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A Rising Tide Lifts All Homes? Housing Consumption Trends for Low-Income Households Since the 1980s

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Erik Hembre

Federal Reserve Bank of Minneapolis

J. Michael Collins

University of Wisconsin-Madison

Samuel Wylde

University of Illinois-Chicago

Keywords: Consumption Inequality, Housing Quality, Safety Net, Poverty

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Erik Hembre
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J. Michael Collins
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Abstract

This study analyzes patterns of housing consumption and expenditures among low-income households since 1985. For households in the bottom income quintile, real monthly housing expenditures have risen from \$623 to \$1,102. However, these increased expenditures partially reflect housing quantity improvements, including more square footage, more rooms, and larger lot sizes. The data also show a marked improvement in housing quality, such as fewer sagging roofs, broken appliances, rodents, and peeling paint. The housing quality for low-income households improved across 35 indicators. These quality improvements equate to between a 34 to 43 percent increase in housing consumption and suggest that a typical low-income household in 2021 experiences housing quality equivalent to the average national household in 1985. Though relative housing consumption has remained similar, this “rising tide” of housing may have additional benefits for the health and well-being of families and children living in better housing.

JEL Classification Codes: I31, I32, R21.

Keywords: Consumption Inequality, Housing Quality, Safety Net, Poverty

1 Introduction

The study of inequality has multiple dimensions, including changes in the distribution of income, wealth, consumption, and time use (Fisher et al., 2022; Han et al., 2020). For policymakers, a driving concern is often reducing relative material hardships, including food, health care, and housing problems—issues that are most directly related to consumption inequality (Meyer and Sullivan, 2023; Armstrong et al., 2022; Haveman et al., 2015). An important question for policy is the extent to which public social safety net programs have addressed consumption inequality for low-income households, especially over longer periods of time.

While some research has found improving living standards for lower-income households in recent decades (Meyer and Sullivan, 2023; Han et al., 2020; Haveman et al., 2015; Meyer and Sullivan, 2008), other work has found evidence of greater hardship and worsening material well-being (Shaefer and Edin, 2013; Drew, 2015; Iceland et al., 2021). Often absent from this debate is a detailed evaluation of the consumption that low-income households spend half their income on: housing. Meyer and Sullivan (2023) uses rents and rental equivalent for owner-occupied housing as a proxy for housing consumption, and other studies use broad measures such as homeownership or bedrooms per person, which offer only a coarse measure of housing conditions (Rodems and Shaefer, 2020; Ziliak, 2021). This study investigates how housing consumption—using detailed measures of both quality and quantity—changed between 1985 and 2021 for low-income households, especially among social safety net recipients.

Housing is a necessity and, as the largest household expenditure, an important, if not *the* most important, determinant of household well-being (Currie, 2009; Leventhal and Newman, 2010). Historically, housing conditions have proven to be one of the most important indicators of the health and well-being of low-income families (Thomson et al., 2009). Improved housing conditions can benefit the health and human capital of children, adults, and seniors (Jacobs et al., 2009; Meltzer, 2016; Gibson et al., 2011; Lopoo and

London, 2016; Goux and Maurin, 2005), but high housing expenses are also associated with hardships including food insufficiency and housing instability (Shamsuddin and Campbell, 2022; Beverly, 2001; Kirkpatrick, 2011; Desmond, 2015).

Housing expenditures have grown considerably in recent years as housing prices have outpaced inflation and income growth. House price increases mean that households have to allocate more of their budget to pay for housing, but does this increased expenditure also provide higher living standards? Increased housing expenditures could reflect improvements in consumption relative to prior generations. The alternative is that households have to pay more to live in worse quality and more cramped homes. In this case, perhaps due to stagnant wages and restrictions on housing supply, each generation of households pays relatively more but does not experience improvements in their level of their consumption.

In recent years, research on household consumption has proliferated, in part because of greater access to retail scanner and administrative microdata, although these data are typically better indicators of expenditures than consumption, especially controlling for the relative quality of goods and services (Landais and Spinnewijn, 2020). Quantifying and evaluating housing consumption is difficult due to the diverse bundle of goods and services housing provides. Home values and rental prices differ greatly depending on basic characteristics such as the number of bedrooms and bathrooms, square footage, lot size, and location. However, houses also vary across dozens of additional detailed characteristics including exterior and interior building materials, appliances, flooring, foundations, electrical and plumbing characteristics, windows, and insulation among a myriad of other features. These quality characteristics contribute to housing price variation yet are rarely incorporated into analyses of living standards. For example, cheaper or less durable materials may result in higher maintenance or energy costs, reducing the value of housing services (Wilhelmsson, 2008). Though typically not measured or observed in survey data, these housing quality components also could have implications

for the material well-being of low-income families. The presence of asbestos insulation or lead paint, for example, can have negative health consequences and greatly reduce the consumption value of housing (Billings and Schnepel, 2017).

This study uses the American Housing Survey (AHS) to investigate trends in housing quality, quantity, and expenditures among low-income households from 1985 through 2021. The AHS is a longitudinal study that tracks housing units over time. Importantly, the AHS provides a wide range of consistently measured housing quality characteristics along with detailed housing quantity and expenditure data. Building on Eggers and Moumen (2013), we utilize 35 measures of poor housing quality and 11 measures of housing quantity to assess housing consumption trends. To translate these quality and quantity changes into their consumption value, we estimate a hedonic pricing model based on the 1985 housing market and then use changes in our observable quantity and quality measures to project housing consumption changes each survey year.

We find that the absolute level of housing quality for low-income households has improved substantially since 1985. The general rising tide of housing quality has lifted the quality of housing among the poorest households. The average low-income household in 2021 consumes housing that is equivalent to the 60th percentile in the 1985 housing quality distribution—an improvement of 25 percentiles from the average 1985 low-income household. Rates of low-income households in poor quality housing declined from 33 percent in 1985 to 12 percent in 2021. Since 1985, every one of our 35 poor quality measures has declined by 55 percent on average.

Housing quantity has also significantly improved since 1985 for low-income households, though not by as much as housing quality. Across each of 11 dimensions, housing quantity has increased. The average square footage per person increased by 9 percent from 1985 to 2021 while total rooms per person increased by 0.29. Rates of more detailed housing quantity features, such as having a garage, porch or deck, or a fireplace have nearly doubled.

Using our hedonic house pricing model, we find that these quality and quantity improvements translate to a 45 percent increase in housing consumption among low-income households by 2021, with roughly an equal share of this gain attributed to the quality and quantity variables. Though this gain is less than the rise in monthly housing expenditures, it does mark a substantial increase in material well-being, as measured by housing conditions among low-income households.

These findings are consistent with prior studies showing that housing quality has improved over time (Holupka, 2011; Newman, 2014; Meyer and Sullivan, 2008), alongside housing expenditure increases (Reichenberger, 2012). This study offers new evidence on housing expenditures and consumption for an important focal population of economically vulnerable households.

This work has direct implications for welfare policy. Numerous programs aim to reduce material hardship for low-income families. However, over the past four decades, benefit levels have become less generous with more restrictions on eligibility (Ziliak, 2007; Hembre, 2020). Understanding the consumption patterns of program participants over time provides policymakers evidence on the adequacy of program benefits and standard of living. To be clear, considerable research has documented income and consumption inequality over time (Saez and Zucman, 2020; Blundell et al., 2018; Saez and Zucman, 2016; Attanasio and Pistaferri, 2016; Piketty and Saez, 2003), but relatively few studies examine trends in absolute living standards. Because of the large and increasing share of household budgets spent on housing, combined with less generous safety net programs, policymakers may be particularly concerned that living standards among safety net recipients are declining in absolute terms. As housing consumption increases, households may reduce spending on goods and services that influence human capital, such as food or health care. However, without capturing housing quality improvements, conventional inflation-based housing price index measures may understate changes in well-being over time.

