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8 Housing and Saving in the United States

Jonathan Skinner

8.1 Introduction

Between 1955 and 1970, the share of owner-occupied housing in total household net wealth hovered around 21 percent. In the nine years between 1970 and 1979, housing wealth climbed to 30 percent of net wealth (Board of Governors 1991).[1] During the 1970s, the increased value of owner-occupied housing delivered a $700 billion windfall (in 1986 dollars) to homeowners. While the share of housing has since fallen to 28 percent, it is likely that consumption and saving decisions by American households have been affected by this fundamental shift in the size and composition of U.S. household wealth.

How has this shift in housing prices affected aggregate capital accumulation? Will the combination of higher long-term inflation rates and higher real housing prices since the 1970s depress future nonresidential saving? The first goal of this paper is to survey the growing literature on life-cycle housing decisions to shed light on these issues. Such empirical and theoretical studies have examined the "tilting" of real mortgage payments during periods of high inflation, the down-payment constraint, the introduction of home equity loans, mobility decisions of the elderly, and the impact of uncertainty in asset returns—including housing assets—on household portfolios. The implication of these studies appears to be that both higher real housing prices and higher inflation rates should have only a small impact on aggregate capital accumulation in the long run.

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1. Wolf (1989) calculated that owner-occupied equity as a fraction of total wealth in 1980 was at its highest level in this century.

Most of the theoretical work has been couched in terms of steady-state comparisons between equilibrium solutions. In the theoretical models, shifts in the underlying structure of the model are anticipated, and the economy has time to adjust to the new regime. For those who rode the tide of higher housing prices in the 1970s and parts of the 1980s, the shift in housing wealth was largely unanticipated and the economy's response largely short-run in nature. The second goal of this paper is to examine how the *unexpected* wealth increase in the 1970s affected both individual portfolios and aggregate saving behavior in the short run.

The standard life-cycle model predicts that an unanticipated increase in housing wealth should have a much larger impact on aggregate saving in the shortterm. Homeowners are predicted to increase consumption in response to the windfall. Indeed, some economists have attributed the low saving rate in the 1980s to the consumption behavior of homeowners unlocking their housing capital gains with home equity loans or by drawing down other assets. When the life-cycle model is expanded to include a bequest motive, however, the answer is less clear. In 1988, the Economist conjectured that "most of those who inherit their parents' home . . . will regard the proceeds of their parents' thrift as an insurance against poverty in their old age. So, for the time being, they will save, converting their parents' physical assets into financial equity of their own." (April 9, 1988, 13).

That is, the question of whether housing windfalls are spent or passed along to future generations is crucial to understanding how the housing windfall has affected aggregate saving. As is shown below, the evidence is not entirely clear on this question; aggregate data appear to support the notion that housing wealth is spent, but microeconomic data suggest that the housing wealth is saved.

The converse of this unexpected wealth enjoyed by existing homeowners is the unexpected high housing prices faced by potential house buyers. The third goal of the paper is to examine how higher housing prices affects current renters. In comparing saving behavior across metropolitan areas, Sheiner (1990) found that higher housing prices encourage saving for the now larger down payment. That is, the shift in housing prices—particularly in urban areas—could have indirectly spurred overall wealth accumulation by the young.

The final goal is to measure how the fundamental change in housing values has affected the riskiness of household portfolios. Are current younger households facing greater economic uncertainty as a result of overleveraged houses? I use the *Survey of Consumer Finances* from 1969 and 1986 to show that the ratio of mortgage principal to housing value actually declined during the period, suggesting that households are not at appreciably greater risk from highly leveraged housing. If families are not more leveraged, then are they at greater risk from volatile housing prices? Evidence from the *Panel Study of Income Dynamics* (PSID) suggests that housing prices were only slightly more variable in the late 1970s than they were in the late 1960s.

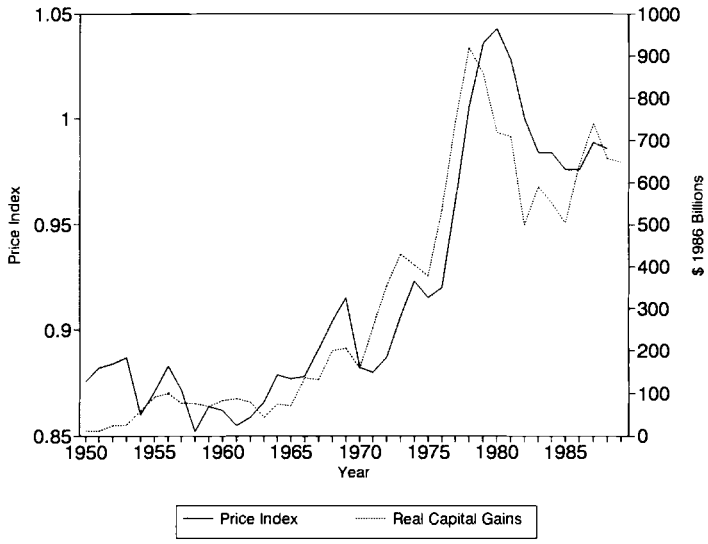

Fig. 8.1 Housing prices and housing real capital gains, 1950–89
Sources: McFadden 1992; Federal Reserve System, various years.

The next section documents the broad-based change in the housing wealth of the United States during the 1970s. First, the dramatic capital gains in housing wealth during the 1970s are documented using aggregate data from the Federal Reserve Bank's balance sheets. Second, microeconomic evidence from the *Survey of Consumer Finances* in 1969 and 1986 is used to establish two empirical regularities: housing equity makes up a majority of total wealth for the median household, and housing equity grew relatively uniformly between 1969 and 1986 across both age and income groups. That is, changes in housing value during the 1970s had a major impact on the asset positions of a large fraction of U.S. households.[2]

8.2 An Overview of Housing Wealth

Figure 8.1 shows the real index of housing prices between 1950 and 1989 based on the Commerce Department deflators for housing prices and quality indices (McFadden 1992). Following gradual stagnation of housing prices in the 1950s and 1960s, prices turned up sharply by 18 percent in the 1970s before a decline in the 1980s.

