

# The Affordability of Homeownership to Middle-Income Americans

*By Jordan Rappaport*

From 1971 through mid-2007, the nominal national sales price of housing grew almost eightfold. Controlling for inflation, this represented a near doubling in the relative price of housing. The retrenchment in prices that began in 2007 has so far remained small compared to the earlier increase.

As house prices climbed, many people complained that housing had become unaffordable to middle-income Americans. As early as 1998, newspapers warned that homeownership was becoming a heavy financial burden. As sales price rises accelerated in 2003 and crested in 2006, homeownership was increasingly portrayed as the “unattainable” American dream (Strickand; Fogarty; Simon; Fessenden; Scott and Archibold).

Notwithstanding such concerns, homeownership actually rose strongly beginning in the mid-1990s and in 2004 attained its highest level ever. The more recent surge in foreclosures suggests many households indeed purchased homes they could not afford. Still, this does not necessarily imply that housing in general has become unaffordable

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to middle-income households. Instead, it may be that many defaults resulted from *specific* households purchasing *specific* houses whose location, size, and other attributes made their sales price too high relative to the purchasers' financial resources.

This article seeks to answer the question of whether homeownership has indeed become less affordable to middle-income Americans. Assessing affordability is difficult because the "affordability" of housing is a vague concept, both from theoretical and measurement points of view. Theoretically, it is not clear how to compare the financial obligations of ownership with household financial resources. More practically, it is unclear how to measure "middle income" resources and the financial obligations associated with owning a representative house.

In terms of theory, a common affordability comparison of obligations and income is to divide the former by the latter. The resulting ratio gives the housing expenditure share of income. Intuitively, ratio affordability captures what share of the "pie" housing obligations constitute. A problem with the expenditure share concept of affordability is that it cannot determine whether changes in income and homeownership obligations make people better or worse off.

An alternative affordability comparison subtracts obligations from income. The resulting residual income concept of homeownership affordability is preferable because it correctly reflects changes in household welfare as income and homeownership obligations change. Intuitively, residual income affordability captures how much of a "pie" that changes size is left over after meeting the financial obligations of homeownership.

In terms of results, the estimated housing share of expenditures increased significantly between 1971 and 2007, implying a decrease in affordability by the ratio concept. However, the absolute dollar increase in representative homeownership obligations was smaller than the absolute dollar increase in representative household income. Hence the residual income concept of affordability improved. Why, then, have there been so many concerns on the affordability of homeownership? One possible explanation is that the growth of residual income from 1971 to 2007 was considerably slower than residual income growth during the 1950s and 1960s. Another possible explanation is that the increase in residual income from 1971 to 2007 depended in part on a sharp increase in women's labor force participation. Had women con-

tinued to participate at their 1971 rate, residual income would likely have decreased.

The first section of this article describes some important considerations in measuring affordability, such as what it means to be “middle income” and what constitutes a “representative house.” The second section examines the historical behavior of the two main components of affordability: household income and the required payments associated with homeownership. The third section compares income with required payments using the preferred measure of affordability as well as an alternative one. The fourth section discusses in more depth some reasons why perceptions of affordability may have decreased.

## I. CONSIDERATIONS FOR MEASURING AFFORDABILITY

Assessing the affordability of housing to middle-income households requires addressing several important issues. One is defining a middle-income household. Another is specifying the quality of a representative house whose affordability is to be measured. A third is specifying how to compare household financial resources with the required payments of homeownership. There are no “right” choices to these requirements. But understanding what a particular measure of affordability is capturing is critical to understanding affordability.

In this assessment, “middle income” is represented by the median income in each year among households headed by a married couple. A married-couple household can divide this income among purchasing housing, purchasing nonhousing goods and services, and saving. For determining taxes, this representative married couple is further assumed to have two children.

Representing middle income by the median income of a married-couple family is just one of many possibilities. Alternatively, one might prefer some other percentile in the income distribution. Households with 40th-percentile income and those with 60th-percentile income are also typically thought of as middle income. Similarly, middle income might be represented by the income of some other household type. For example, it might be measured by the median income of all households rather than by that of just married-couple households.

The choice of a representative middle-income household significantly affects the evaluation of affordability. For example, households

from higher in the income distribution experienced above-average financial resource growth from 1971 to 2007. In contrast, the rising share of households with just a single adult member caused income growth among all households to trail income growth among married-couple households.

The choice of a representative house also significantly affects the evolution of affordability. Houses differ from each other in many ways, including location, size, and amenities. A house's numerous specific attributes are said to determine its "quality." Measuring affordability requires specifying the quality level of the house used to determine the required payments associated with homeownership. A higher quality implies higher payments and in turn lower affordability.

Measuring housing quality is difficult, mainly because many house attributes are not easily quantifiable. Even if they were, it would be unclear how to weight a house's numerous attributes to come to a summary numerical quality level. Rather than trying to observe quality directly, economic theory suggests that, at a given point in time, quality and selling price should be closely linked. Specifically, a house that sells for more than another house at a given point in time can be inferred to have higher quality.<sup>1</sup> For this interpretation to make sense, "quality" must encompass literally all house attributes, including location. In this article, quality is indeed assumed to increase with a house's sales price. More specifically, a representative quality level for measuring affordability is taken as the quality level that corresponds to a median-priced single-family home in 2006. A "constant-quality house price index" can then price such a 2006 median-quality house back to 1971.<sup>2</sup> In other words, an estimate of the rate of price growth for houses whose quality remains unchanged in turn estimates the price at which the representative-quality house would have sold in each year.

In contrast to the constant-quality assumption, average house quality has greatly increased over time. For example, the median square footage of a newly constructed single-family home rose 60 percent from 1971 to 2006 (National Association of Homebuilders). This increase in quality has contributed to rising house prices. Statistically holding quality constant prevents the trend toward larger and otherwise nicer houses from diminishing measured affordability.

A final consideration in measuring affordability is choosing how to compare the required payments of ownership with financial resources. One commonly used measure of affordability is the ratio of required payments to income. The ratio comparison gives the share of annual resources devoted to housing. It serves as an intuitive benchmark to assess affordability. An increase in the ratio indicates that house payments are growing faster than income, suggesting that affordability has declined. An important drawback of the ratio measure is that it can give a misleading measure about household welfare—that is, whether households benefit from given changes in income and homeownership financial obligations. Obligations may grow in percentage terms more than income, thereby causing ratio affordability to deteriorate. But because income exceeds obligations, the absolute dollar increase in the former may exceed the absolute dollar increase in the latter. If so, households can continue to consume the same quality of housing while increasing purchases of nonhousing goods and services. Hence, household welfare has clearly improved. Essentially, the larger share of the “pie” going to housing may be dominated by enlargement of the pie.