2 Data and Methodology

To understand the housing experiences of low-income households we utilize the national sample of the American Housing Survey (AHS) from 1985 to 2021. The AHS is sponsored by Department of Housing and Urban Development and conducted by the Census Bureau. The national AHS is a biennial panel of housing units (as opposed to households) begun in 1973 to collect detailed data on the physical condition of approximately 60,000 homes and neighborhoods, the costs of financing and maintaining homes, and resident characteristics.¹ AHS interviewers return to the same housing units every other year, allowing us to analyze changes over time even as residents turn over. The Census periodically adds units to the survey to maintain a sample that represents the U.S. residential housing stock. We observe changes in the housing stock as older units are demolished or renovated, and new units are added. We are not treating the AHS as a panel, per se, but rather observing the units occupied by low-income households in each period dynamically over time.

The AHS provides two important advantages for tracking historical housing consumption. The first is that the AHS includes a comprehensive set of housing quantity and quality questions (Newman and Garboden, 2013). In addition to the more commonly fielded survey questions such as total number rooms and bathrooms the AHS includes detailed housing characteristics across a wide range of housing dimensions such as square footage, lot size, roof condition, presence of cracks in the walls or floors, plumbing and electrical issues, whether the toilet(s) or other appliances work, and a self-reported rating of neighborhood quality.

The second advantage of these data is the historical availability: The AHS is one of a limited number of nationally representative surveys that have been fielded continuously over the past 40 years. While variable availability and definitions change sometimes between surveys, including an important redesign in 1997 and a resampling and redesign

¹Many housing quality variables were limited prior to 1985, so we focus on the 1985 to present period.

in 2015, the AHS has remained relatively consistent since 1985, allowing us to create a consistent housing quality index across survey waves.

To analyze housing trends among low-income households, we separately consider households as either social safety net recipients or those in the bottom income quintile each wave. Social safety net recipients are those who report receiving benefits from the Supplemental Nutrition Assistance Program (SNAP), Temporary Assistance for Needy Families (TANF), or Supplemental Security Income (SSI). While presented as a single group of social safety net recipients in the analysis, we did separately consider trends for each program and found broadly similar results. Participation in safety net programs has grown over this time. In 1985, 9.8 percent of households in the AHS reported receiving benefits from one of these programs and, by 2021, 12.8 percent of households received benefits. However, it is important to note that the composition of program participants is also changing over time (Moffitt, 2015). While this population is of keen interest for contemporary welfare policy, we expect the trends for the bottom quintile and safety net recipients to be similar over time. (Further details on these programs can be found in Appendix A.1.)

In addition to housing quantity and quality variables, the AHS provides information on housing expenditures, home values, and household characteristics. To compare housing expenditures over time we adjust all dollar values to 2021 values using the Personal Consumption Expenditure (PCE) price index. To analyze housing expenditures, we measure monthly total housing expenditures that include mortgage payments, contract rent, property taxes, property insurance, HOA payments, utilities, routine maintenance costs, and mobile home fees or land rent. Housing expenditures exclude any federally subsidized rental contributions.

To measure housing consumption changes for low-income households we separately analyze housing quality and quantity variables. For measures of housing quantity we consider square footage, the number of total rooms, lot size (for single-family units),

bedrooms, bathrooms, dining rooms, presence of a garage, porch, basement, and a fireplace. We adjust for household size in housing quantity variables using a scaling factor of $\frac{1}{(adults+0.7*children)^{0.7}}$ to account for economics of scale in housing consumption. For parity, we use the same formula to adjust household income on a per-person basis when determining income quintiles.

2.1 Poor Housing Quality

While housing quality is often difficult to observe, the AHS contains a rich set of housing quality characteristics, covering exterior features, interior features, appliances, plumbing/electrical, structural features, and neighborhood characteristics. The AHS also includes a summary measure of adequacy of housing quality (ZADEQ), but as discussed by Eggers and Moumen (2013) this measure has limited usefulness because it only includes three levels (adequate, moderately inadequate, and severely inadequate) and less than 2 percent of homes receive the “severely inadequate” designation. Prior research has worked to improve upon the ZADEQ quality measure. Eggers and Moumen (2013) build a poor-quality index based on a set of 42 quality measures in the AHS, assigning subjective weights to these components when aggregating to a single index.

To create a consistent index, we restrict our analysis to a set of 35 variables that are available and similarly defined throughout the 1985-2021 period. The quality variable set includes: presence of rodents, a floor hole, no plugs, no public sewer, peeling paint, fuses blown, a wall crack, no washer, no dryer, inside water leaks, outside water leaks, no dishwasher, toilet breakdown, number of fuse problems, cold house, without running water, unvented heat, no refrigerator, number of water stoppages, number of toilet breakdowns, no hot water, roof problems, heat provided by cooking stove, cracks in foundation, broken windows, sloping walls, walls missing bricks or siding, no tub, sewage broken, number of broken sewage problems, no air conditioning, no sink, poor neighborhood indicator, trash in neighborhood, bars on windows or neighbor windows.

For each variable, we create an indicator variable equal to 1 if a negative quality attribute is reported and then standardize variables for aggregation. When not reported, missing values are replaced by the most recent observation in the unit. Technical details of the Poor Quality Index (PQI) we use for this analysis are in the Appendix A.2.

To summarize poor housing quality, we report the average PQI values. The average PQI value is zero and has a standard deviation of about 10. To capture poor housing quality changes across the full housing distribution we create two indicator variables to demarcate especially good- or poor-quality housing. The “Good Quality” indicator equals 1 if none of the 35 quality measures are equal to 1. “Good Quality” housing equals 18 percent of the full sample. The “Poor Quality” indicator equals 1 if the weighted housing quality scale scores above the 90th percentile.

To assess the housing consumption and expenditures of low-income households we compare outcomes in the early part of our sample (1985–1989) to the later part of our sample (2017–2021) after adjusting for changes to demographic characteristics, such as age and marital status, that can affect housing outcomes. To account for these observable characteristic differences, we regress housing outcomes on demographic characteristics and time period-by-group indicators:

$$Y_i = \beta_0 + \beta_1 X_{it} + \beta_2 LATE + \beta_3 LowInc + \beta_4 (LATE \times LowInc) + \epsilon_{it} \quad (1)$$

In this equation, Y_i is the outcome of interest (such as unit size, PQI, or housing expenditures), ϵ_{it} is a random error term, and X_{it} is a set of demographic variables including age, sex, marital status, number of people, number of kids, and indicators for presence of non-relatives, single-persons, and multiple families. The variable $LATE$ is a dummy variable for the later period ($t \in \{2017, 2019, 2021\}$) as opposed to the early period ($t \in \{1985, 1987, 1989\}$) and β_2 represents the change in outcome Y for higher income households in the late period. The variable $LowInc$ is a binary variable equal to 1 either

for social safety net recipients or the lowest income quintile, depending on specification. β_3 reveals the differential in outcome Y for *LowInc* households relative to the excluded group of higher income households in the early period. The coefficient β_4 reveals the marginal change in outcome Y for *LowInc* in the late period relative to higher income households in the late period after accounting for demographic changes. Summing β_2 and β_4 represents the absolute change in outcome Y for low-income households between 1985–1989 and 2017–2021.