These price shifts led to substantial changes in wealth holdings. Figure 8.1

2. By contrast, changes in the value of financial wealth such as stocks affect consumption and saving decisions of only the 28 percent of families that own any stocks at all (Mankiw and Zeldes 1991).

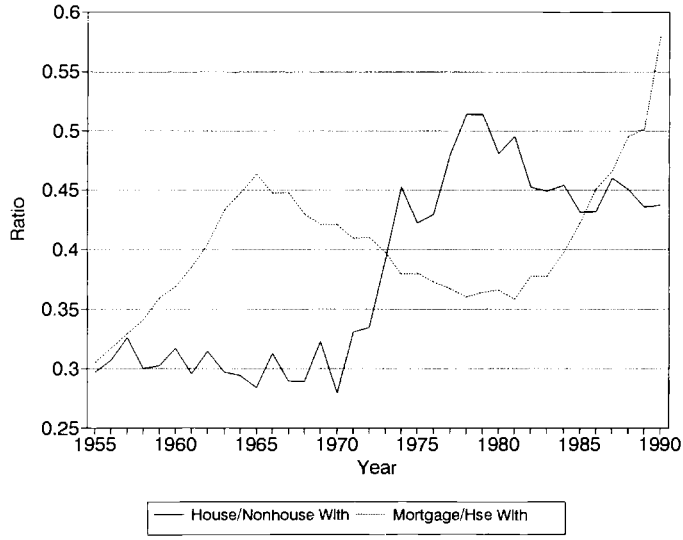

Fig. 8.2 Ratio of housing to nonhousing wealth, and mortgage to housing wealth, 1955–90
Sources: Federal Reserve System, various years.

documents the magnitude of capital gains—or wealth appreciation net of new investment—in the housing market. Using 1950 as the benchmark, Federal Reserve Board data on housing and landholdings are used to calculate accumulated real capital gains in owner-occupied housing.[3] By the end of the 1970s, accumulated capital gains in housing neared $1 trillion. To express this in another way, average capital gains in housing between 1970 and 1978 was 42 percent of average real personal saving.[4]

Housing has become a more important element in the aggregate wealth portfolio. Figure 8.2 graphs the ratio of owner-occupied housing assets to net nonhousing wealth between 1955 and 1990.[5] This ratio has grown from 0.31 in the 1960s to a high of 0.49 in 1979, when housing was at a high and stock markets at a low, before declining through the 1980s. Even in 1990, this ratio was 15 percentage points higher than in 1965.

The ratio of mortgage debt to total housing wealth, reported in figure 8.2, is a good measure of the degree of leverage in housing markets. Not surprisingly, the ratio of mortgages to housing wealth fell during the 1970s to a low of 0.35

3. As McFadden (1990) notes, his price index excludes changes in land prices. However, his index matches the pattern of wealth changes quite closely, and those wealth changes include land.

4. Personal saving does not include capital appreciation in housing.

5. Note that this aggregate measure includes nonhousing wealth of renters as well as homeowners. Net nonhousing wealth is calculated as net wealth less durables less owner-occupied housing and land. Unfortunately, assets of trust and nonprofit organizations are included with these household figures. See Board of Governors (1991).

Table 8.1 Housing Equity and Tenure, 1986

Age	Homeowner (%)	Equity/ Net Worth	Median Equity/ Net Worth
Under 31	40.4	.480	.597
31–40	57.5	.443	.604
41–50	70.5	.354	.563
51–60	78.3	.287	.613
61–70	70.9	.239	.545
Over 71	65.0	.264	.611

Source: Survey of Consumer Finances, 1986.

in 1979—mortgages tend to be fixed nominally and adjust slowly over time, while the value of housing changes more rapidly. What is more surprising is that even during the mixed housing markets of the 1980s, the leverage ratio has more than rebounded from its previous low level. By 1990, the ratio was 58 percent, 23 percentage points higher than the equivalent ratio in 1965. Some part of the increase was caused by the relatively tax-favored status of housing mortgages following the Tax Reform Act of 1986.

Aggregate household wealth measures are useful for assessing changes in the overall capital stock, but given the skewed distribution of wealth, they provide less information about the extent to which households are affected by the changes in asset value. For example, one might expect that changes in the stock market might affect the consumption of households that own stock, but 72 percent of households own no stocks at all (Mankiw and Zeldes 1991). To measure the extent to which housing price changes might affect consumption choice across households, I use microeconomic data from the 1969 and 1986 *Survey of Consumer Finances.* While they share the same name, the 1969 survey was administered by the Michigan Survey Research Center and focused largely on durable and automobile purchases, so the wealth data are less complete than for the 1986 survey.[6]

Table 8.1 presents summary statistics on home ownership and the share of housing wealth to total wealth for the 1986 sample only, with families weighted to be representative of the total population.[7] The first column tabulates the percentage of families in that age group who own a house. The percentage who own houses rises from 40 percent under age 31 to a peak of 78.3 percent for ages 51–60.

Focusing on the importance of housing in the wealth portfolio for homeown-

6. The unit of observation is neither the family or the individual, but the automobile. Hence a family with three cars would appear in the sample three times. The subsequent analysis has corrected for this unusual weighting scheme.

7. Observations were deleted if income was below $2,000 or if—for homeowners—either the house market value was less than $2,000 or if mortgage payments were not made on a monthly basis. A total of 2,726 observations remained, of which 2,148 represented homeowners.

Table 8.2 **Housing Equity and Income by Age, 1969 and 1986**

Age	Housing Equity, 1986	Change in Equity, 1969–86 (%)	Family Income, 1986	Change in Income, 1969–86 (%)
Under 31	27,494	50.13	32,241	1.84
31–40	40,396	32.89	38,709	2.92
41–50	69,411	75.08	50,035	24.22
51–60	74,560	42.15	40,714	15.59
61–70	76,397	67.68	31,020	61.38
Over 71	60,490	64.78	25,206	44.17

Source: Survey of Consumer Finances 1969, 1986.

ers, table 8.1 details the aggregate share of housing equity to total net wealth for each age group. Aggregate housing equity accounts for less than half of total net wealth, with the fraction falling to roughly one-quarter at ages above 51. These fractions are not representative of the typical family, however, because of the highly skewed distribution of nonhousing wealth. A better measure of the importance of housing is the (weighted) median ratio of housing equity to net household wealth, again broken down by age. Table 8.1 suggests no age trend in this ratio; the *median* homeowner holds slightly more than half of his wealth in housing equity regardless of age. That is, at least in the 1986 cross-section, housing equity and nonhousing wealth is accumulated at roughly the same rate as homeowners age.