An alternative measure of affordability is the arithmetic difference between income and required payments. This measure shows how much income households have left over after they purchase a representative, constant quality of housing. This residual income can be used to purchase nonhousing goods and services or to save for the future. Unlike the ratio measure, residual income correctly reflects household welfare. If residual income affordability is higher in one year compared to another, household welfare has improved.<sup>3</sup>

The choices of a representative household, a representative house, and a means of comparing income with required housing payments together provide a framework for measuring the affordability of housing over time. The next section shows the specific calculations of the representative household’s income and the representative house’s required payments. The following section then shows the comparison of the two over time.

## II. THE COMPONENTS OF AFFORDABILITY

The affordability of homeownership depends both on financial resources and on required payments. Resources primarily depend on

wages, how many hours household members work, and taxes. Required payments depend on house prices, interest rates, tax incentives, and the quality of the house being purchased.

### *Financial resources*

In a most general sense, a household's financial resources can be represented by the following equation:

$$\text{Current and expected future income} + \text{savings and investments} \\ - \text{current and expected future tax liabilities} - \text{current debts}$$

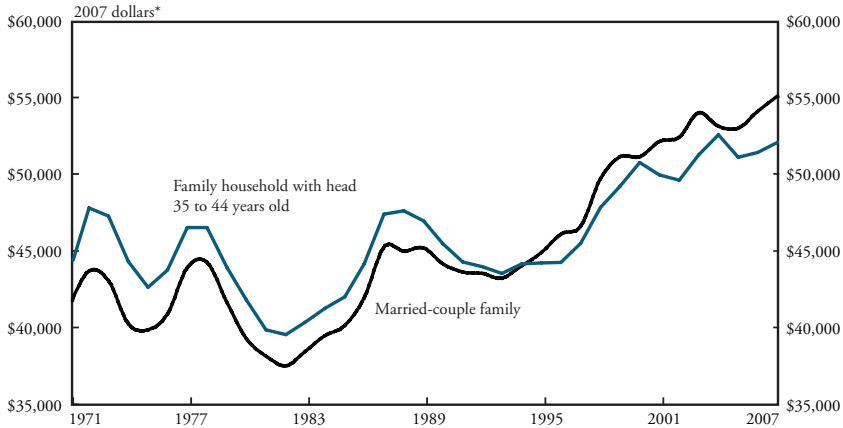
In practice, future income is hard to predict, and household savings and debts are poorly measured by researchers. Hence a household's current income is typically used as a proxy for its resources.

"Middle income," as measured by the median income of various household types, has fluctuated widely since the early 1970s (Chart 1). The median after-tax real income of a household headed by a married couple fell from a peak of \$44,000 in 1978 to \$37,000 during the 1982 recession and then climbed slowly to \$55,000 in 2007.<sup>4</sup> For the entire 1971-2007 period, median after-tax real income for married-couple households grew 0.8 percent annually. Compared with the experience of the 1950s and 1960s, such growth was relatively modest.

The growth of the median income among all married-couple households may overstate the growth of the median income among only young married-couple households, which is when many couples seek to purchase their first house. The aging of the baby boom meant that the average age of married couples significantly increased between the early 1970s and mid-2000s. The typical increase of income with age most likely accounts for some portion of the rise in the median income of married-couple households.

The income of younger family households, those headed by someone aged 35 to 44, grew slower than that of married-couple families (Chart 1). Between 1971 and 2007, median after-tax income of these younger households grew by an average of 0.4 percentage point per year, just half the rate for married-couple households. However, the younger household rate may understate middle-income growth because there was a big increase in single-parent family households between 1971 and 2007, which tends to depress growth. Thus for younger, married-

*Chart 1*  
AFTER-TAX HOUSEHOLD INCOME



Sources: U.S. Census Bureau, NBER TaxSim, Bureau of Labor Statistics

\*Deflated by CPI-U less shelter

couple households, median income probably grew by somewhere between 0.4 and 0.8 percentage point per year. The remainder of this article will use the higher growth rate, while discussing the implications for affordability if middle-income growth were slower.<sup>5</sup>

The slow income growth since 1971 follows from several important trends. One was that average real wages for men held fairly steady. Another was that real wages for women rose moderately. A third was that labor force participation by women climbed sharply, from 50 percent in 1971 to 75 percent in 2005. The combination of these three trends caused overall real wages to remain approximately constant: The increase in women's wages was offset by the increase in women's participation. The offset occurred because women were typically paid less than men, so that an increase in their participation lowered combined-gender average wages. Notwithstanding the constancy of average real wages, the increase in married women's participation boosted average household income.<sup>6</sup>

Whether the rise in married women's labor force participation should be interpreted as increasing the affordability of housing depends on the reason for this increase. On the one hand, the increased participation might actually have been the response to decreased affordability. If the financial challenge of homeownership was becoming

increasingly difficult, more household members might have been forced to look for paid work. If so, it would be misleading to say that women's participation improved affordability. On the other hand, the increase in women's participation was also the result of some more positive forces. One such force was the spread of labor-saving home technologies. Washing machines, vacuum cleaners, microwave ovens, and prepared foods collectively freed women to engage in activities outside the home (Greenwood, Seshadri and Yorukoglu).<sup>7</sup> A second force was the combination of increasing educational opportunities, decreasing workplace discrimination, and changing social attitudes (Costa). A third positive force was the increased view by many women of work as a source of fulfillment (Goldin). To the extent these latter, positive forces were the source of the increase in women's participation, the associated earnings did indeed help to make housing more affordable.<sup>8</sup>

In this article, no distinction is made as to source of income. Hence increases in participation are implicitly interpreted as increasing affordability. To the extent that it was an increasing financial challenge of homeownership that caused women to increasingly seek out work, affordability will be overstated.

A different trend contributing to the path of after-tax income was a rising and then falling tax burden. For a family with two children and the median pre-tax income of married couples, the estimated average tax burden from federal and state income and payroll taxes was 19 percent of income in 1971. It rose to 30 percent in the early and mid-1980s and then gradually fell to 24 percent in 2007.<sup>9</sup> Over the entire 36-year period, changes in taxes dampened average after-tax real income growth for this representative family by about 0.2 percentage points per year.<sup>10</sup>

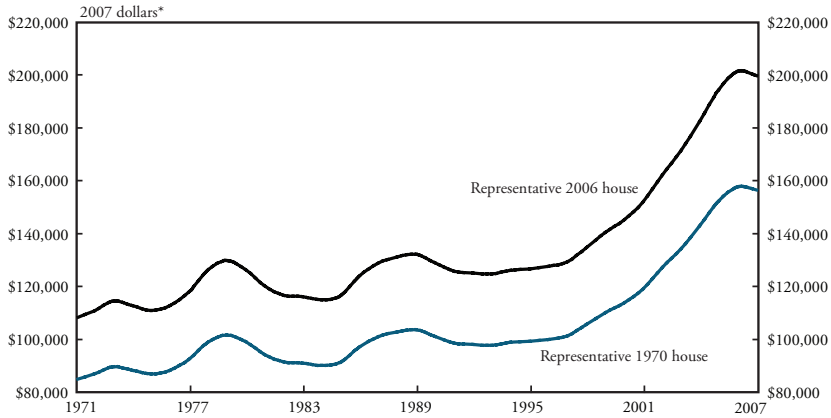
### *The required payments associated with homeownership*

House prices are the most visible determinant of required house payments. Other important determinants of payments include mortgage interest rates; federal, state, and local taxes; insurance; and maintenance expenses.