3 Results

We begin our analysis measuring housing quality changes for our low-income groups over the years 1985-2021. We follow this with an analysis of housing quantity changes and then housing expenditure changes. Table 1 reports separate regression estimates from Equation (1) for safety net recipients and for the bottom income quintile. Regression outcomes include the PQI, the Poor Quality indicator, square footage per person, total rooms per person, housing budget share, and housing expenditures. The estimates for the rows labeled “SocSaf” and “Bottom20” are based on an indicator for a household receiving SNAP, SSI or TANF benefits, or being in the bottom quintile of incomes, respectively. The estimates labeled “Late” are based on an indicator for the 2017–2021 period. The interaction term is the relative change for each group in the “Late” period, relative to the whole population and prior years. The row “Absolute Change” is the sum for the change for each subgroup in the later period. We have divided the results into discussions of housing quality, quantity, and expenses, leading each section with visuals followed by a discussion of the regression estimates in Table 1.

3.1 Housing Quality

Rates of poor quality housing among transfer program recipients have declined dramatically since 1985. As shown in the left panel of Figure 1 (Poor Quality), in 1985,

39 percent of social safety net recipients and 30 percent of households in the bottom income quintile lived in poor quality housing. By 2021, only 16 and 12 percent lived in poor quality housing.

The housing quality improvements over this 36-year period are economically meaningful. To better understand these improvements, Figure 2 displays the 1985 national PQI distribution. The solid-colored lines reflect the average 1985 PQI values for safety net and bottom quintile households (at the 87th and 82nd national percentiles). The solid black line is the 1985 national average poor quality housing, at the 66th percentile. The dotted vertical lines reflect the 2021 average PQI values for low-income households placed within the 1985 housing quality distribution. By 2021, poor housing quality decreased by nearly a standard deviation for both groups to the 65th percentile for social safety net recipients and to the 56th percentile for the bottom income quintile.

Figure 2 shows that the home quality of current low-income households is similar to the average national home quality in 1985. While the absolute housing quality gains have been large, the relative gains for low-income households are considerably smaller with each group moving up 5 percentiles in the 2021 housing quality distribution to the 82nd and 77th percentiles.

Improvements in housing quality among low-income households are broadly observed across our 35 poor quality measures. The top panel in Figure 3 displays the changes in the occurrence of each poor quality measure from the 1985-1989 period to the 2017-2021 period. Marks below the dotted line (1 on the y-axis) indicate a reduction of the poor quality measure. All 35 components decreased over this three-decade stretch for both safety net recipients and bottom quintile households. On average, each measure declined by 50 percent. Poor quality measures with the largest declines include having no kitchen sink, no hot water, no private bathtub or shower, and having rodents present. The largest declines are for interior poor quality features, dropping by 58 percent on average. Neighborhood quality variables had smaller reductions, averaging a 40 percent

decrease for these measures. The large improvements in housing quality for low-income households are not confined to the worst quality housing but observed throughout the quality distribution.

Column (1) of Table 1 shows that, after adjusting for demographic changes, the relative PQI improved by around 5 units for safety net recipients and just under 4 units for the bottom income quintiles of income. The absolute change in PQI for social safety net recipients in the late period for the PQI was -9.55, nearly a full standard deviation. The absolute change in PQI for the bottom quintile of income group was just under -8 units.

Column (2) of Table 1 further shows that adjusting for changes in recipient demographics using PQI, large long-term decline in poor quality housing observed in Figure 1 holds. The rate of homes in the lowest 10 percent of the PQI distribution relative to the overall population declined by 14 points for safety net recipients and nearly 10 points for the bottom income quintile. The absolute rate of people living in poor quality units declined by 16 points for safety net recipients and 16 points for the lowest income quintile by the late period. These results provide strong evidence that since 1985 there has been a widespread, steady, and sizeable reduction in poor quality housing among low-income households.

3.2 Housing Quantity

We next examine housing quantity trends for low-income households. The middle panel of Figure 1 (Square Footage) shows that square footage per person has increased by 70 square feet per person for safety net recipients and by 114 square feet per person for bottom income quintile households since 1985–1989, relative to an initial average of 772 square feet per person. The increase in housing quantity has been broadly parallel across groups and occurred primarily before the Great Recession housing bust and remained stagnant since.

Column (3) of Table 1, including demographic controls, shows a relative increase in housing unit square footage per person in later periods, although less so for safety net recipients and bottom income quintile households. Nevertheless, these groups experienced an absolute change in square footage of nearly 70 ft² per period. Column (4) shows that the relative number of rooms per person has increased by 0.31 and 0.29 overall, relative to an average of 2.99 rooms per person. In absolute terms, rooms per person for both groups increased by about a quarter of a room (0.26 and 0.28, respectively).

The bottom panel in Figure 3 considers a comprehensive set of 11 housing quantity variables and displays the rate of occurrence in the recent period (2017-2021) relative to the early period (1985-1989). The horizontal dotted line at a value of 1 corresponds to a measure whose value did not change during this period. All 11 components, for both safety net recipients and bottom income quintile households, increased since 1985-1989. These improvements include, on average, a 13 percentage point increase in having a basement, a 17 percentage point increase in central heat, 30 percent and 8 percent more bathrooms and bedrooms, 10 percent greater lot sizes, and a 31 percentage point increase in having a porch or deck. The largest increases in rates of occurrence are for dining rooms, a fireplace, and a garage, all of which rose by greater than 60 percent.

Similar to poor housing quality changes, these housing quantity improvements are observed throughout the quantity distribution of low-income households. In contrast to the large reductions in poor housing quality, however, we observe more modest increases in housing quantity across our set of quantity measures for low-income households since 1985 than we observe for quality improvements.

3.3 Hedonic Pricing Model

While the previous sections revealed a large decline in poor quality housing combined with a modest increase in housing quantity since 1985 for low-income households, quantifying the value of these gains can be challenging. Housing is sold as a bundled

good with all the quality and quantity measures included here plus numerous other unobserved characteristics. To quantify the value of improvements to housing consumption, we estimate a hedonic house pricing model to uncover the relationship between observed home attributes and value. We then use these estimates to predict changes in house prices or rents based on changes in these observed characteristics. Regardless of which housing type (owned or rented) is used to estimate the hedonic model, prices or rents are then predicted for all housing units. Further details of this approach are provided in the Appendix A.3.

Figure 4 displays estimates of housing consumption changes separately for home values and rental values for both safety net recipients and bottom income quintile households. The figure also deconstructs how much of these changes is attributed to quality improvements and quantity improvements by comparing the distance between the dotted black line and the blue line for quantity changes and the distance between the blue and the red lines for quality improvements. The results reveal that housing consumption has increased substantially between 1985 and 2021. Based on predicted home values, housing consumption has risen for safety net recipients and bottom quintile households. Using rental values instead of home values, housing consumption has risen by about one-third. Notably, housing quality and quantity improvements accounted for a similar share of the housing consumption increase when utilizing the house price estimation, however quantity improvements account for a greater share when utilizing rents. Quality improvements account for 53 percent and 33 percent of the total consumption increases for the rental and owner models for safety net recipients while quantity improvements account for 51 percent and 29 percent. These gains to housing consumption were fairly smooth and constant over the 36 year period. Further, we do not observe a distinct relationship between housing consumption and the business cycle or the housing boom-and-bust cycles during this time period.

3.4 Housing Expenditures

The right panel Figure 1 (housing expenses) displays average housing expenditures over time for safety net recipient and bottom income quintile households. Housing expenses increased substantially for these groups over the study period. Average real housing expenditures for social safety net recipients and bottom income quintile increased from \$603 and \$605 in 1985 to \$1,034 and \$1,045 in 2021.