Were the aggregate increases in housing wealth concentrated within a few age groups or income groups? Table 8.2 details the changes, for homeowners, in housing equity and income in constant 1986 dollars. There is a consistent rise in the real value of home equity across age groups, with the largest increase, 75 percent, for those aged 41–50.[8] In part, these increases may be a consequence of the overall rise in family income during the same period. But as table 8.2 shows, the average increase in real income was at most half of the percentage increase in home equity, at least for those under the age of 61.

The increase in home equity across income groups was not as evenly distributed. For homeowners only, table 8.3 presents a comparison of housing equity in 1969 and 1986 by income decile, once again expressed in 1986 dollars.[9] For most deciles, real housing equity rose by roughly 50 percent over the period. Not every group experienced an increase in housing equity; decile 3 registered

8. These are not comparisons among "synthetic cohorts"; a homeowner who was 28 in 1969 would have been in the "<31" category in that year but in the "51–60" category in 1986.

9. The income deciles were created by the *Survey of Consumer Finances* for the entire sample. Hence the subsample of homeowners is likely to be underrepresented in the lower deciles.

a 13 percent decline. By contrast, housing equity for the highest income decile more than doubled.

In summary, despite its relatively small share of total national wealth, housing is a dominant asset for the majority of American households that own homes. The dramatic changes in housing wealth during the past two decades were widely distributed across many groups, although middle-aged and higher-income families appeared to have experienced the greatest growth in housing equity between 1969 and 1986. Section 8.3 addresses a much harder issue, which is how this broad-based change in wealth might be expected to affect long-term capital accumulation.

8.3 Housing in the Life-Cycle Model

The life-cycle model of consumption is the standard workhorse for analyzing housing and saving decisions. This section reviews the basic results arising from the theoretical models, and asks how well these models explain the observed changes discussed in section 8.2. I restrict the analysis to owner-occupied housing.

It is easiest to begin with a partial equilibrium life-cycle model under complete certainty. If moving costs were negligible, financing considerations ignored, housing perfectly divisible (either rented or owner-occupied), and capital markets perfect, then the life-cycle model would predict that housing consumption would be chosen continuously in conjunction with other types of consumption. Housing investment could then be chosen according to an optimal portfolio rule, but it would not necessarily be equal to optimal housing consumption.

Table 8.3 **Housing Equity and Income by Decile, 1969 and 1986**

Decile	Housing Equity, 1986	Change in Equity, 1969–86 (%)	Family Income, 1986	Change in Income, 1969–86 (%)
1	35,249	52.55	3,985	0.61
2	35,782	6.53	7,613	−0.65
3	40,234	−12.94	11,660	−4.70
4	47,809	73.39	15,480	−6.90
5	40,811	57.73	19,993	−5.15
6	47,035	45.57	25,149	−0.83
7	51,265	44.34	30,891	2.70
8	52,274	58.96	38,379	8.81
9	67,972	65.77	49,019	14.46
10	128,898	101.04	108,054	47.59

Source: Survey of Consumer Finances 1969, 1986.

A number of authors have pointed out the implausibility of such a model and have introduced a variety of factors to make the analysis of housing more realistic. They have focused on (1) a down-payment constraint, (2) equality between housing held for consumption and housing held for investment, (3) moving costs, and (4) high initial real mortgage payments during an inflationary period, or "tilt."

Restrictions by banks on borrowing lead to minimum requirements not only for current income, but also for current liquid wealth. Hence high lifetime-income but low current-wealth families could be constrained by higher housing prices either to defer home ownership or to begin with a smaller ("starter") house at early ages. Jones (1990), for example, found that the presence of liquid assets was a very strong positive predictor of home ownership, holding current earnings constant, in a sample of young Canadians. Liquid wealth may have a weaker impact on housing demand in the United States; in Canada, mortgages neither allow tax-deductible interest payments nor twenty–thirty-year loan periods.

The second complication in typical housing markets is that the consumption of owner-occupied housing is typically limited by the amount invested (Henderson and Ioannides 1983). This constraint, coupled with a minimum house size, implies not only that households must balance consumption demand for housing with optimal investment choices, but that the lumpy nature of housing may leave their wealth portfolio highly undiversified for moderate lengths of time.

Moving costs introduces a third element of rigidity (or "stickiness") to housing choices. Grossman and Laroque (1990) develop an elegant generalized model of durable purchases and show that small moving costs may lead to considerable rigidity in durable (or housing) consumption. This result suggests that changes in the timing of housing consumption over the life cycle have relatively little impact on lifetime utility. The intuition is as follows: Suppose that without adjustment costs a family would move six times during the life cycle. With the introduction of a small adjustment cost, the family moves only four times. Hence the utility loss (in dollar terms) of the existence of adjustment costs is bounded from above by only twice the small adjustment cost.[10]

Finally, high persistent inflation rates coupled with fixed nominal mortgage interest payments leads to a "tilting" of real mortgage payments (Kearl 1979; Schwab 1983). Inflation raises the nominal interest rate and thereby increases the fixed nominal mortgage interest payment. This in turn tilts the real mortgage interest flows toward earlier payments. While the nominal payment is fixed for the life of the mortgage, the real payment gradually declines over time. For example, Schwab (1983) considers two thirty-year mortgages of $20,000, each with a real interest rate of 3 percent (and ignoring tax issues). In the first case, inflation is zero, and real (and nominal) annual payments are

10. In practice, of course, adjustment costs may be substantial.

$1,020. In the second case, the inflation rate is 8 percent and the nominal rate 11 percent. Real mortgage payments vary from $2,130 in the first year to only $229 in the final year.