*House prices.* From 1971 to 2007, U.S. real house prices grew by an annual average rate of 1.7 percent (Chart 2, both lines). The constant-quality house price index (HPI) on which this is based estimates the growth rate of prices but not their level.<sup>11</sup> But the level of prices is criti-



Chart 2  
CONSTANT-QUALITY PRICE LEVELS



Sources: U.S. Census Bureau, Freddie Mac, Bureau of Labor Statistics  
\*Deflated by CPI-U less shelter

cal for determining affordability. Fortunately, constant-quality price indexes are estimated in such a way that they apply to all quality levels. Hence a representative price can be chosen in a specific year, and then the house quality to which that price corresponds can be priced by the HPI in other years.

The quality of the representative house being priced over time is assumed in all years to be the quality of the median-priced house in 2006. Because economic theory implies that at a given point in time, house quality increases with house price, the median-priced house in 2006 will also have the median quality in that year. Moreover, the median-priced, median-quality house should be approximately what the median-income household wishes to purchase.<sup>12</sup> In 2007 dollars, the price of a representative 2006 house increased from \$107,000 in 1971 to \$199,000 in 2007 (Chart 2, top line).

The choice of 2006 as the year to use for median quality is arbitrary. For measuring the change in affordability over time, a quality level more representative of an earlier time period also works.<sup>13</sup> For example, houses could alternatively be priced at a quality level more representative of 1970. The house quality level chosen by a representative household in the early 1970s was substantially lower than the quality level chosen by a representative household in the mid-2000s. A house

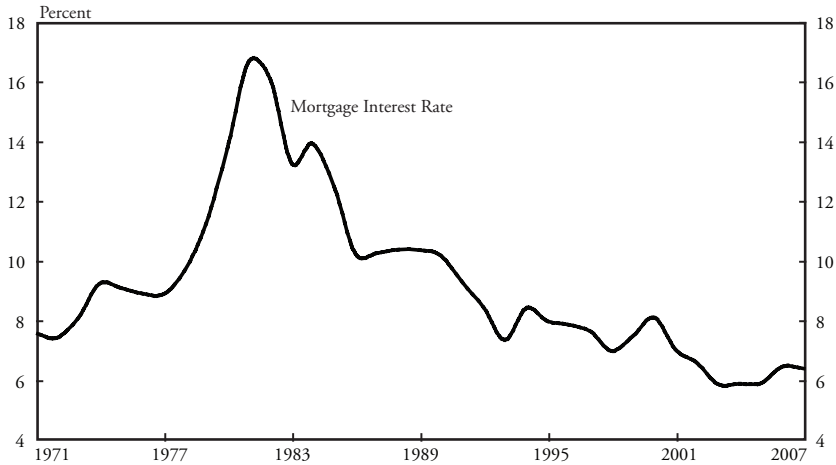
with constant quality corresponding to the median price in 1970 appreciated from \$84,000 in 1971 to \$156,000 in 2007 (2007 dollars; Chart 2, bottom line). In pricing a representative house, holding constant the level of quality over time is more important than the specific level of quality.

Because the 2006-quality and 1970-quality price series are calculated with the same HPI, both are characterized by the same growth rate. From 1970 to 2006, real price growth averaged 1.7 percent per year. If instead quality were not held constant but assumed to be the median for each year in that year, the price of housing would have risen from the bottom left of the lower line in Chart 2 to the top right of the top line. With quality thus allowed to increase, real growth in the price of housing would seem to have averaged 2.4 percent per year. In fact, the increase in quality accounted for almost one-third of this apparent rise.

*Payments associated with borrowing.* Several factors combine with house sales prices to determine the required payments associated with homeownership. A major reason for this joint determination is that houses are almost always purchased with borrowed money. A first implication is that owners often need to save up for a downpayment. Research on home purchases in Massachusetts shows a decline in households' net deposits from a median of 20 percent of house value in 1990 to a median of 10 percent of house value in 2007 (Foote, Gerardi, Goette, and Willen).<sup>14</sup> Numerous anecdotes suggest this reduction in required deposits has been replicated nationally. Saving for a downpayment has thus become less of a hurdle to homeownership, thereby improving affordability. While this downpayment component of homeownership affordability is extremely important, it will not be addressed further in this article. The main reasons are the lack of historical data and the difficulty of quantifying the hurdle represented by saving for a downpayment.<sup>15</sup>

A second implication of borrowing to purchase homes is that the mortgage component of required payments is highly sensitive to interest rates. Nominal interest rates on a fixed 30-year mortgage have varied widely since the early 1970s (Chart 3). Most noticeably, they spiked to extreme highs in the early and mid-1980s. This spike made mortgage payments especially high. From the late 1980s through 2003, nominal fixed interest rates continually fell, thereby helping to lower mortgage payments.<sup>16</sup>

Chart 3

MORTGAGE INTEREST RATE, CONFORMING  
30-YEAR FIXED

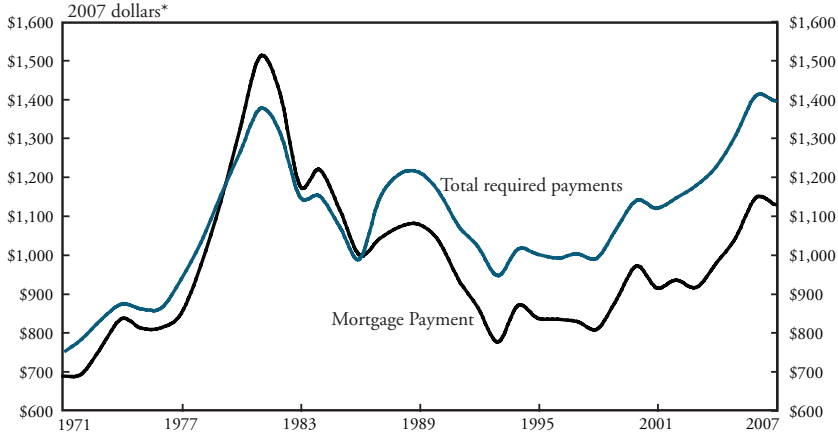
Source: Freddie Mac

Mortgage payments are determined jointly by the price of a newly purchased home and by the mortgage interest rate when that purchase took place. For a 2006-quality house newly purchased in each year, the spike in interest rates caused the combined monthly principal and interest payments to more than double from 1971 to 1981 (Chart 4, black line).<sup>17</sup> Thereafter, real mortgage payments almost halved as interest rates retreated. Beginning in the late 1990s, real mortgage payments began rising once again as a strongly rising purchase price dominated moderately falling interest rates. Even so, real mortgage payments in 2007 remained well below their early 1980s peak.