Table 1, Columns (5-6) show the estimate for housing budget shares and expenditures for the social safety net and the bottom quintile samples. The budget shares are higher across the sample overall in the later periods, and both social safety net recipients and bottom income quintile households pay a larger share of their income for housing in general, as shown in Column (5). Bottom income quintile households in later periods experienced an approximately 2.8 percentage point budget share increase for housing relative to the entire sample, and in absolute terms are spending an additional 6 percentage points of income on housing. We do not see this level of absolute changes for the social safety net recipients sample. Since more benefits were tied to work and the mix of who received benefits changed, this may reflect rising incomes among social safety net recipients. Column (6) displays real housing expenditures, which are much higher in the later periods of the data relative to prior periods (about \$640 relative to an overall mean of \$1,297). Relative housing costs for the social safety net recipients and lowest income quintile groups increased at a lower rate than for the population overall, yet the absolute change in real housing expenditures for both groups increased by around \$430 per month—a large increase relative to the mean or standard deviation.

We can offer several insights into these expenditure patterns that may help position these findings. First, both SSI and SNAP benefits are indexed using the consumer price index for urban wage earners (CPI-U), and this index increased at a faster rate than the PCE index that we use to adjust housing expenditures over time. This mechanically would reduce budget shares for social safety net recipients as the numerator is adjusted

at a lower rate than the denominator.

Second, since 1985, the homeownership rate in our sample increased from 31 percent to 39 percent by 2021 for the lowest quintile income group. Renters spend 30 percent less than homeowners on housing costs on average across our panel. This implies that the transition toward more homeownership among low-income populations is also partially explained by housing expense increases.

Third, those in the bottom income quintile had no relative change in the income distribution over time by construction; their real income per person rose by just 7.8 percent from \$7,636 to \$8,234 from 1986 to 2021. In 1985, the average social safety net recipient was at the 14th percentile in the 1985 income distribution but rose to the 25th percentile in the 2021 income distribution; real incomes nearly doubled for this group. These income gains are not due to more generous benefit levels, but instead a combination of increased earnings and these programs serving different populations over time (for example, fewer very-low income TANF beneficiaries and more moderately low income SNAP beneficiaries). National median incomes per person among social safety net recipient rose from \$28,318 to \$38,211, a 35 percent increase (four times the bottom quintile group overall). Furthermore, AHS income reporting does not fully account for the earned income tax credit and child tax credit. Both these programs expanded during the study period for low-income earners with children (Splinter, 2020).

Finally, we might suspect that housing subsidies have distorted housing expenses over this period. It is true that subsidized households pay considerably less for housing. In 1985 tenants with a subsidy paid 38 percent less in housing costs; by 2021 they paid 52 percent less than nonsubsidized households. However, our overall findings are not likely due to changes in subsidized housing programs. The rates of housing assistance remained similar for low-income households at 14 percent throughout this period.

Most of the overall expenditure increase is attributable to people residing in larger and more expensive homes. For example, while real housing expenditures for low-income

homeowners rose by 82 percent, their real home values roses more than tripled. The pattern for rental units is similar. Average rents for low-income households increased by 72 percent over this time.

4 Discussion

Based on the AHS data from 1985 to 2021, both housing quantity and quality have risen substantially among low-income households. All 35 poor housing quality indicators improved for both safety net recipients and bottom quintile households over this time period. Housing quantity improvements were similarly broad though gains were smaller in magnitude. For instance, square footage per person increased by about 10 percent to 15 percent and rooms per person increased by between a quarter and a third of a room.

Using a hedonic model to price a range of housing characteristics, we find that average housing consumption for low-income households also increased by between 34 percent and 43 percent. This reflects a sizeable increase in material well-being for these households due to increased incomes and improvements in housing attributes not captured by standard inflation adjustment measures. The absolute size of housing consumption gains suggests that the average low-income household in 2021 lives in a home of similar quality to that of the national average household in 1985.

Though housing is only one component of low-income households' material well-being, it is the largest and perhaps the most important consumption good. In conjunction with the decreasing prices of other household necessities such as clothing and other consumer goods since 1985, the findings presented here show that housing consumption of low-income households increased substantially over the same period.² This suggests a general improvement in the living standards of these households.

Future research can help to disentangle the causes of the housing consumption

²From January 1985 through December 2023, the Bureau of Labor Statistics Current Price Index for Urban Consumers of all items has risen by 292 percent while the price index for apparel has only risen by 25 percent.

increase we observe. Policies such as local housing regulations and code enforcement may have pushed up the quality and size of housing units at the same time that consumer preferences have shifted to expect higher quality units. As the newly built housing stock ages, older units have filtered down to become affordable but retain higher quality features. The relative price changes we observe could also suggest a general rise in living standards over time for these households, which may also occur in other goods and services markets (for example, food: Christian and Rashad (2009)). Indeed, research on poverty and well-being has increasingly examined measures beyond income and wealth (for example, Aguiar and Bils (2015) and Collins and Urban (2020)). Quality and quantity measures are challenging to observe but may offer key insights for research and policy.

Policymakers may find these results encouraging, but it is important to view changes in housing consumption carefully. If greater housing quality comes at the expense of nonhousing hardships then the welfare enhancing aspects of better housing may be undermined. Since a portion of low-income people own their homes, there is the potential that mortgages, taxes, and other costs could place more low-income households at greater financial risk (Dynan, 2009). Indeed, prior studies show rising use of SNAP food benefits among people receiving SSI, for example (Schmidt et al., 2016; Trenkamp and Wiseman, 2007). If greater housing quality comes at the expense of hardships like food insecurity, the welfare enhancing aspects of better housing may be undermined. Further studies are needed to evaluate if the positive externalities of improved housing conditions are a net positive for social welfare.

It is important to note that while this study finds improvements in the absolute housing consumption levels, the relative housing consumption gains for low-income households were more limited. For policymakers, a key question becomes the value of more equality in housing conditions, rather than improvements in more severe measures of housing conditions. If the policy objective is to offset the added costs of housing

related to improvements in housing conditions, programs such as SSI, SNAP, and TANF could be better coordinated with housing subsidies to better protect poor households from rising costs.

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References

- Aguiar, M. and Bils, M. (2015). Has consumption inequality mirrored income inequality? *American Economic Review*, 105(9):2725–2756.
- Armstrong, G., Cho, C., Garner, T. I., Matsumoto, B., Munoz, J., and Schild, J. (2022). Building a consumption poverty measure: Initial results following recommendations of a federal interagency working group. *AEA Papers and Proceedings*, 112:335–39.
- Attanasio, O. P. and Pistaferri, L. (2016). Consumption inequality. *Journal of Economic Perspectives*, 30(2):3–28.
- Beverly, S. G. (2001). Material hardship in the United States: Evidence from the Survey of Income and Program Participation. *Social Work Research*, 25:143.
- Billings, S. B. and Schnepel, K. T. (2017). The value of a healthy home: Lead paint remediation and housing values. *Journal of Public Economics*, 153:69–81.
- Blundell, R., Joyce, R., Keiller, A. N., and Ziliak, J. P. (2018). Income inequality and the labour market in Britain and the US. *Journal of Public Economics*, 162:48–62.
- Center on Budget and Policy Priorities (2023). A quick guide to SNAP eligibility and benefits.
- Christian, T. and Rashad, I. (2009). Trends in us food prices, 1950–2007. *Economics & Human Biology*, 7(1):113–120.
- Collins, J. M. and Urban, C. (2020). Measuring financial well-being over the lifecycle. *The European Journal of Finance*, 26(4-5):341–359.
- Currie, J. (2009). Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development. *Journal of Economic Literature*, 47(1):87–122.