Suppose that the increase in housing prices during the 1970s was a permanent change. According to the theoretical model, housing purchases are likely to be deferred because of down-payment constraints and the restrictions on borrowing. The equality of housing investments and housing consumption may further discourage purchases of housing, since a larger expenditure share would also imply a larger and less balanced portfolio share of housing. Mobility may also rise as households must closely match housing size with their current (rather than future) income.[11] The consequent rise in adjustment costs from more frequent moves might further reduce the demand for housing.

How would housing prices affect overall saving? Obviously, a higher house price implies fewer nonhousing assets. To the extent that families defer house purchases, overall (nonhousing) saving may be increased. For example, Krumm and Kelly (1989) present evidence that saving rises prior to the house purchase to meet the down payment, and after the house purchase to rebuild liquid assets. Still it is unlikely in the aggregate that changes in the time path or in the composition of housing and nonhousing consumption will have a large impact on aggregate capital accumulation. Hayashi, Ito, and Slemrod (1988) developed a life-cycle model to test how higher housing prices would affect aggregate saving. They applied the model to the Japanese economy and suggested that the higher Japanese housing prices relative to the United States account for only a small fraction of the overall differences in saving rates between the two countries.

Inflation is predicted to have an ambiguous impact on housing demand. The tilt effect tends to encourage the deferral of housing purchases and to reduce the total quantity of housing (Schwab 1983; Kearl 1979). Because the tilt effect increases real mortgage payments when the house is purchased (from $1,020 to $2,130 in the example above), prospective home buyers may find that limitations on mortgage payments as a fraction of current income require them to come up with a larger down payment. Hence inflation could render the minimum down-payment constraint superfluous.

Offsetting this effect is the potential tax advantage of home ownership in an inflationary world. The nominal appreciation of owner-occupied housing is essentially untaxed.[12] Hence when inflation and the nominal interest rate both rise in tandem (the orthodox Fisher effect), both the real return on alternative

11. That is, suppose that anticipated earnings in the future are large. A family might choose to purchase a larger house now to avoid the transactions costs of moving in the future. With more expensive housing prices (and a tilt in mortgage payments), families are less able to anticipate future housing demand because of down-payment or mortgage constraints.

12. The effective tax rate on housing wealth gains is very low because of the $125,000 allowance for capital gains of housing for owners over age fifty-five and the stepped-up basis at death.

nonhousing investment and the real cost of mortgage financing fall, conferring a greater advantage to home ownership over other forms of wealth.

Housing would not benefit from inflation in the presence of taxation if nominal interest rates rose by a sufficient amount to keep the after-tax real return unchanged.[13] The intuition is that the after-tax rate of return on alternative, nonhousing assets is unchanged in the presence of heightened inflation, so the asset value of housing is similarly unchanged. There is little evidence to support this modified Fisher effect; empirical evidence suggests that nominal interest rates rise by at most the change in inflation (Tanzi 1980; Melvin 1982). Goodwin (1986) finds that the tax-inflation benefits and the tilt effect roughly cancel each other out, implying that anticipated inflation has a neutral impact on housing demand in the long term.

How might inflation affect the degree of leverage in the house? On the one hand, households may seek to increase their initial leverage rate because of the shortened real duration of their mortgage.[14] On the other hand, bank requirements restricting the ratio of nominal mortgage payments to nominal income would restrict leverage, forcing new home buyers to provide larger down payments. As is shown in section 8.7, the empirical result that leverage rates have not changed dramatically between 1969 and 1986 lends some credence to the view that these two effects also offset one another.

One potential solution to the tilt problem currently being considered by the U.S. government is to offer inflation-adjusted mortgage policies. Under this plan, households would pay only the real interest rate (nominal interest minus inflation), with the inflation premium rolled back into the mortgage principal. Kearl (1979) suggested that such a plan would increase the demand for housing substantially. Of course, by stimulating demand for an asset that already enjoys tax advantages, the net impact on nonresidential saving and government revenue might be negative.

The orthodox life-cycle model has strong predictions about the housing decisions of the elderly—they should be dipping into home equity and possibly downsizing their home. Section 8.4 examines in more detail the empirical support for these predictions.

8.4 Housing Demand by the Elderly

Housing is both a consumption good and an investment good. While the life-cycle model may have little to say about consumption by the elderly, it does imply that retired households should gradually spend down both housing and nonhousing wealth. A number of recent studies, however, have found little

13. That is, the nominal interest rate would rise by $1/(1 - t)$ points for every point increase in the inflation rate, leaving the real after-tax return on nonhousing equity unchanged (Darby 1975). Berkovec and Fullerton (1989) address this issue in a general equilibrium setting.

14. That is, the inflation tilt loads real mortgage payments in earlier years, thereby reducing the effective length of the loan.

evidence of the gradual downsizing of home equity implied by the life-cycle model (Merrill 1984; Venti and Wise 1989, 1990; Feinstein and McFadden 1989). In fact, these studies have found that retired households on average are as likely to increase their housing equity as to decrease it. Merrill (1984) reports that more retired households switch from *renters* to *owners* than from owners to renters, not a transition normally associated with life-cycle "downscaling." Additional evidence comes from Feinstein and McFadden (1989), who suggest that more than one-third of elderly households reside in dwellings with at least three more rooms than the number of inhabitants, and are hence "overconsuming" housing services.

Despite the apparent inability of the life-cycle model to explain such phenomena, it cannot yet be discarded as a model of retirement housing demand for a number of reasons. First, the life-cycle model places no restrictions on the housing consumption choice of the elderly (see also Ioannides 1989a). Absent evidence that housing choices of the elderly violate restrictions on utility, the demand for housing services may simply be stronger at older ages (e.g., Venti and Wise 1990). Alternatively, the decline in the user cost of housing for older families (Ai et al. 1990) could induce relative price effects for housing as well.