The inclusion of mortgage principal payments distinguishes required homeownership payments from homeownership costs. Principal payments are a transfer rather than a cost because they build homeowner's equity. The rationale for including monthly mortgage payments in determining affordability is that on a month-to-month basis, they can significantly contribute to the financial challenge of homeownership. Homeowners typically do not have the choice to skip their principal payment. Doing so subjects them to the risk of foreclosure. The quantitative implication of instead excluding principal payments is minor.

Chart 4

## MONTHLY MORTGAGE AND TOTAL REQUIRED PAYMENTS, NEWLY PURCHASED 2006-QUALITY HOUSE



Sources: U.S. Census Bureau, Freddie Mac, Bureau of Labor Statistics  
 \* Deflated by CPI-U less shelter

The reason is that principal payments are relatively small compared to interest payments during the first year of a 30-year mortgage, which is the basis for the calculations used in this article.<sup>18</sup>

*Other required payments and offsets.* Total required homeownership payments include several important components in addition to mortgage payments. These are real estate taxes, required maintenance expenses, and homeowner's insurance.<sup>19</sup> Total payments also include an offset, which is the tax saving homeowners receive from deducting their mortgage interest payments when determining their federal taxes. This tax savings, which can be substantial, functions essentially as a rebate on homeowners' mortgage interest payments. For this reason the tax savings is treated as lowering required payments rather than increasing post-tax income.<sup>20</sup> The resulting formula for required homeownership payments is given below.

$$\left( \begin{array}{c} \text{required} \\ \text{homeownership} \\ \text{payments} \end{array} \right) = \left( \begin{array}{c} \text{mortgage} \\ \text{interest} \\ \text{payment} \end{array} \right) + \left( \begin{array}{c} \text{mortgage} \\ \text{principal} \\ \text{payment} \end{array} \right) + \left( \begin{array}{c} \text{real} \\ \text{estate} \\ \text{taxes} \end{array} \right) + \left( \begin{array}{c} \text{maintenance} \\ \text{expenses} \end{array} \right) + \left( \begin{array}{c} \text{homeowner's} \\ \text{insurance} \end{array} \right) - \left( \begin{array}{c} \text{tax} \\ \text{savings} \end{array} \right)$$

Total required payments moved closely with mortgage payments during the 1970s and early 1980s (Chart 4, blue line). Thereafter, total required payments moved moderately above mortgage payments.

The mid-1980s divergence between total homeownership required payments and mortgage payments reflects a decrease of the tax savings from homeownership beginning in 1987. The Tax Reform Act of 1986 (TRA) reduced the tax savings from homeownership by significantly increasing the standard deduction, thereby boosting after-tax income for non-itemizers (mostly non-homeowners). For a given pre-tax income, the tax savings from homeownership can be calculated as after-tax income from itemizing minus after-tax income from taking the standard deduction. The rise in standard-deduction after-tax income, holding pre-tax income constant, thus caused the homeownership tax savings to fall. The tax savings from homeownership was further eroded by stricter limits on the expenses that could be deducted on itemized returns (Follain and Ling).<sup>21</sup>

### THE USER COST OF HOMEOWNERSHIP

An alternative measure of the financial challenge posed by homeownership considers the hypothetical effect on a household's assets from purchasing a house on December 31, holding it for exactly a year, and then selling it. How much lower would a household's assets be compared to not having purchased any housing? This "average user cost" measure differs from required homeownership payments in three ways. First, it considers mortgage payments to be a form of savings rather than a cost. This makes sense because principal payments increase household assets. Second, user cost considers the foregone interest income on homeowners' equity to be a cost. If the deposit on a house had been invested instead, the interest would have increased household assets. Third, user cost considers any price appreciation of the house to be an offset against other costs. After all,

rising house prices have dramatically increased the assets of many homeowners. The following formula represents user costs:

$$\left( \begin{array}{c} \text{average} \\ \text{user} \\ \text{cost} \end{array} \right) = \left( \begin{array}{c} \text{mortgage} \\ \text{interest} \\ \text{payment} \end{array} \right) + \left( \begin{array}{c} \text{real} \\ \text{estate} \\ \text{taxes} \end{array} \right) + \left( \begin{array}{c} \text{maintenance} \\ \text{expenses} \end{array} \right) + \left( \begin{array}{c} \text{homeowner's} \\ \text{insurance} \end{array} \right) + \left( \begin{array}{c} \text{foregone} \\ \text{earnings on} \\ \text{homeowner's} \\ \text{equity} \end{array} \right) - \left( \begin{array}{c} \text{tax} \\ \text{savings} \end{array} \right) - \left( \begin{array}{c} \text{nominal} \\ \text{house} \\ \text{price} \\ \text{appreciation} \end{array} \right)$$

The calculation does not take into account considerations such as moving costs because the concept of purchasing a house for a year is just an accounting device and should not be interpreted literally. User cost thus does not contradict the fact that most homeowners will stay in their house for many years. On the contrary, it can measure the cost for each of those years.

The average user cost of homeownership swung widely between 1971 and 2007 (Chart B1). Similar to required payments, the average-user-cost measure is characterized by a spike in the early 1980s. Otherwise, it is dominated by its price appreciation component. Thus, during both the early and late 1970s, when nominal house price appreciation was high, user costs were low and even negative. A negative user cost simply indicated that a year's house price appreciation exceeded the sum of all other net costs. A similarly negative average user cost followed from the rapid appreciation of housing prices from 2002 to 2005. More recently, the leveling off and then decline of house prices have driven average user costs to historic highs.

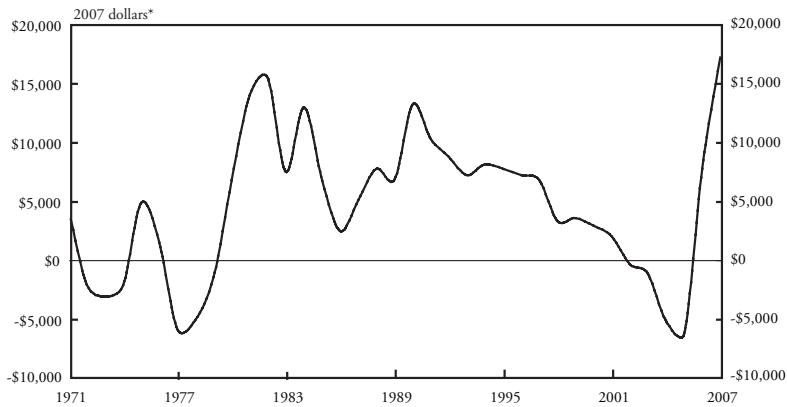
A potential weakness of the average-user-cost measure is its high sensitivity to price appreciation. It may be true that someone with large financial resources can buy a home, live in it for several years, and then sell it at an increase in price that essentially covers all accumulated housing-related expenses since the purchase. But there is always the risk that an expected price ap-

preciation does not occur. In other words, the user costs shown in the figure are ex-post measures rather than ex-ante ones. Even if the price appreciation were known with certainty, ownership requires substantial financial resources to cover expenses and mortgage payments. An alternative average-user-cost measure that excludes the appreciation component looks very similar to required payments measure shown in Chart 4.