- Desmond, M. (2015). Eviction's fallout: Housing, hardship, and health. *Social Forces*, 94:295.
- Drew, J. A. R. (2015). Disability, poverty, and material hardship since the passage of the ADA. *Disability Studies Quarterly*, 35(3).
- Duggan, M., Kearney, M. S., and Rennane, S. (2015). The Supplemental Security Income program. In *Economics of Means-Tested Transfer Programs in the United States, Volume 2*, pages 1–58. University of Chicago Press.
- Dynan, K. E. (2009). Changing household financial opportunities and economic security. *Journal of Economic Perspectives*, 23(4):49–68.
- Eggers, F. J. and Moumen, F. (2013). American Housing Survey: A measure of (poor) housing quality. (*Washington, DC: US Department of Housing and Urban Development, Office of Policy Development and Research*).
- Fisher, J. D., Johnson, D. S., Smeeding, T. M., and Thompson, J. P. (2022). Inequality in 3-d: Income, consumption, and wealth. *Review of Income and Wealth*, 68(1):16–42.
- Gibson, M., Petticrew, M., Bambra, C., Sowden, A. J., Wright, K. E., and Whitehead, M. (2011). Housing and health inequalities: a synthesis of systematic reviews of interventions aimed at different pathways linking housing and health. *Health & Place*, 17(1):175–184.
- Goux, D. and Maurin, E. (2005). The effect of overcrowded housing on children's performance at school. *Journal of Public Economics*, 89(5-6):797–819.
- Han, J., Meyer, B. D., and Sullivan, J. X. (2020). Inequality in the joint distribution of consumption and time use. *Journal of Public Economics*, 191:104106.
- Haveman, R., Blank, R., Moffitt, R., Smeeding, T., and Wallace, G. (2015). The war on

- poverty: Measurement, trends, and policy. *Journal of Policy Analysis and Management*, 34(3):593–638.
- Hembre, E. (2020). TANF effective benefit guarantees, tax rates, and child-only penalties, 2000–2016. *National Tax Journal*, 73(2):401–428.
- Holupka, C. S. (2011). The housing and neighborhood conditions of America’s children: Patterns and trends over four decades. *Housing Policy Debate*, 21:215.
- Hoynes, H. and Schanzenbach, D. W. (2015). Us food and nutrition programs. In *Economics of Means-Tested Transfer Programs in the United States, Volume 1*, pages 219–301. University of Chicago Press.
- Iceland, J., Kovach, C., and Creamer, J. (2021). Poverty and the incidence of material hardship, revisited. *Social Science Quarterly*, 102(1):585–617.
- Jacobs, D. E., Wilson, J., Dixon, S. L., Smith, J., and Evens, A. (2009). The relationship of housing and population health: a 30-year retrospective analysis. *Environmental Health Perspectives*, 117(4):597–604.
- Kirkpatrick, S. I. (2011). Housing circumstances are associated with household food access among low-income urban families. *Journal of Urban Health*, 88:284.
- Landais, C. and Spinnewijn, J. (2020). Introduction to the special issue: New perspectives on consumption measures. *Journal of Public Economics*, 189:104236.
- Leventhal, T. and Newman, S. (2010). Housing and child development. *Children and Youth Services Review*, 32(9):1165–1174.
- Lopoo, L. M. and London, A. S. (2016). Household crowding during childhood and long-term education outcomes. *Demography*, 53(3):699–721.
- Meltzer, R. (2016). Housing affordability and health: Evidence from New York City. *Housing Policy Debate*, 26:80.

- Meyer, B. D. and Sullivan, J. X. (2008). Changes in the consumption, income, and well-being of single-mother headed families. *American Economic Review*, 98(5):2221–41.
- Meyer, B. D. and Sullivan, J. X. (2023). Consumption and income inequality in the united states since the 1960s. *Journal of Political Economy*, 131(2):247–284.
- Moffitt, R. A. (2015). The deserving poor, the family, and the us welfare system. *Demography*, 52(3):729–749.
- Newman, S. and Holupka, S. (2017). *The Quality of America’s Assisted Housing Stock: Analysis of the 2011 and 2013 American Housing Surveys*. US Department of Housing and Urban Development, Office of Policy Development.
- Newman, S. J. (2014). Housing affordability and investments in children. *Journal of Housing Economics*, 24:89.
- Newman, S. J. and Garboden, P. M. (2013). Psychometrics of housing quality measurement in the American Housing Survey. *Cityscape*, pages 293–306.
- Piketty, T. and Saez, E. (2003). Income inequality in the United States, 1913–1998. *The Quarterly Journal of Economics*, 118(1):1–41.
- Reichenberger, A. (2012). A comparison of 25 years of consumer expenditures by homeowners and renters. Technical report, U.S. Bureau of Labor Statistics.
- Rodems, R. and Shaefer, H. L. (2020). Many of the kids are not alright: Material hardship among children in the united states. *Children and Youth Services Review*, 112:104767.
- Saez, E. and Zucman, G. (2016). Wealth inequality in the united states since 1913: Evidence from capitalized income tax data. *The Quarterly Journal of Economics*, 131(2):519–578.

- Saez, E. and Zucman, G. (2020). The rise of income and wealth inequality in America: Evidence from distributional macroeconomic accounts. *Journal of Economic Perspectives*, 34(4):3–26.
- Schmidt, L., Shore-Sheppard, L., and Watson, T. (2016). The effect of safety-net programs on food insecurity. *Journal of Human Resources*, 51(3):589–614.
- Shaefer, H. L. and Edin, K. (2013). Rising extreme poverty in the united states and the response of federal means-tested transfer programs. *Social Service Review*, 87(2):250–268.
- Shamsuddin, S. and Campbell, C. (2022). Housing cost burden, material hardship, and well-being. *Housing Policy Debate*, 32(3):413–432.
- Splinter, D. (2020). Us tax progressivity and redistribution. *National Tax Journal*, 73(4):1005–1024.
- Thomson, H., Thomas, S., Sellstrom, E., and Petticrew, M. (2009). The health impacts of housing improvement: a systematic review of intervention studies from 1887 to 2007. *American journal of public health*, 99(S3):S681–S692.
- Trenkamp, B. and Wiseman, M. (2007). The food stamp program and supplemental security income. *Soc. Sec. Bull.*, 67:71.
- Wilhelmsson, M. (2008). House price depreciation rates and level of maintenance. *Journal of Housing Economics*, 17(1):88–101.
- Ziliak, J. P. (2007). Making work pay changes in effective tax rates and guarantees in us transfer programs, 1983–2002. *Journal of Human Resources*, 42(3):619–642.
- Ziliak, J. P. (2015). Temporary assistance for needy families. In *Economics of Means-Tested Transfer Programs in the United States, Volume 1*, pages 303–393. University of Chicago Press.

Ziliak, J. P. (2021). Recent trends in the material well-being of the working class in america. *The ANNALS of the American Academy of Political and Social Science*, 695(1):70–91.