Furthermore, Sheiner and Weil (1992) present persuasive evidence that elderly households do reduce their housing services, although the reduction generally occurs later in the life cycle and is often precipitated by widowhood.[15] For example, the home-ownership rates of all women aged 65–69 is 77 percent; by ages 80—85, the percentage drops to 59, with less than half owning their own house after age 85. They also report that for widows, home ownership falls by 12 percentage points and median home equity by roughly 30 percent, in the four years after the husband's death. Based on comparisons of home ownership for high- and low-income households, they suggest that these changes in housing tenure are a consequence of taste changes rather than financial necessity.[16]

Suppose that retired households are consuming housing optimally. A portfolio model of the life cycle might still predict that households should attempt to spend down their home equity.[17] But as Merrill (1984), Venti and Wise (1989), and others have shown, housing equity for the elderly generally increased during the period of analysis. How can this finding be reconciled with the life-cycle model?

There are at least two possible explanations. The first is that the size of home equity is not large, so that the gains to tapping into home equity through re-

15. Venti and Wise (1989) and Feinstein and McFadden (1989) earlier noted the strong impact of events such as widowhood, children's moving, or divorce on mobility decisions, but did not directly test the impact of such changes on ownership patterns.

16. Feinstein and McFadden (1989), however, suggest that families with both low incomes and low levels of liquid wealth are more likely to switch from owner-occupied to rental property conditional on moving.

17. Alternatively, individuals could spend down other types of assets but leave housing equity unchanged. However, such a strategy would lead to an unbalanced portfolio.

verse mortgages is light.[18] For example, Venti and Wise (1991) suggest that the reverse mortgage would supplement income for the median retired families by between 4 and 10 percent of their existing income. In short, the transactions costs of reaching the home equity may not be worth the minimal extra income.

A different explanation for why home equity was observed to increase for elderly families is that the period of time covered by the *Retirement History Survey*—the predominant source of data on elderly housing—was also a period during which housing prices rose substantially. So increases in home equity may not have been a conscious life-cycle plan by retired households, but rather the outcome of housing windfalls.

McFadden (1992) has developed a model of housing demand and supply to predict the future trends in housing prices based on projected income and demographic changes. His preliminary results suggest that the capital appreciation in housing enjoyed by earlier cohorts will nearly evaporate for later cohorts, with real returns on housing dropping from an annual average of 3 percent (for cohorts born between 1880 and 1900) to roughly 0.5 percent for the baby boom generation. While McFadden's estimates are not as pessimistic as those of Mankiw and Weil (1989), they suggest that future patterns of home equity could display earlier and more pronounced downsizing by retired households.

To this point, much of the theory has been largely in terms of steady-state or at least stationary equilibrium. I next turn to a consideration of how both existing and prospective homeowners were affected by the largely unanticipated shift in housing wealth after the 1970s.

8.5 Housing Price Appreciation and Saving by Current Homeowners

The saving slowdown of the 1980s has spawned many explanations. One explanation is that housing wealth windfalls have stimulated consumption. Because capital gains from housing and land are not included in national income and product accounts, a rise in the price of housing will have no impact on measured income but could cause consumption to rise. Thus the declining saving rate (as conventionally measured) may be a consequence of increased consumption by homeowners flush with windfall capital gains.

Such a view gains support from the simple life-cycle model. Because housing is often held by older families, the aggregate marginal propensity to consume out of housing wealth tends to be high. Suppose that an exogenous change in tax policy (Poterba 1984) causes the price of housing and land to increase.[19] Calculations from a life-cycle simulation model with fifty-five overlapping generations suggest that a 10 percent increase in the real price of hous-

18. One version of a reverse mortgage annuity would involve a bank paying the household a fixed stream of income until death, at which point the bank takes title to the house.

19. Assume that land is in fixed supply so that despite new investment in housing, overall housing prices still rise.

ing (such as that during the past two decades) causes a short-term decline of 3 percentage points in saving (Skinner 1989). Ultimately, as the spendthrift generations die out and the new generations save more for the now more expensive housing, aggregate saving rates and the capital stock (per worker) are predicted to rebound to near their previous levels.

The theoretical implication that housing capital appreciation depresses nonhousing saving depends on at least three assumptions: capital markets allow older families to spend their housing wealth, homeowners treat housing wealth similarly to other types of wealth, and there is no bequest motive. Violating any of these assumptions implies an attenuated effect of housing capital gains on consumption.

The 1980s saw the rapid growth of one popular method of freeing housing capital gains: the home equity loan. As Manchester and Poterba (1989) have documented, second mortgages as a fraction of total mortgages have increased from 3.2 percent of all home mortgages in 1980 to 10.8 percent in 1987. Their results using survey data suggest that, of each dollar from a home equity loan taken out subsequent to purchasing the house, other assets are reduced by 60–70 cents. One interpretation of this finding is that homeowners are successful at spending their windfall home equity gains. Alternatively, as the authors note, the result could also reflect differences in the population between those with home equity loans and those without. For example, unexpected medical expenses could lead both to a home equity loan and to a decline in other forms of assets. However, the cumulative balance of $100 billion in home equity loans is not large. Even starting from a zero balance in 1986, the average net increase in loans would have been only $20 billion annually, or less than 0.5 percent of current national income.

A further explanation for why housing wealth might not affect consumption and saving has been proposed by Thaler (1990). In his view of economic psychology, individuals control their spending impulses by creating "nonfungible" mental accounts that restrict certain forms of assets from being spent. If housing is nonfungible, then windfalls from housing prices would not be spent.

The final possibility is that the bequest motive will cause homeowners to save the accumulated wealth to assist their children in purchasing the now more expensive housing. Two pieces of evidence point against this intergenerational altruism hypothesis in the United States. First, one might expect that families with children should save more of their housing windfall than those without children. There was no evidence for such differences in the panel regressions by Skinner (1989).

Second, the altruism hypothesis would suggest that first-time home buyers might turn to parents or other relatives to help with more expensive housing. Some evidence on this proposition is provided by survey data from the Chicago Title and Trust Company (1991) on first-time home buyers. The real median house price for first-time buyers increased by 22 percent between 1976 and 1990. During the same period, median monthly housing payments as a fraction

of income, again for first-time buyers, rose from 23 percent to 36 percent. Yet the share of the down payment provided by relatives actually fell, from 10.8 percent in 1976 to 10.2 percent in 1990.