*Chart B1*

**AVERAGE USER COST OF HOMEOWNERSHIP**

Married-couple family with median income purchasing a 2006-quality house



Sources: U.S. Census Bureau, Freddie Mac, Bureau of Labor Statistics, NBER TaxSim, US Treasury

\*Deflated by CPI-U less shelter

The total required payments associated with homeownership stood near a historic high in 2007. But this did not necessarily imply that housing had become less affordable. To judge affordability requires comparing the high payments with household resources.<sup>22</sup>

### III. MEASURING AFFORDABILITY

As discussed briefly in the first section, the affordability of homeownership can be measured by comparing resources with required payments in two alternative ways. Ratio affordability is calculated by dividing payments by resources. It highlights the relative rates at which resources and payments have grown. Between 1971 and 2007, the share of income required to make payments on a representative house rose significantly and so ratio affordability declined. But ratio affordability poorly reflects household welfare. Residual income, which measures affordability as the difference between resources and payments, correctly reflects household welfare. Between 1971 and 2007, residual income affordability moderately increased. This suggests that a representative household purchasing a representative house was better off in 2007 than in 1971.

#### *Ratio affordability*

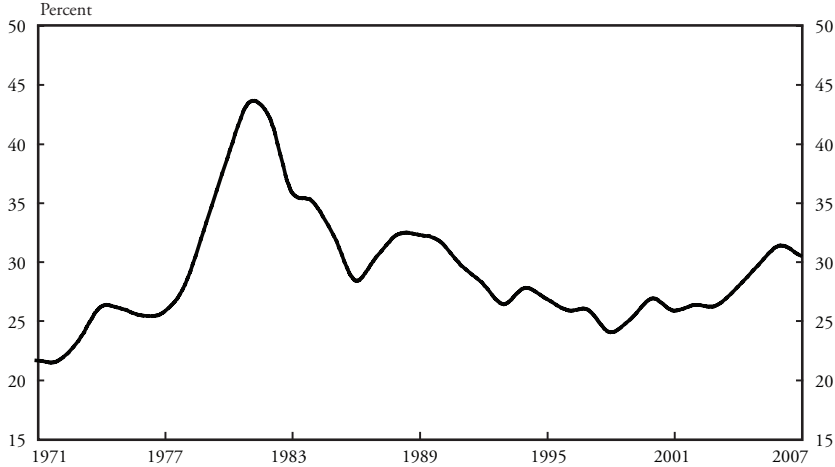
The ratio of required homeownership payments to after-tax income suggests that while housing in 2007 was significantly less affordable than in 1971, it nevertheless remained relatively affordable by recent historical standards (Chart 5). The payments portion of the affordability ratio is just the total required homeownership payments measure shown in Chart 4. The resources portion is after-tax income for a married-couple family that takes the standard deduction, which is shown in Chart 1.

The ratio of payments to income suggests that housing was especially affordable in 1971. A married-couple family with two children could support the purchase of a 2006-quality house with just 22 percent of their after-tax income. This low homeownership expenditure share was notwithstanding the purchase of a house that was considerably above average quality in 1971. Then, as interest rates soared during the early 1980s, the required house expenditure share soared as well. In 1981, the affordability ratio reached 43 percent. Almost certainly, a 2006-quality house was out of reach for the median income married-couple household. Thereafter, expenditure-share affordability



*Chart 5***THE RATIO OF REQUIRED PAYMENTS TO AFTER-TAX INCOME**

Married couple family with median income purchasing a 2006-quality house



Sources: U.S. Census Bureau, Freddie Mac, Bureau of Labor Statistics, Bureau of Economic Analysis, NBER TaxSim  
 \*Deflated by CPI-U less shelter

improved as interest rates and the required payments associated with homeownership fell. Beginning in the mid-1990s, rising after-tax income kept the affordability ratio relatively moderate even as required homeownership payments were steadily rising. As a result, the 30 percent ratio of net ownership payments to after-tax income in 2007 was below what prevailed during most of the 1980s.<sup>23</sup>

The decrease in housing-expenditure-share affordability from 1971 to 2007 does not necessarily imply that households were worse off in 2007 than in 1971. Even though the annual required payments associated with owning a constant 2006-quality house rose from 22 percent of income to 30 percent of income, the actual income left over after paying for housing was higher in 2007 than in 1971. More generally, it is not clear what the ratio of payments to income implies in terms of the ability to support the financial requirements of homeownership. The share of income that a household can devote to housing, without causing serious hardship in purchasing other necessities, itself depends on income. A household that earns millions of dollars a year can devote nearly all of this to housing without experiencing hardship. Conversely, someone

with close to zero income will probably experience hardship even spending nothing on housing. An alternative measure of affordability, residual income, better describes the ability to support required homeownership payments while also accurately reflecting household welfare.

### *Residual income affordability*

The residual-income approach to affordability focuses on the resources households have left over after purchasing housing. These left-over resources can be used to purchase nonhousing goods and services and to save. This comparison between required payments and resources is calculated simply by subtracting payments from after-tax income, rather than dividing the former by the latter.

From 1971 to 2007, residual income for a married-couple family purchasing a 2006-quality home first fell steadily and then rose steadily (Chart 6). The fall brought real residual income down from \$32,000 in 1971 to \$22,000 in 1981. The long rise saw residual income attain \$38,000 in 2007. On net, real residual income increased \$6,000 from 1971 to 2007. This is an improvement in affordability of 18 percent, or a 0.5 percent rise per year. In other words, a married-couple family with median income that had just purchased a 2006-quality home could additionally purchase 18 percent more nonhousing goods and services in 2007 than in 1971. Such a family was thus considerably better off in 2007.<sup>24</sup>

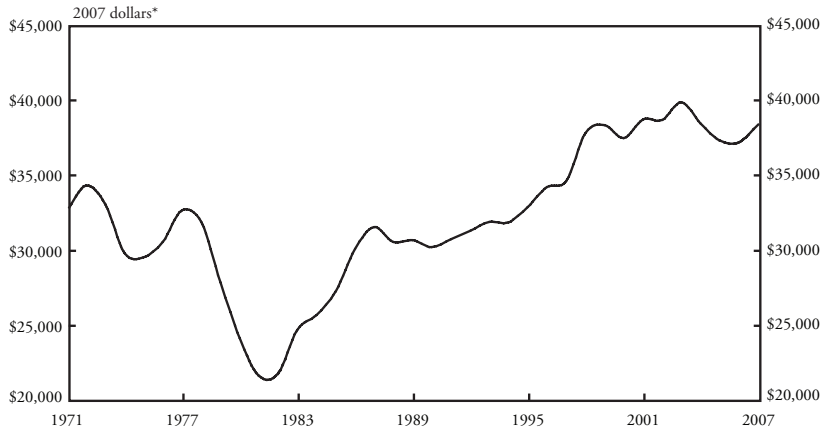
Residual-income affordability needs to be interpreted carefully. As a cash-flow measure, it captures the month-to-month financial challenge of homeownership. A first important caveat, discussed above, is that residual-income affordability does not capture the substantial, though decreasing over time, financial challenge that owners face in saving a downpayment. A second caveat, also discussed above, is that residual income as calculated in this article treats mortgage principal payments as decreasing affordability even though they are a form of savings that builds owner equity.