Table 1: Regression Estimates of Housing Changes for Low-income Households

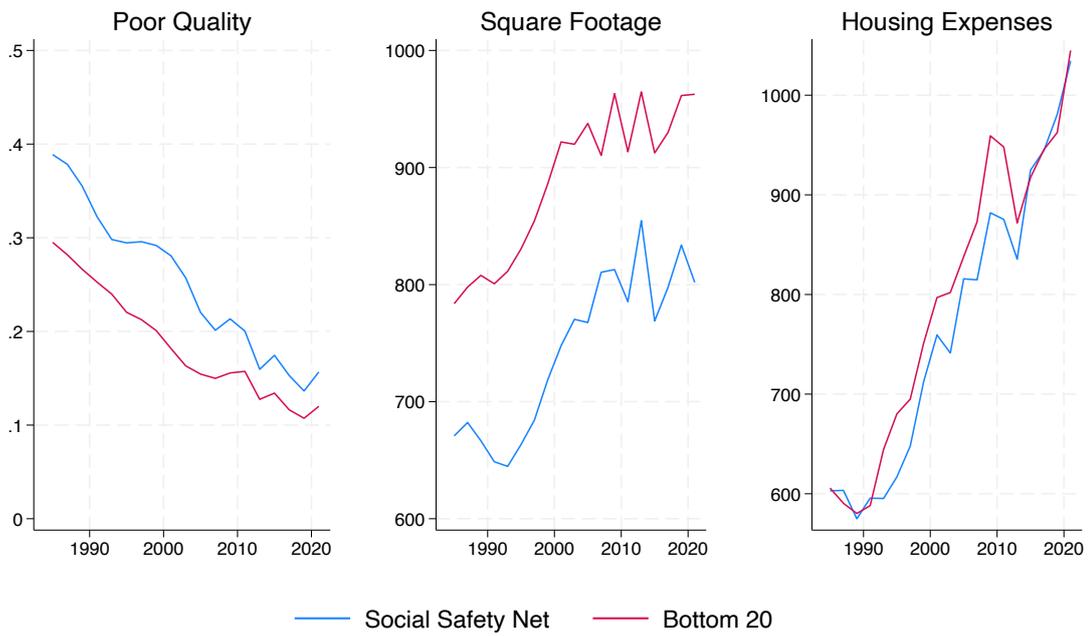
	(1)	(2)	(3)	(4)	(5)	(6)
	PQI	Poor Quality	Square Feet	Rooms	Housing Budget Share	Housing Expenditures
Social Safety Net						
SocSaf	9.350*** (0.232)	0.228*** (0.006)	-213.739*** (8.322)	-0.504*** (0.013)	17.220*** (0.448)	-373.661*** (7.728)
Late	-4.649*** (0.052)	-0.077*** (0.001)	172.875*** (5.086)	0.313*** (0.007)	2.860*** (0.235)	640.466*** (8.719)
Late x SocSaf	-4.898*** (0.255)	-0.140*** (0.007)	-103.089*** (10.448)	-0.052*** (0.017)	-2.126*** (0.530)	-211.341*** (15.232)
Absolute Change	-9.55	-0.22	69.79	0.26	0.73	429.13
Bottom 20%						
Bottom20	6.684*** (0.136)	0.155*** (0.004)	-214.760*** (5.826)	-0.481*** (0.010)	38.979*** (1.016)	-377.872*** (5.665)
Late	-4.173*** (0.052)	-0.066*** (0.002)	163.181*** (5.251)	0.287*** (0.007)	3.251*** (0.097)	638.218*** (9.237)
Late x Bottom20	-3.706*** (0.159)	-0.097*** (0.004)	-61.021*** (8.408)	-0.006 (0.014)	2.800*** (1.005)	-202.776*** (14.177)
Absolute Change	-7.88	-0.16	102.16	0.28	6.05	435.44
Y Mean	0.08	0.10	1,047.06	3.55	31.74	1,297.08
Y Standard Deviation	9.98	0.30	773.68	1.44	45.66	1,410.75
N	300,809	300,809	300,809	300,809	300,809	300,809

* p<0.10, ** p<0.05, *** p<0.010

Source: American Housing Survey.

Notes: This table displays coefficients from estimating Equation (1) on housing outcomes comparing each sample in early years (1985-1989) relative to late years (2017-2021) using an OLS regression. The top panel shows regression estimates when considering social safety net recipients (SocSaf) while the bottom panel shows estimates when considering bottom income quintile households (Bottom20). The Poor-Quality Index (PQI) is based on 35 measures, where each measure is z-scored and higher values reflect worse quality housing. The Poor Quality indicator indicates a unit above the full sample 90th percentile in poor quality. Square Feet and Rooms are adjusted for household size. Budget share is housing expenditures to income (omitting benefit payments). Controls include householder age, sex, marital status, number of people, number of kids, and indicators for presence of non-relatives, single-persons, and multiple families.

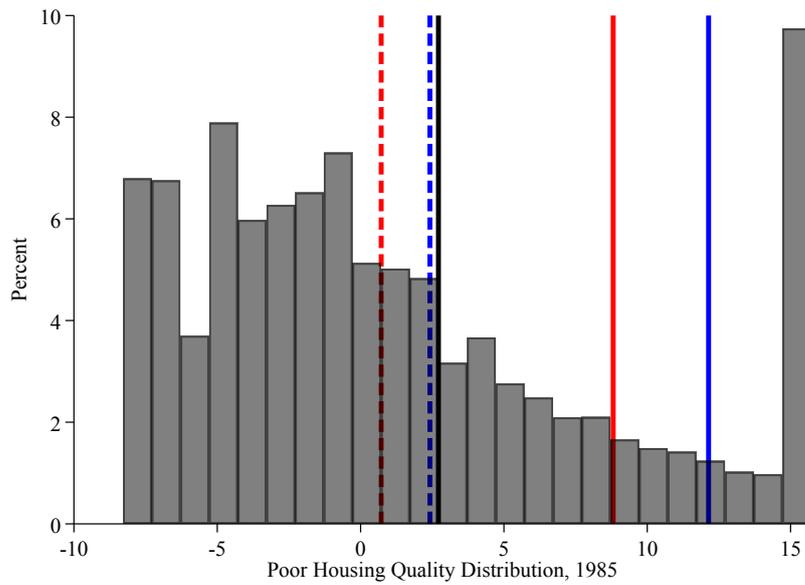
Figure 1: Housing Trends for Low-Income Households, 1985-2021



Source: American Housing Survey, 1985-2021.

Notes: This figure plots mean rates of Poor Quality housing, square footage per person, and monthly housing expenses between 1985 and 2021 for social safety net and bottom income quintile households. The Poor Quality indicator indicates a unit above the full sample 90th percentile in poor quality.