The question of whether housing wealth windfalls affect saving and consumption is empirical. There are three approaches to testing the hypothesis. First, aggregate linear time-series consumption functions have been estimated, using housing wealth as an independent variable. Bhatia (1987) and Hendershott and Peek (1989), for example, found that consumption rose between 4 and 5 cents per dollar of housing (or housing plus durable) equity. One shortcoming of these time-series regressions is the lack of a utility function underlying the estimating equation. Another problem is the potential for spurious correlation between consumption expenditures on the left-hand side of the equation that includes an imputed flow of services from owner-occupied housing, and the market value of housing wealth on the right-hand side of the equation.

A second approach is to estimate Euler equation regressions using aggregate time-series data. For example, Skinner (1993) used aggregate data between 1950 and 1989 to estimate that the marginal propensity to consume (MPC) was roughly 0.03 percent per one percentage point increase in housing wealth, although the coefficient was not significant at conventional levels. (Note that nondurables exclude housing services and make up only one-third of total consumption expenditures.) The estimated long-term impact of housing windfalls on consumption, however, was essentially zero.

The third approach is to use microeconomic panel data. An important study by Bosworth, Burtless, and Sabelhaus (1991) documented the dramatic decline in household saving during the 1980s, using both the *Survey of Consumer Finances* (SCF) and the *Consumer Expenditure Survey* (CES). They found that much of the observed decline in saving rates between 1963 and the 1980s (in the case of the SCF) and between 1972–73 and the 1980s (in the case of the CES) occurred among homeowners. For example, using the SCF, the saving rate declined by 6.29 percent for homeowners between 1963 and 1983–85 but by only 0.49 percent for renters. These tabulations suggest that homeowners spending their windfalls were behind the saving decline in the 1980s. Surprisingly, the same pattern was not repeated in Canada. They calculated that, in Canada between 1978 and 1986, saving rates fell by 1.3 percent for homeowners and by 3.1 percent for renters.

Another example of the microeconomic approach is by Skinner (1989), who used the panel aspect of the PSID to construct family-specific measures of consumption and housing value over time. Consumption is not directly available from the PSID, although there are multiple indicators of consumption reported, such as food consumption, restaurant consumption, utility payments, and number of automobiles. By weighting these components using regression coefficients from the CES, overall consumption was imputed for each family in each year. Regressions of the change in housing prices for nonmovers on

changes in consumption (essentially the microeconomic counterpart of the macro-Euler equations) suggested that housing price shifts had no effect on consumption.[20] In short, the empirical evidence about the effects of housing wealth on consumption are mixed.

Are the upper ranges of empirical estimates—say, an MPC out of housing wealth equal to 4 cents per dollar—large or small by the standards of the life-cycle model? A life-cycle household enjoying a $100,000 permanent windfall in its housing price would not consider itself $100,000 wealthier, since the cost of housing services in the area has likely risen. The "true" windfall is the present value of the $100,000 capital gain *when (or if) the family sells the house.* So if the windfall occurred in 1979 and the family planned to move in 2009 to an area with no real gain in housing prices, the present value of the windfall in 1979 would have been only $100,000/$(1 + r)^{30}$, or $41,198, assuming a real discount rate of 3 percent.[21] In this case, an estimated MPC out of housing wealth of 0.0412 would imply a true MPC out of the present value of housing wealth equal to 0.10.

The aggregate impact of housing wealth on consumption is a weighted average across all age groups, with older households exhibiting a higher MPC out of housing windfalls. Calculations using a life-cycle model with fifty-five generations suggest a short-run MPC from housing wealth of roughly 3 percent (Skinner 1989), well within the upper range of empirically estimated coefficients. Using this 3 percent MPC and assuming a housing windfall of $700 billion during the 1970s (see figure 8.1), the implied increase in consumption is $21 billion annually, or only 0.6 percent of GNP in 1986. Housing prices by themselves are unlikely to have explained the decline in saving during the 1980s.

8.6 Housing Price Appreciation and Saving by Potential Homeowners

To this point, I have focused on how the unexpected housing price increase affected existing homeowners. Price appreciation should also affect saving by renters who hope to purchase housing in the future.[22] Wealth appreciation enjoyed by current homeowners on their fixed assets are matched dollar for dollar by a wealth loss for future generations who must pay more for the existing housing stock.

Sheiner (1990) has estimated that younger families in areas with high housing prices also tend to save more, conditional on factors such as income, rental

20. Pooled cross-section and time-series regressions, however, did suggest that housing wealth affects consumption. These pooled regressions may be tainted by the problem that spendthrifts are likely both to buy large houses and to spend a high fraction of income on other consumption goods.

21. This calculation assumes no further real price appreciation in housing. If current capital gains are projected to increase in the future, the MPC out of housing wealth would be larger.

22. Rental payments might also be expected to change, although such effects are ignored in this paper.

payments, and other demographic variables. She finds that variation among states in housing prices are sufficiently large to account for a large fraction of wealth differences among renters. For example, a renter in California, the state with the highest housing prices, is predicted to hold $2,406 more in wealth than a renter in Kentucky, the state with the lowest housing price. This difference is larger than the *average* wealth holdings of the sample.[23]

As Sheiner reports, her results may suggest that higher housing prices actually encourage, rather than discourage, aggregate saving. If homeowners treat housing wealth as nonfungible and do not spend it, but renters save for the more expensive housing, then housing prices could paradoxically *increase* aggregate saving rates.

There is some evidence that, beyond some threshold in housing prices, renters give up hope of ever affording owner-occupied housing and as a consequence reduce their saving. In response to a survey asking "How has the recent increase in land and housing prices affected your plans to save for housing purchase?" only 5 percent of Japanese respondents replied that they would increase their planned purchase price, cut back on consumption, and increase saving. Thirty-two percent answered that they had abandoned their housing purchase plans entirely (Central Council 1990).[24] In short, if housing prices grow to the point where prospective buyers drop from the market, saving among renters could decline rather than increase.