The increasing affordability of housing as measured by residual income stands in sharp contrast to the many complaints of decreasing

Chart 6

## RESIDUAL AFTER-TAX INCOME AFTER TOTAL REQUIRED PAYMENTS

Married-couple family with median income purchasing a 2006-quality house



Sources: U.S. Census Bureau, Freddie Mac, Bureau of Labor Statistics, NBER TaxSim

\*Deflated by CPI-U less shelter

## THE AFFORDABILITY OF RENTING

Homeownership is often equated with the American dream. But for many households, renting may make more sense. For such households, residual income affordability has improved slightly faster than the residual income of homeowners.

Households that rent tend to have fewer members and less income than households that own their homes. Hence the representative household for determining affordability is assumed to have lower-middle income. Specifically, the representative middle-income household is assumed to have the 40th-percentile income among *all* households (instead of among married-couple households). Such a household had after-tax income approximately 60 percent that of a married-couple household in 2007. This representative middle-income household also experienced slower after-tax real income growth than was experienced by married-couple

households: an average of 0.5 percent per year from 1971 to 2007 rather than 0.8 percent.

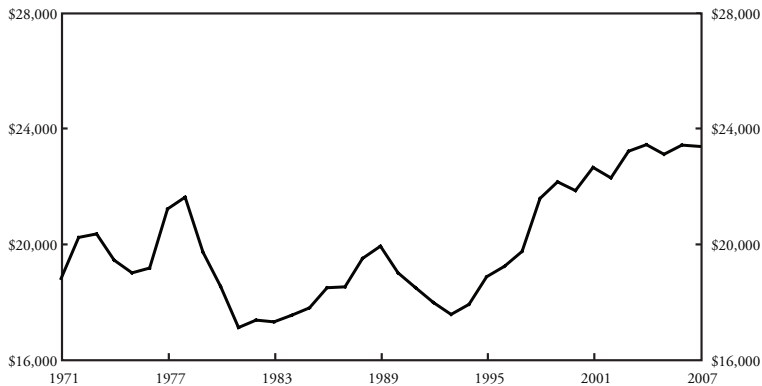
The faster growth in residual income for the representative renter household derives entirely from slower growth in required payments. Real rent growth from 1971 to 2007 averaged 0.4 percent per year, far below the 1.8 percent average rate of increase of required homeownership payments.

The slow growth of renter income combined with slow growth in rental payments resulted in average real residual income growth of 0.6 percent from 1971 to 2006, which compares to average ownership real residual income growth of 0.5 percent (Chart B2).

### Chart B2

#### RESIDUAL AFTER-TAX REAL INCOME AFTER ANNUAL HOUSE RENT

For household with 40th-percentile income renting a 2006-quality unit



Sources: U.S. Census Bureau, Bureau of Labor Statistics, Bureau of Economic Analysis, NBER TaxSim

\*Deflated by CPI-U less shelter.

In contrast to the experience of the representative middle-income renter, rental affordability for many low- and very-low-income households has been declining. The lower a household's income, the lower the quality of the housing unit it can afford to rent. "Low quality" here need not imply unsafe or unlivable. Rather, it might mean smaller, older, and in a less con-

venient location. Research suggests that these units have become increasingly scarce due both to the deterioration of urban neighborhoods that caused the quality of units there to become unacceptably low as well as to the gentrification of other neighborhoods that caused quality to become unaffordably high. Considerable recent research documents the severe burden renting suitable housing presents to many low-income American households (Gyourko and Tracy; Quigley and Raphael; Fisher, Pollakowski, and Zabel).

affordability described in the introduction. The next section discusses some possible explanations for the dichotomy.

#### **IV. WHY IS HOMEOWNERSHIP PERCEIVED AS UNAFFORDABLE?**

The residual income of a married-couple household purchasing a 2006-quality house grew at a moderate rate from 1971 to 2006. This implies that the welfare of such a household improved as well. Why then have so many expressed concern that housing continues to become ever more unaffordable? A number of causes are possible. Some concern measurement issues, while others concern the divergence of actual economic performance from previous expectations.

##### *Measurement explanations for perceived unaffordability*

Measurement explanations for perceived unaffordability are characterized by the contention that the improvement in affordability described above is in some way incorrectly calculated.

*How to compare income and payments.* A first measurement issue affecting perceptions of the financial challenge of homeownership is whether to measure affordability by the ratio formula or the residual one. Measured as a ratio, affordability in 2007 was much worse than in 1971 and had also deteriorated moderately between 2003 and 2006.<sup>25</sup> As argued above, however, households were actually better off with the combination of average income and homeownership payments that prevailed in 2007. Complaints that homeownership was improv-

erishing households may have arisen from the mistaken belief that the increasing ratio of house payments to income implied that households were becoming worse off.

*Choices of representative household and house.* A second measurement issue affecting the judgment of affordability concerns the choices of the representative household and house. The calculation of residual income can be very sensitive to such choices. As described in section 2, a family household headed by someone 35 to 44 years old experienced real residual income growth of just 0.1 percent per year from 1971 to 2007 rather than the 0.5 percent rate experienced by a married-couple family. Other household types may have seen residual affordability decline over time. Similarly, the price of many constant-quality houses may have risen faster than the nationally representative rate. In particular, house price growth was probably sufficiently steep in some metropolitan areas to cause significant declines in residual-income affordability.<sup>26</sup>

### *Outcomes versus expectations*

A different set of explanations for perceived low affordability focuses on expectations. Households' sense of well-being may depend in part on their comparison between actual and expected circumstances.