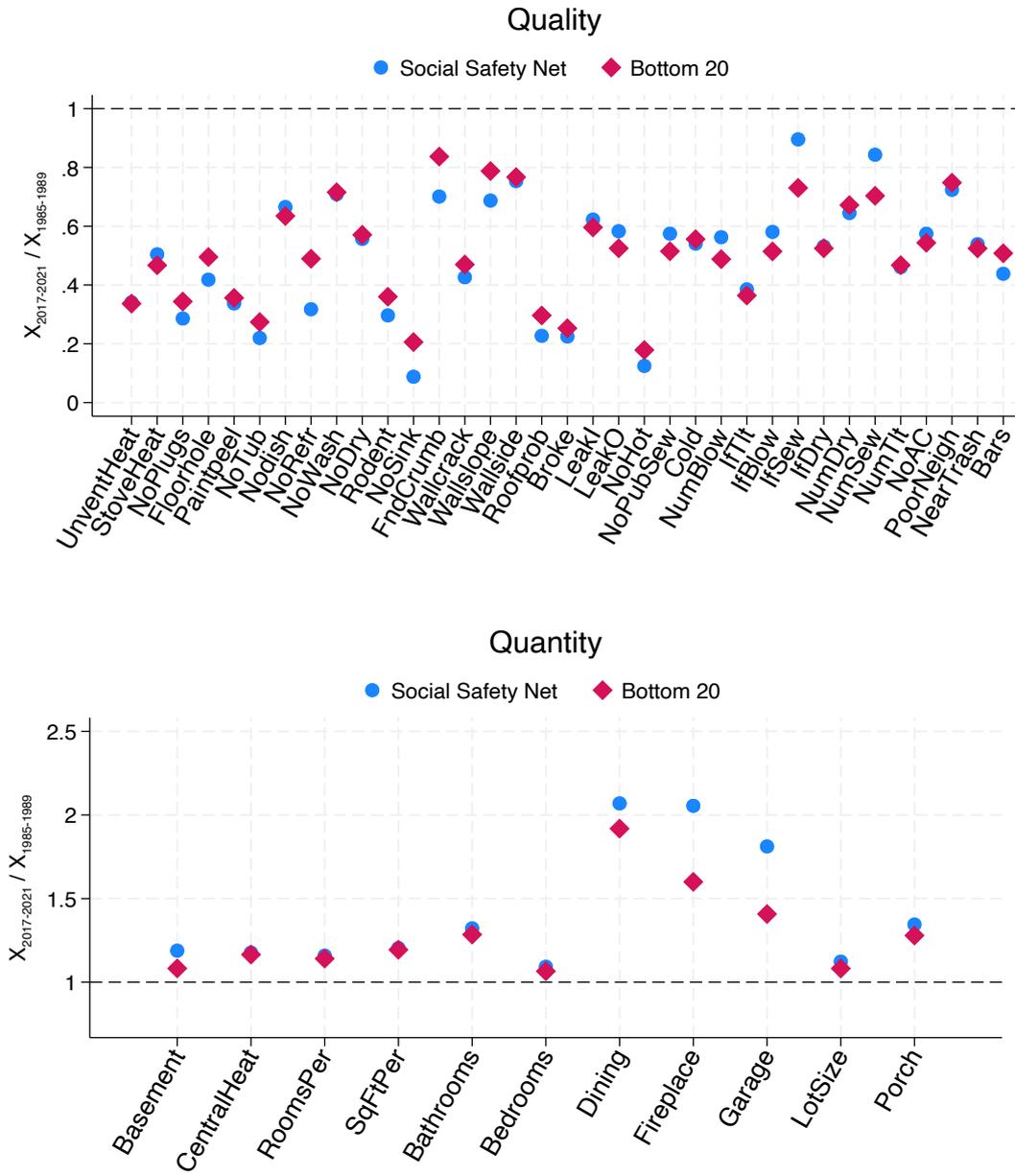
Figure 2: Poor Housing Quality Distribution in 1985



Source: American Housing Survey.

Notes: This histogram displays the PQI distribution in 1985. The Poor-Quality Index (PQI) is based on 35 measures, where each measure is z-scored and higher values reflect worse quality housing. PQI values have been top-coded at 15. The blue vertical lines represent mean PQI values for social safety net recipients, the red lines are mean PQI values for bottom income quintile households, and the black vertical line represents the 1985 national mean. Solid vertical lines represent the 1985 averages and dotted lines represent the 2021 average for each low-income group.

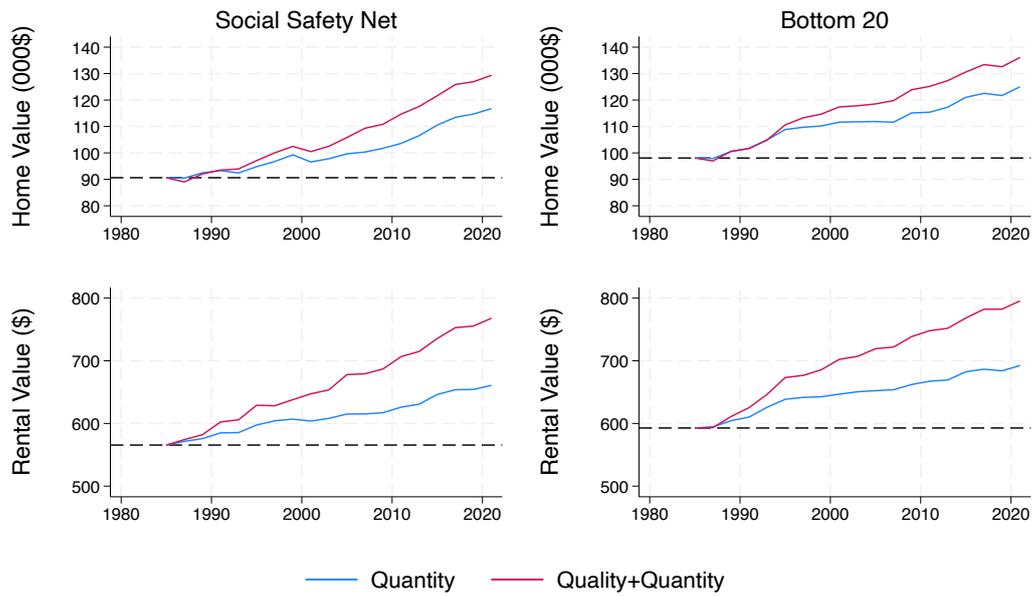
Figure 3: Housing Component Changes, 1985-1989 vs. 2017-2021



Source: American Housing Survey.

Notes: This figure displays the ratio of the average occurrence of 35 housing quality indicator variables (top) and 11 housing quantity variables (bottom) during the 2017-2021 period relative to the 1985-1989 period. Values below a value of one (the dotted line) reflect a decrease in the occurrence rate of that variable in the late period relative to the early period.

Figure 4: Housing Consumption Decomposition for Low-income Households, 1985-2021



Source: American Housing Survey, 1985-2021.

Notes: This figure displays housing consumption changes for social safety net recipients (left) and bottom income quintile households (right) based on a hedonic pricing model of the 1985 housing market as detailed in Appendix A.3. The blue lines reflect expected home (top panels) or rental (bottom panels) values each year based on changes in observable housing quantity characteristics. The red lines add changes resulting from both housing quantity and quality changes in the rental and price estimates.

Appendix

A.1 Safety Net Programs Studied

We next provide a brief overview of the social safety net programs SSI, SNAP, and TANF over the 1985–2021 period. These three programs are the programs we can identify participation in the AHS data based on survey responses. While there have been numerous changes to these programs over the past several decades, none of these primary social safety net programs has increased benefit levels above inflation during this time. This overview draws from more comprehensive discussions of each program in book chapters Duggan et al. (2015), Ziliak (2015), and Hoynes and Schanzenbach (2015) for SSI, TANF, and SNAP.

A.1.1 SSI

The federal SSI program began in 1974 targeted to children with disabilities, adults with disabilities, and very low-income people aged 65 and older. To qualify, all SSI participants must satisfy a common set of income and asset requirements. An SSI participant cannot have more than \$2,000 in financial assets (excluding home equity and a vehicle). Adults with disabilities must be determined to be unable to participate in substantial gainful work activity defined as earning \$1,310 per month in 2021. A child must have a physical or mental impairment that results in marked and severe functional limitations and is expected to last for at least one year to qualify for SSI.

In 2021, SSI participants received a maximum monthly benefit of \$794, which is adjusted for inflation each year. SSI participants are automatically eligible for the Supplemental Nutrition Assistance Program (SNAP), housing assistance, and Medicaid (in most states), but they are ineligible to receive Temporary Assistance for Needy Families (TANF) benefits.³ SSI benefits are reduced by \$0.50 for each \$1 of earned income and

³While SSI recipients are ineligible for TANF, other members of their household may still be eligible to receive TANF benefits.

by \$1 for each \$1 of unearned income, including Social Security Old Age and Survivors Insurance and Social Security Disability Insurance. SSI benefits are indexed to inflation, specifically to the consumer price index for urban wage earners and clerical workers (CPI-W), but otherwise have remained constant since program inception.