8.7 Housing and Uncertainty

Models that assume perfect foresight over the life cycle ignore the important role of risk in housing wealth and the impact of this risk on consumption decisions. The lumpy nature of housing, as well as the typical equality between housing consumption and housing investment, means that portfolio decisions about housing investments cannot be derived in isolation from consumption decisions (Bossons 1978).

Berkovec and Fullerton (1992) and Hendershott and Won (1992) have recently developed complex simulation models reflecting this interdependence between housing consumption and investment. In their models, households face uncertain returns both on housing and nonhousing assets, and changes in the tax regime are shown to affect overall wealth both through the traditional incentive effect and through changes in the after-tax variance of the returns. In particular, Berkovec and Fullerton highlight the importance of financial risk in housing when they find that full taxation of owner-occupied housing has only small effects on the total quantity of housing. The disincentive effect of a tax

23. While net worth of less than $2,000 may seem low, the sample is restricted to renters, and the very wealthy are excluded.

24. I am grateful to Charles Horioka for pointing out this survey to me.

on housing is nearly offset by the reduction in the variance of housing returns as a consequence of the tax.

The Berkovec and Fullerton and Hendershott and Won models focus on the "hedging" demand for housing assets, in the sense that housing increases the risk of the entire family portfolio. Goodwin (1986) focuses additionally on the "speculative" demand for housing portfolio. That is, when there is uncertainty about the (nominal or real) price of future housing, owning a house provides excellent insurance against future (regional or local) price shifts. Hence under this view, purchasing housing can reduce, rather than increase, the total amount of uncertainty. Goodwin finds limited evidence that either the speculative or the hedging affects are large, although his results may be an artifact of using aggregate data.

To what extent are household portfolios disrupted by the purchase of a house? Ioannides (1989b) finds that the portfolio decisions of recent movers do appear constrained by mortgage lending requirements. That is, recent movers with lower earnings (holding nonhousing wealth constant) show higher ratios of equity to housing value, suggesting that they are constrained from leveraging their house by bank lending restrictions tied to current earnings. This disequilibrium holds only for recent movers; portfolio decisions for nonmovers appear unrelated to current earnings.

The sharp changes in housing prices during the past few decades might be expected to have two effects. The first is an increase in the volatility of housing prices, so that owning a house induces more risk to family wealth. The second is higher leverage rates (i.e., the ratio of mortgage principal to housing value) for first-time buyers. Both a higher leverage ratio and greater price volatility would increase the riskiness of the household portfolio and hence reduce the demand for housing by risk-averse households. Could these two effects have explained in part the sluggishness in housing prices during the 1980s? To address this issue, I first test whether housing prices have become more volatile and then measure the changes in leverage ratios between 1969 and 1986.

The PSID has followed five thousand families (and their dependents) since 1968. In each year, the respondent was asked the market value of his or her house. Each of the sample families yielded a maximum of nineteen observations on housing price changes (from 1968–69 to 1986–87). An observation was deleted if during the current or previous year the family had moved or experienced a major compositional change, or did not own a house, or if the real (1986) value of the house was less than $2,000. Nearly fifty-six thousand observations remained.

Figure 8.3 graphs the year-to-year real annual change in housing prices, as well as its standard deviation, from 1968–69 through 1986–87. (Log changes in excess of the absolute value of 1.0 were truncated at either 1 or −1.) As a rough measure of the accuracy of such subjective housing value measures, the log average annual rates of change were compared in figure 8.3 with the objec-

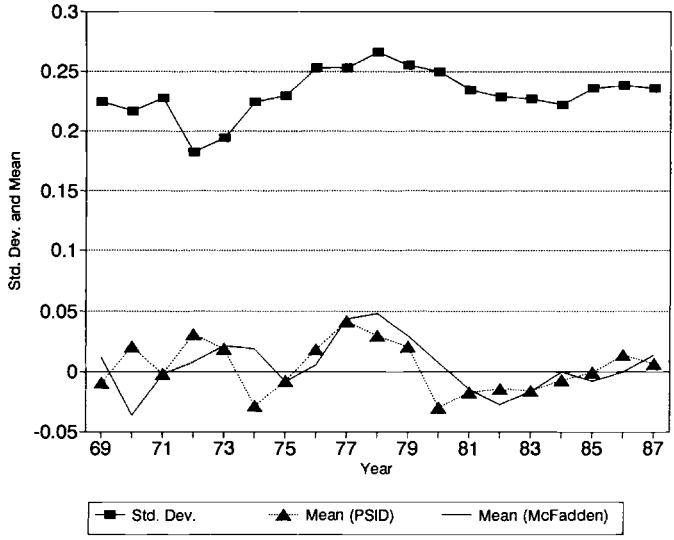

Fig. 8.3 Annual (log) change in housing prices: mean and standard deviation, 1969–87

Sources: Panel Study of Income Dynamics; McFadden 1992.

tive Commerce Department measures (McFadden 1992). The two series are quite close in mapping housing price changes over the 1970s and 1980s and diverge only in the late 1960s.

Figure 8.3 traces the standard deviation of real annual changes in housing prices. Despite the sharp run-up in housing prices during the 1970s (shown in figure 8.1), the change in the standard deviation of housing prices is relatively modest compared to the underlying pattern of uncertainty. That is, housing prices since 1969 have always been volatile, with a standard deviation in excess of 0.18 in log terms (or roughly speaking, 18 percentage points). Hence one cannot conclude that homeowners have been exposed to a significant increase in overall housing price risk in the last few decades.[25]

Household portfolios are at greater risk when they are highly leveraged.[26] Data from the Chicago Title and Trust (1991) suggest a larger fraction of home buyers with high leverage rates; the fraction of families buying a house with less than 10 percent down payment rose from .27 in 1976 to .40 in 1989.

To test this view that average homeowners have become more exposed to

25. It should be cautioned that these housing figures are subjective rather than objective appraisals. They tend to change in jumps—say, a house is reported worth $25,000 in 1968 and 1969 and then rises in 1970 to $30,000—leading to perhaps some overstatement of the true market volatility. Still, to the extent that housing demand and saving behavior reflects the subjective assessment of the household's net wealth, these measures are the appropriate ones to use.