*Slower residual income growth.* While it is true that residual income grew between 1971 and 2007, the rate at which it did so was considerably slower than during the 1950s and 1960s. An expectation that income would continue to grow at 3 percent per year surely led to disappointment when it actually grew at less than 1 percent per year.<sup>27</sup> Some of this disappointment would probably be directed toward any rise in homeownership payments since they typically constituted the largest category of household expenditures.<sup>28</sup>

*Increasing average house quality.* Expectations also shape the quality of house in which people choose to live. Affordability, as calculated above, holds house quality constant over time. Doing so focuses the analysis of affordability on changes in income and in required homeownership payments rather than on changes in the nature of housing. But, in reality, numerous households were not content to remain in a constant-quality house. Instead, many upgraded to higher-quality houses, either by renovation or by moving. Many other households

probably wished to do the same. Thus the financial challenge of purchasing the *desired* level of housing may have increased by more than is suggested by the residual income measure of affordability.<sup>29</sup>

*Increased workforce participation.* Still another set of expectations shaping the perceived affordability of housing concerns the rise in workforce participation by married women. Increasing paid work by women has been an important contributor to household income, especially for the married-couple representative household. For married-couple households that desired to keep their labor force participation at some initial level, the representative income time path used in the affordability calculations above overstates growth. Hence the increase in residual income overstates the change in affordability, which very well may have been negative. The justification for letting the increase in married women's workforce participation help improve affordability, as discussed above, is that it occurred for many reasons unrelated to economic necessity.<sup>30</sup>

Of course, there may be many other sources for the perceived unaffordability of housing. Whatever the reason, it is clear that accelerating the rate of increase in affordability is highly desirable.

## V. SUMMARY AND CONCLUSIONS

The real required payments associated with homeownership increased rapidly from 1971 to 2007. As a result, the financial challenge of purchasing housing was perceived by many to become more difficult. Importantly contributing to this perception was household income growth that was relatively sluggish compared to the previous decades.

Measuring affordability as the ratio of the required payments on a constant-quality house relative to after-tax income shows affordability in 2007 to be above its level during the 1980s but otherwise below its level during most of the remaining years since 1971. For a married-couple household with median income purchasing a 2006-quality house, housing's expenditure share of after-tax income rose from 22 percent in 1971 to 30 percent in 2007. This fall in ratio affordability reflects that required homeownership payments grew more quickly than after-tax household income.

But ratio affordability poorly reflects household welfare. For the same married-couple household purchasing the same constant 2006-quality

house, the rise in after-tax income from 1971 to 2007 more than offset the rise in required payments. As a result, residual income increased by 18 percent and affordability improved.

Notwithstanding this improvement in affordability, the growth rate of residual income from 1971 to 2007 was much slower than it had been during the 1950s and 1960s. An obvious question is how public policy might promote faster residual income growth for middle-income Americans. As the formula for calculating residual income makes clear, successfully accelerating its growth requires accelerating after-tax income growth or slowing required payment growth or both. Unfortunately, finding plausible public policies that can achieve either of these may prove difficult.



## ENDNOTES

<sup>1</sup>However, no such inference can be made between house prices and house quality based on sales at different points in time. The reason is that the price of housing, holding quality constant, may itself have changed.

<sup>2</sup>Constant-quality house price indexes typically assume that house prices grow at identical rates regardless of quality. In other words, they rule out the possibility that high-quality house prices grow faster than do low-quality house prices. In fact, there is no reason to expect such identical price growth to be true. See Rappaport (2007) for a discussion.

<sup>3</sup>With housing quality held constant, residual income affordability correctly ranks combinations of income and payments according to which most benefit households.

<sup>4</sup>All real values in this article represent the purchasing power in 2007 dollars of goods and services *other than housing*. The conversion from nominal to real 2007 dollars uses a modified version of the Consumer Price Index that excludes shelter. For residual income affordability, such a price index correctly allows for the comparison of purchasing power toward nonhousing goods and services after housing costs have been met. More generally, using the entire CPI index to deflate housing costs understates their relative change since housing costs are themselves a large component of CPI.

<sup>5</sup>A “family household” simply means a household with two related members. The increasing trend of two adult household members both working increased the income growth of married-couple households.

<sup>6</sup>Since unmarried women had already been likely to work, a disproportionate share of the increase in women’s labor force participation was by married women.

<sup>7</sup>So too did clean heating. Coal had been a rich source of household soot. It also required considerable work by household members. Coal, coke, and wood together heated 45 percent of households in 1950. This fell to just 4 percent of households in 1970 and less than 2 percent in 2000 (U.S. Census Bureau).

<sup>8</sup>An additional reason for the increase in women’s labor force participation may have been that women were delaying starting a family until a later age.

<sup>9</sup>Calculations were done using NBER’s TaxSim. Estimated federal income tax is based on taking the standard deduction. State income tax estimate is based on average itemized deductions of households with similar income.

<sup>10</sup>Federal taxes are calculated based on taking the standard deduction rather than itemizing, as homeowners typically do. But for the purpose of measuring homeownership affordability, the tax savings from itemizing is treated as a reduction in ownership costs rather than as an increase in after-tax income.

<sup>11</sup>The estimated growth rate is based on the Freddie Mac Conventional Home Price Index, purchase-only version. This is very similar to the better-known purchase-only OFHEO House Price Index. The advantage of the Freddie Mac index is that it starts in 1970 rather than 1975. For present purposes,

a concern with constant-quality price indices is that they may not be successful in holding quality constant. In particular, the repeat-sales variety of such indices assume that houses maintain their quality over time rather than deteriorate. Thus a house that is purchased in 1971 is assumed to have the same quality 36 years later when it is sold in 2007. This concern is at least partly offset by the inability of repeat-sales indices to statistically control for increases in quality from home capital improvements. For more details on constant-quality home price indices, see Rappaport (2007).

<sup>12</sup>More specifically, the median-income household in any specific year should desire to purchase the median-quality, median-priced house in that same year. However, the fact that the housing market is relatively illiquid, with many homeowners remaining in the same house for many years even as average new house quality rises, may cause some discrepancy between the median-income household and the median-quality home.

<sup>13</sup>The *level* of affordability, however, depends closely on the choice of base year. For a given level of income, the lower median quality of houses in earlier years makes them more affordable.

<sup>14</sup>Net deposits combine households' equity investment in first, second, and other mortgages. If a household borrows 80 percent of a purchase price via a first mortgage and 10 percent of the value of a purchase price via a second mortgage, the net deposit is 10 percent. Note that downpayments are not a cost of homeownership. Rather they convert one type of household asset (money) into another (homeowner's equity).

<sup>15</sup>The surge in foreclosures that began in 2006 has led to large financial losses for many households. It is possible that some of these households would have benefited from a higher downpayment hurdle that prevented them from purchasing a house they ultimately could not afford.

