-18	-17	-16	18	16	n/a

Source: US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Notes: Includes vacant units but excludes no-cash renters and vacant units with zero rent. Cutoffs are based on real contract rents. Change in share is calculated here as the straight change from 1990 to 2017 rather than cumulative changes within surveys.

Table 8: Change in Number and Share of Low-Cost Rentals by State: 1990-2017 (CPI-U Adjusted)

	Rental units < $600				Rental units < $800				Rental units < $1,000			
	Change, 1990-2017	Share, 1990 (%)	Share, 2017 (%)	Change in share, 1990-17	Change, 1990-2017	Share, 1990 (%)	Share, 2017 (%)	Change in share, 1990-17	Change, 1990-2017	Share, 1990 (%)	Share, 2017 (%)	Change in share, 1990-17
US	-2,465,539	41	25	-16	-799,622	61	44	-18	1,435,319	76	60	-16
Alabama	-8,328	77	53	-23	82,146	91	76	-15	125,610	97	88	-9
Alaska	-3,282	17	14	-4	-11,710	35	23	-12	-7,014	55	43	-13
Arizona	-5,918	36	20	-16	25,456	66	42	-25	136,065	84	65	-18
Arkansas	22,893	80	59	-21	73,988	93	83	-10	105,481	97	93	-5
California	-113,610	14	9	-5	-197,372	27	17	-10	-229,612	44	29	-15
Colorado	-89,513	42	12	-30	-145,606	68	24	-44	-130,384	84	40	-44
Connecticut	15,228	20	17	-3	31,061	34	31	-3	37,584	54	53	-1
Delaware	798	28	17	-12	-4,547	50	34	-17	3,285	78	59	-18
DC	-16,924	27	12	-14	-39,792	47	19	-29	-47,963	64	29	-35
Florida	-155,515	31	14	-17	-98,251	56	31	-25	48,199	76	51	-25
Georgia	12,765	47	30	-17	143,672	68	51	-17	234,150	85	70	-15
Hawaii	-3,081	17	10	-8	-7,902	28	14	-14	-7,739	41	25	-16
Idaho	-3,865	71	37	-34	32,820	89	63	-26	64,805	95	82	-13
Illinois	-174,358	42	26	-17	-184,675	63	45	-19	-104,736	79	64	-15
Indiana	-31,126	62	42	-20	104,210	85	74	-11	156,815	95	88	-6
Iowa	-51,237	72	45	-27	-6,839	90	74	-16	16,956	96	87	-9
Kansas	-17,625	63	44	-20	36,053	84	71	-13	65,884	93	85	-7
Kentucky	13,570	74	54	-20	70,999	91	77	-14	129,679	96	89	-7
Louisiana	-187,196	72	37	-36	-120,943	90	64	-26	-49,354	96	81	-15
Maine	-114	43	36	-7	42	68	59	-8	6,725	84	77	-6
Maryland	-69,737	26	12	-14	-97,229	43	22	-20	-93,263	59	36	-23
Massachusetts	6,867	26	20	-6	20,477	38	31	-8	-13,417	55	44	-10
Michigan	-52,924	47	34	-13	38,129	70	63	-7	38,728	86	82	-5
Minnesota	-7,384	38	25	-13	9,756	60	43	-17	48,165	78	63	-15
Mississippi	-26,520	80	53	-27	14,333	93	77	-16	42,429	97	90	-7
Missouri	-37,780	63	44	-18	38,842	84	72	-12	103,216	93	87	-7
Montana	-24,405	75	38	-37	-9,620	93	64	-29	10,996	98	80	-17
Nebraska	-12,977	64	40	-24	2,879	86	68	-18	25,784	94	83	-11
Nevada	13,886	20	12	-8	70,374	44	34	-10	133,885	70	58	-12
New	377	20	14	-6	-770	39	30	-9	4,378	61	54	-7
New Jersey	-4,537	18	11	-7	-66,452	32	19	-13	-53,805	51	36	-16
New Mexico	-16,774	56	35	-21	7,213	80	61	-18	34,981	91	78	-12
New York	-210,400	30	19	-11	-467,667	50	31	-19	-637,585	68	43	-25
North Carolina	34,694	62	37	-25	218,572	82	60	-22	359,462	93	76	-16
North Dakota	-4,512	71	34	-36	14,250	91	62	-29	30,411	97	80	-17
Ohio	-93,300	60	44	-16	85,510	83	73	-9	181,298	93	87	-6
Oklahoma	-49,547	73	46	-27	7,019	90	74	-16	56,363	96	88	-8
Oregon	-83,467	44	16	-27	-129,433	74	34	-39	-46,325	88	56	-32
Pennsylvania	-225,809	52	32	-20	-57,824	72	57	-15	52,503	85	74	-11
Rhode Island	616	31	26	-5	-7,526	54	45	-9	2,940	74	70	-4
South Carolina	30,007	61	39	-23	82,480	83	62	-20	136,687	92	77	-14
South Dakota	-8,834	74	44	-30	8,157	91	72	-19	19,198	97	86	-11
Tennessee	2,969	65	41	-24	42,570	86	64	-22	149,034	95	80	-15
Texas	-540,602	51	20	-32	-277,058	77	44	-33	218,156	90	65	-24
Utah	-33,735	59	19	-39	-13,078	83	44	-39	29,910	92	65	-27
Vermont	-5,126	36	23	-13	-5,989	63	44	-19	-2,903	83	66	-16
Virginia	-55,970	35	21	-15	-42,614	53	34	-18	24,001	67	49	-19
Washington	-111,339	36	14	-22	-140,347	61	27	-33	-131,403	79	43	-36
West Virginia	-1,903	84	61	-23	27,072	95	86	-9	33,506	98	94	-5
Wisconsin	-71,688	50	32	-18	43,470	76	64	-12	117,149	90	83	-6
Wyoming	-9,247	72	33	-39	2,072	90	64	-26	6,404	96	77	-19

Source: US Census Bureau Decennial Census, American Community Surveys, IPUMS.

Notes: Based on real contract rent adjusted by CPI-U; includes vacant units but excludes no-cash renters and vacant units with zero rent. Change in share is calculated as the simple change from the 1990 Decennial Census to the 2017 ACS. Change in units is cumulative sum of within-survey changes (Decennial Census 1990 to 2000, and ACS 2000 to 2017).