26. For example, suppose there are two homeowners, one with a leverage ratio of 50 percent, the other with a ratio of 90 percent. A one-percentage-point shift in house prices causes a 2 percent revaluation of equity for the first homeowner, but a 10 percent revaluation for the second.

Table 8.4 **Leverage of Housing by Age, 1969 and 1986**

Age	Median Leverage, 1969	75th Percentile, 1969	Median Leverage, 1986	75th Percentile, 1986
Under 31	.690	.859	.563	.771
31–40	.531	.707	.485	.691
41–50	.308	.567	.249	.486
51–60	.000	.339	.034	.250
61–70	.000	.038	.000	.073
Over 71	.000	.000	.000	.000

Source: Survey of Consumer Finances 1969, 1986.

housing price risk, data from the SCF on leverage ratios were compiled in table 8.4. Median and seventy-fifth-percentile leverage ratios (mortgage principal remaining divided by house market value) were calculated for both 1969 and 1986. Median leverage ratios decline with age, so that the representative homeowner had nearly full equity in a house by age 51–60. The comparison between leverage rates in 1969 and 1986 suggests there has been no overall increase in the leverage ratios of households. If anything, the leverage rates have *declined* since the late 1960s; for ages under 31, the median leverage rate fell from 69 percent to 56 percent. As is also noted in table 8.4, this result holds not just for the median household, but for those "high exposure" families who are in the seventy-fifth percentile of leverage ratios.

One way to reconcile the Chicago Title and Trust data with the SCF data is to note that equity is built up more rapidly in the presence of inflation. Taking a snapshot of homeowners in 1990 would include some who may have purchased a house with very little down payment in, say, 1984, but subsequently experienced rapid equity buildup caused by inflation.[27] Note finally that, since 1986, the leverage ratio for housing wealth rose substantially owing to the tax advantages of home equity lines of credit. However, such shifting may not imply greater overall leverage if accompanied by a reduction in revolving taxable credit.[28]

It might be argued that the leverage ratio is not relevant to household risk, and that a more relevant risk is whether the household can meet the mortgage payments. In this view, a rise in the ratio of mortgage payments to total income might indicate greater riskiness of home ownership. To test for this, table 8.5 compares the ratio of mortgage payments to income in 1969 and 1986, broken down by age group. Table 8.5 shows a modest increase in the ratio of mortgage

27. Note also that the *average* down payment for first-time buyers fell from 18 percent in 1976 to 16 percent in 1990 (Chicago Title and Trust 1991).

28. For example, Skinner and Feenberg (1990) found that housing mortgage interest payments increased by 60–80 cents for every dollar reduction in nondeductible interest payments following the 1986 tax reform. That is, households shifted nonhousing debt into tax-preferred housing debt.

Table 8.5 **Mortgage Payments as a Percentage of Family Income, 1969 and 1986**

Age	Median Payment, 1969	90th Percentile, 1969	Median Payment, 1986	90th Percentile, 1986
Under 31	11.70	19.96	12.85	25.51
31–40	10.50	17.33	11.73	24.78
41–50	7.49	16.59	7.00	19.80
51–60	0.00	16.92	2.08	17.64
61–70	0.00	11.99	0.00	14.28
Over 71	0.00	0.00	0.00	2.24

Source: Survey of Consumer Finances 1969, 1986.

payments to income between 1969 to 1986. Families in the ninetieth percentile of mortgage payments (as a ratio to income) show a somewhat larger increase in the burden of mortgage payments. Still, the overall impact of changes in the riskiness of home ownership are likely to be quite modest for housing demand.

8.8 Conclusion

The sharp rise in housing prices during the 1970s has had an important impact on the financial health of many homeowners. During the entire decade of the 1970s, capital gains in housing alone approached $700 billion (in 1986 dollars) and amounted to nearly half of all personal saving during the decade. During this same period, average inflation rates increased substantially; even ignoring the 1970s, inflation rates doubled from an average annual rate of 2.4 percent in the 1960s to 5.0 percent in the 1980s.

How might these two fundamental shifts be expected to affect the level and composition of long-term aggregate saving? The life-cycle model suggests that homeowners should respond to a long-term rise in housing prices by a reduction in housing services. While families may wait longer before purchasing a house, theoretical studies do not suggest that the higher housing prices should depress aggregate capital accumulation in the long term. By the same token, inflation affects the tilt of nominal housing mortgages and the tax advantage of housing, but the overall impact of inflation on housing markets is also likely to be small.

The *temporary* effect of housing price windfalls may have had a larger effect on saving patterns in the United States. There is some evidence that homeowners have partially spent down their housing windfalls, although the evidence is not conclusive. Whether this accumulated housing wealth is being gradually spent down, saved for bequests, or saved because homeowners find it difficult to extract the home equity is an unresolved question.

The life-cycle model also implies that potential homeowners currently rent-

ing should save more as a consequence of higher housing prices. The study by Sheiner (1990) supports this view; variations in housing prices across cities are found to explain a large fraction of financial wealth holdings of renters. Still, if housing prices are out of the reach of renters, they may respond by giving up entirely on home ownership and by saving less.

Finally, how did the fundamental changes in housing prices and inflation affect the riskiness of household portfolios? The empirical evidence suggests little change over time, either in the housing leverage rates, or in the volatility of housing prices. We can therefore exclude increased housing risk as an explanation for laggard housing demand in the 1980s.

This paper has ignored one key piece in explaining the puzzle of housing prices—why the structural shift in housing prices during the 1970s? Some authors have pointed to the interaction between inflation and the tax code—allowing nominal mortgage interest payments to be deducted implied an often negative real after-tax cost of borrowing during the 1970s (Poterba 1984). Others have stressed demographic changes in the age structure of the population as driving housing prices—the baby boom coming of age accounted for the housing price rise and its subsequent decline (Mankiw and Weil 1989; see also Hendershott 1991). It may be difficult to pinpoint how housing prices should affect saving rates without identifying what caused the dramatic shift in housing prices in the first place.

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