<sup>16</sup>The popularization of adjustable-rate mortgages (ARMs) in the early 1980s partly mitigated the increase in fixed rates. Interest rates on ARMs are reset annually based on an observed benchmark such as the rate banks charge each other for short-term loans. In the mid 1980s, ARM interest rates were more than two percentage points below fixed rates. For households willing to bear the significant risk that interest rates might substantially rise, monthly payments were substantially lower than is showed. As a result, more than two-thirds of new mortgages in some years featured adjustable interest rates (Nothaft and Wang). Since the mid-1990s, the rate differential between fixed and adjustable mortgages has considerably narrowed, and the share of mortgages featuring adjustable rates has tended to stay well below one-third (Freddie Mac). Hence comparisons between 1971 and 2007 of payments and affordability calculated using fixed-rate interest rates should be relatively representative notwithstanding the introduction of adjustable-rate mortgages.

<sup>17</sup>Interest payments are assumed to be on a 30-year fixed-rate mortgage with a 90 percent loan-to-value ratio. The interest rate is the annual average of monthly rates reported in the Freddie Mac Primary Monthly Market Survey.

<sup>18</sup>Alternatively, excluding principal payments lowers net required homeownership payments by 1 percent (when interest rates are high) to 15 percent (when interest rates are low).

<sup>19</sup>Maintenance and real estate taxes are each assumed to equal 1 percent of house value (structure plus land)(Harding, Rosenthal, and Sirmans; Emrath; Siniavskaia). Homeowner's insurance is assumed to equal 0.33 percent of house value.

<sup>20</sup>The tax savings is calculated as the additional federal taxes a married-couple household with two children and median income would pay taking the standard deduction rather than itemizing its mortgage interest expense plus all other qualifying expenses. The calculation is done using the NBER's TaxSim program. It is assumed that nonowners minimize taxes by taking the standard deduction and that qualifying homeownership expenses are the difference that makes itemizing desirable. In this case, any tax savings a homeowner realizes by itemizing, regardless of the type of deduction, should be treated as an offset to ownership costs. For example, state and local income taxes can be claimed only because ownership makes it profitable to itemize, and so their deduction lowers the required payments associated with ownership.

<sup>21</sup>The increase in the after-tax income of non-homeowners did not actually hurt homeowners. Treating the decrease in the homeownership tax subsidy from the increase in the standard deduction as increasing required homeownership payments is an accounting convention. The same accounting convention treats after-tax income for homeowners as being measured based on taking the standard deduction. More generally, any savings from itemizing compared to taking the standard deduction are accounted for as a reduction in payments. Hence, the real dollar increase in net payments from the increase in the standard deduction was exactly offset by a real dollar increase in measured after-tax income. The combined amount of housing, nonhousing goods and services, and savings that the representative could afford was thus unchanged. Equivalently, residual income affordability was unchanged. Ratio affordability, on the other hand, fell because the *percentage* increase in payments exceeded the *percentage* increase in measured after-tax income. Separately, the stricter limits on itemizations were primarily with respect to nonhousing expenses. Nonhousing deductions effectively lower homeownership payments to the extent that they rely on housing expense deductions to be usable. Typically, nonhousing deductions do not collectively exceed the standard deduction, which is why most non-homeowners do not itemize. In contrast, homeownership deductions typically exceed the standard deduction, thereby making it beneficial to itemize. Homeownership then gets "credit" for the tax savings from the nonhousing deductions, which otherwise would not

have been claimed. TRA thus lowered the amount of such credits that homeownership could claim.

<sup>22</sup>An additional cost not considered here arises from commuting. The time and monetary costs associated with transportation to and from work can be considerable. However, the constant-quality house price indexes used herein explicitly hold location constant. Thus any increase in commuting time that affected constant-quality house prices arose only from increased congestion or a change in the location of work.

<sup>23</sup>Excluding principal payments from required payments implies a path of ratio affordability that rises from 19 percent in 1971 to 26 percent in 2007.

<sup>24</sup>Alternatively, excluding mortgage principal payments from total required payments implies that real residual income increased by 21 percent, or 0.53 percent per year (versus 0.46 percent per year including principal payments).

<sup>25</sup>Residual income also declined from 2003 to 2006.

<sup>26</sup>Of course, households that already own their house experience a capital gain when house prices rise. Any associated rise in property taxes due to the increase in house valuation might be met by borrowing against the increased homeowner equity. Often this may not be possible, in which case required payments will have risen even for long-time owners. Separately, increases in house prices in a metro area may be accompanied by sufficient increases in income to offset the increased costs. But research suggests this typically did not occur (Albuoy; Chen and Rosenthal). To compare affordability across metro areas, residual income should be estimated for an identical household and an identical house. Doing so requires statistically holding constant the substantial demographic and house type variations across metro areas. Put differently, a metro area's affordability should be measured by the residual income that a nationally-representative household would have if it purchased a nationally representative-quality house in that metro area. In the context of comparisons across metro areas, lower affordability is not necessarily undesirable. The reason is that lower affordability may occur in places where people very much want to live due to high levels of amenities—for example, nice weather. If people are highly mobile, migration should eliminate welfare differences across metro areas. The crowding of people into high-amenity metros lowers affordability there by an amount that exactly offsets the welfare gain from the amenities (Rosen; Roback; Rappaport, 2008).

<sup>27</sup>Real pretax income between 1950 and 1971 grew at 3.2 percent per year. The mortgage payments on a constant-quality house between 1950 and 1971 grew at a 2.5 real percent (Shiller). The calculation of residual income growth during the 1950s and 1960s requires several additional, primarily tax-related, elements. If after-tax income growth matched pre-tax growth and if all required payments matched mortgage payments, residual income during the 1950s and 1960s would have grown at a 2.7 percent rate. Even if these latter conditions were not met, it is almost certain that residual income growth during the 1950s and 1960s was far above the 0.5 percent rate from 1971 to 2007.

<sup>28</sup>The disappointing growth of residual affordability from 1971 to 2007 resulted primarily from slower income growth rather than from any speedup in the growth of required homeownership payments. Real pretax income growth slowed from 3.2 percent from 1950 to 1971 down to 1.0 percent from 1971 to 2007. Real mortgage payment growth on a constant-quality home slowed from 2.5 per cent per year from 1950 to 1971 down to 1.4 percent per year thereafter (the earlier growth rate is based on historical house price data reported in Shiller). Without the slowdown in payments growth, residual income affordability from 1971 to 2007 would have grown even more slowly than it actually did.

<sup>29</sup>Residual income can alternatively be calculated allowing quality to increase, for instance, by using the median price of homes over time.

<sup>30</sup>Distinguishing between the choice to work due to otherwise low residual income versus due to some other reason is subtle. Most people who participate in the labor force are at least partly motivated by meeting financial challenges. An expanded notion of residual income can help clarify the extent to which increased participation more broadly affects affordability. Participating in the labor force typically requires reducing time devoted to other activities such as house cleaning, child rearing, education, and leisure. Reducing such activities incurs an opportunity cost determined by the household's valuation of the activities. Thus if a spouse returns to work, a broader notion of residual income would subtract such costs from the extra earnings. On the other hand, if going back to work brings nonwage benefits such as career satisfaction, these should be added to residual income.

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