A.1.2 TANF

The TANF program provides monthly cash benefits primarily to low-income single adults with children.⁴ TANF traces its roots back to the Mothers Pension programs of the late 1800s and early 1900s but was immediately preceded by the Aid to Families with Dependent Children (AFDC). TANF was created in the 1996 Personal Responsibility and Work Opportunity Reconciliation Act with major program changes from AFDC including time limits for benefit receipt, work requirement, and block grant funding, which allowed for greater state discretion on program spending, eligibility, and administration.

The replacement of AFDC with TANF led to a large reduction in caseloads and benefit levels over time. In 1985, there were 3.7 million AFDC caseloads and by 2021 there were only 800,000 TANF caseloads. TANF benefits and eligibility vary considerably across states and time. In 1985, the average three-person AFDC maximum benefit was \$814 (in 2020 dollars) but by 2020 the average three-person TANF maximum benefit was only \$485. Generally speaking, TANF targets very low-income households and imposes high benefit reduction rates. Only 9 percent of TANF cases currently report positive earned income.

A.1.3 SNAP

Beginning as a pilot program in 1961 and fully expanded nationwide by 1975, SNAP (formerly known as the Food Stamp Program) provides monthly food subsidies to low-

⁴This paper focuses on the cash assistance portion of TANF, which is what is measured in our data. TANF funds also support a variety of other state level programs including subsidized childcare and state earned income tax credit programs.

income households. SNAP is a broadly available means-tested transfer program that is open to most all households meeting the income and asset eligibility requirements, although benefits are time-limited for able-bodied adults without dependents. As of 2019, SNAP had 35.7 million recipients who received an average of \$130 per month in benefits. Households may qualify for SNAP categorically through SSI or TANF participation but otherwise must earn below 130 percent of the federal poverty line.⁵

SNAP benefits vary by household size and income. In 2020, a three-person household could receive up to \$509 per month in benefits. After an initial income disregard, SNAP benefits are reduced by \$0.30 for each \$1 in net income with a minimum SNAP benefit of \$16 per month in 2020. Maximum SNAP allotments are adjusted for food price inflation each year based on the cost of the Thrifty Food Plan with two notable exceptions. During the Great Recession, the American Recovery and Reinvestment Act of 2009 raised SNAP benefits by 13.6 percent through October 2013. During the COVID-19 pandemic, all SNAP recipients received the maximum benefit level for their household through an emergency allotment.

A.2 PQI Construction

To construct our poor quality index (PQI) we first z-score each of the poor quality indicators to ensure each measure equally contributes to our index. The PQI is then an average of our 35 adjusted poor housing quality indicators, Q_i :

$$PQI = \sum_{i=1}^{35} Q_i$$

We considered several alternative index constructions such as using subjective weights suggested by Newman and Holupka (2017), using the nonadjusted indicator values, and using estimates from a logistic regression of poor quality components on the Consumer

⁵States can apply for federal waivers regarding eligibility, including asset limits and work requirements(Center on Budget and Policy Priorities, 2023).

Rating Index (CRI) to determine weights. While not reported in our results, none of these alternative measures substantively alters our findings, reflecting our finding that the quality improvements have been broadly observed.

While the AHS provides a relatively consistent set of housing quality measures over time, Eggers and Moumen (2013) show that the 1997 survey redesign affected the reporting of several quality variables, and similar series jumps occur with the 2015 redesign as well. An important survey change in 1997 altered interview protocols resulting in large jumps in many average housing quality variable values. Further, we observe persistent differences in several variable values based on the method of interview, phone or in-person, as interviewers may alter answers based on a visual inspection (such as the presence of rodents) that could differ from direct household responses. To account for within-variable shifts in the 1997 and 2015 redesigns along with a shifting fraction of phone to in-person interview rates, we split the sample into three periods —1985 to 1995, 1997 to 2013, 2015 to 2017 —and apply periodic weights to account for interview method and smooth across transition periods. We base all variables to the 1997–2013 period since this was the longest period in our sample.⁶ A drawback of these period-transition smoothing weights is that they eliminate any true poor quality changes across the adjoining years of 1995–1997 and 2013–2015. This eliminates cross-year variation for two of our 18 survey waves, so the total housing quality changes over the full 1985–2021 period is expected to be underestimated by $\frac{1}{9}^{th}$ if changes in these years are the same magnitude as the average changes across other years.

⁶The means that weights for the 1985–1995 period are calculated as the 1997 average divided by the 1995 average for each variable. Weights for the 1997–2013 period are equal to 1. Weights for the 2015–2021 period are equal to the 2013 average divided by the 2015 average.

A.3 Hedonic Pricing Model

To run our hedonic pricing model, we first estimate the following equation for the 1985 survey:

$$Y_i = \alpha_t^B + \beta_t^B Q_i + \gamma_t^B Z_i + \delta_g^B + \epsilon_i \quad (2)$$

where Y_i is either the reported market sale value or rental cost of housing unit i , Q_i is the matrix of poor housing quality variables, Z_i is the matrix of housing quantity variables, δ_g are MSA fixed effects, and ϵ is a random error term. We allow our coefficients α , β , γ , and δ to vary by building type $B \in \{ \text{single-family, mobile home, low-rise apartment, high-rise apartment} \}$ to reflect variation in pricing across these home types. We exclude any subsidized or rent-controlled units from the estimation sample since their rental values do not reflect market rents. We wish to understand how housing consumption among all households, not just among renters or owners, has changed over time. To avoid confusing compositional changes over time of owners versus renters, we run separate analyses for renters and for homeowners.

While estimation of the hedonic model is performed on about half of the sample (either owned homes with prices or rented homes with rents), we next use the estimation results to predict either rental or home values for *all* housing units in each year: \hat{Y}_t . For a given year t , we project the expected average value (\hat{Y}_t) based on the average observable characteristics \hat{Q}_t , \hat{Z}_t , and $\hat{\delta}_{gt}^B$. Comparing \hat{Y}_t to $Y_{1985}^{\hat{}}$ reveals the rise in housing consumption in year t relative to 1985 based on changes in observable housing characteristics. Then, we deconstruct how much of this housing consumption gain is due to quality and quantity variables by holding either Q_{it} or Z_{it} constant at their 1985 values. That is, the increase in housing consumption due to quality is $\hat{Y}_t(\hat{Q}_t, \hat{Z}_t) - \hat{Y}_t(\hat{Q}_{1985}, \hat{Z}_t)$ while the increase due to quantity is $\hat{Y}_t(\hat{Q}_{1985}, \hat{Z}_t) - \hat{Y}_t(\hat{Q}_{1985}, \hat{Z}_{1985})$.

We run this analysis separately for home values and rental costs, which each have relative strengths for this exercise. A comparative advantage of utilizing rental values is

that rents better approximate the current annual flow or consumption value of housing as opposed to home values, which will additionally be influenced by expected future price growth and mortgage interest rates. Rental markets may also better capture the cost of poor quality on consumption value, as poor quality elements may be more likely to be fixed prior to home sales and owners may have little knowledge of how to price these poor quality elements when reporting home values. In contrast, utilizing home values in our analysis has the relative advantage of doubling the sample size. This difference is particularly stark among single-family homes, which comprise 60 percent of our non-subsidized sample. We find 84 percent of single-family homes are owner-occupied.