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Chapter Title: But They Don't Want to Reduce Housing Equity

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1 But They Don't Want to Reduce Housing Equity

Steven F. Venti and David A. Wise

The majority of the wealth of most elderly people is in the form of housing equity. This housing wealth, it is claimed, is a potential source of support for the elderly as they age. It is further claimed that many elderly would choose to transfer wealth from housing to finance current consumption expenditure, were it not for the large transaction costs associated with changes in housing equity. In the past, it has typically been necessary for such families to move to withdraw wealth from housing. Indeed, the rationale for a market in reverse annuity mortgages has been that the elderly would like to withdraw wealth from housing were it possible to do so without incurring the large transaction costs associated with moving. This paper considers whether these claims are correct. Two related questions are addressed:

- Given the predetermined financial and other circumstances of families as they approach retirement ages, would the typical elderly family like to withdraw wealth from housing?
- Are the transaction costs of moving large, and do they constrain adjustments in the housing wealth of the elderly as they age?

The paper provides a clear answer to the first question. Were all elderly to choose optimal housing equity, given their existing circumstances, there would be little change in housing wealth on average. In particular, the typical elderly family would not choose to reduce housing equity. The answer to the second question is less evident. Assuming that the elderly could gain from a

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reallocation of wealth between housing equity and other assets, the relative gain, in these terms, necessary to justify moving is typically very large. Our evidence suggests a strong preference for remaining in existing housing as the elderly grow older. On the other hand, that the housing equity of the elderly is not typically reduced as they age is not explained by the high transaction costs of moving. The elderly like it that way.

In a predecessor to this paper (Venti and Wise 1989), we considered the change in housing equity when the elderly move. The primary conclusion of that analysis was that the elderly who move were about as likely to increase as to decrease housing equity. But families with low income relative to housing wealth were more likely to move and to reduce housing equity when they did. The latter finding raises the possibility that transaction costs constrained the choices of some elderly who otherwise would have chosen to transfer wealth out of housing.[1]

The current paper is a more formal treatment of moving and the choice of housing equity; the two are considered jointly. The method is analogous to the approach set forth in Venti and Wise (1984) and used to analyze the housing choices of low-income renters. The current paper considers the allocation of bequeathable wealth between housing and other assets, conditional on their predetermined levels and on the income and other circumstances of the elderly as they age. There are two key features of the model: one is that an elderly family moves if the gain from changing housing outweighs the transaction costs of moving. Transaction costs are understood to include, and are likely to be dominated by, the psychic costs associated with leaving friends, familiar surroundings, and the like. The other is that the housing equity chosen after a move represents the optimal level of housing equity, given current circumstances. Based on the second assumption, the model is used to simulate the changes in housing equity that the elderly would choose to make, were they to overcome the transaction costs of moving and choose optimal levels of housing equity. The analysis is based on the Retirement History Survey (RHS). Families are followed over the six RHS surveys, conducted every two years between 1969 and 1979.

The model is described in the first section. Parameter estimates are discussed in the second section and the results of simulations reported in the third. The fourth section contains concluding remarks.

1.1 The Model

The goal of the analysis is to estimate the housing equity that the elderly would prefer. With this goal in mind, we consider the allocation of bequeathable wealth between housing and other assets, conditional on current income and other circumstances. Suppose that the value of housing equity versus other wealth can be captured by the simple function

$$V = H^{\beta}(W - H)^{1-\beta}, \tag{1}$$

where H is housing equity, W is total bequeathable wealth, and β is a preference parameter depending on income and other individual characteristics. Then preferred housing equity is

$$H = \beta W. \tag{2}$$

In fact, the precise functional form of (2), described below, was chosen to fit housing equity choices. Equation (1) was then chosen to be consistent with these empirically observable outcomes.[2] It essentially serves to compare existing housing equity with the preferred level and as a device to assure consistent treatment of moving and housing equity choices.

The family moves between two survey periods if

$$\frac{V_*}{V_0 \cdot M} > 1, \tag{3}$$

where V_* is the value of the optimal allocation of wealth, V_0 is the value of the allocation at the beginning of the period, and M indicates the preference for current housing, presumably with a value greater than one. It reflects the transaction costs that must be overcome if the family is to move. If the gain from moving is G, the family will move if

$$G = \ln V_* - \ln V_0 - \ln M > 0. \tag{4}$$

The transaction costs parameter M reflects everything that gives an advantage to current housing, after controlling for the equity value of housing and the wealth allocation that it represents.[3] For example, the value function in equation (1) could have been written with an additional multiplicative term E^{α}, where E represents attributes that accompany housing, in addition to its equity value. Then $\Delta \ln V$ would include a term $\alpha(\ln E_* - \ln E_0)$, which would be part of what $\ln M$ is presumed to capture.

Transaction costs M are parameterized as

$$\ln M = m_0 + m(X) + e, \tag{5}$$

where m_0 is a constant term, $m(X)$ is a function of individual characteristics like change in marital status or retirement, and e is a random term. The random term is assumed to have the variance components form

$$e_{it} = \lambda_i + \epsilon_{it}, \quad \text{var}(\lambda) = \sigma_{\lambda}^2, \ \text{var}(\epsilon) = \sigma_{\epsilon}^2, \tag{6}$$

where λ_i reflects variation among individuals in resistance to or preference for moving. It is clear that families could move for many reasons other than to change housing equity and that the value of the house to the family reflects

much more than its asset value. It is also clear that many family attributes that may determine moving decisions are not included explicitly in our analysis.[4] Thus, the individual-specific term λ is assumed to persist over time. The ϵ_{it} component is assumed to be random across survey intervals and to be uncorrelated with λ. For any family, it captures the effect of changes in unmeasured variables from interval to interval. As will become clear below, it may also reflect the effect of the difference between actual alternative housing possibilities that exist in fact and the optimal choice that is assumed to exist.

If ϵ has a normal distribution with mean zero, the probability that the family will move between any two survey periods, conditional on λ, is

$$\begin{aligned} \text{pr[move]} &= \text{pr}[\epsilon < \Delta \ln V - m_0 - m(X) - \lambda] \\ &= \Phi[(\Delta \ln V - m_0 - m(X) - \lambda)/\sigma_\epsilon], \end{aligned} \tag{7}$$

where $\Delta \ln V = \ln V_* - \ln V_0$ and Φ is the cumulative normal distribution function.

The term $\Delta \ln V$ is a measure of disequilibrium; it is large if the optimal allocation of wealth between housing and other assets is very different from the existing allocation. The optimal allocation, however, is likely to vary among families. To capture potential differences among families in preferences for housing equity, β is parameterized as

$$\beta_t = \beta_{t-1} + d(Z) + \nu, \quad E(\nu) = 0, \text{ var}(\nu) = \sigma_\nu^2 . \tag{8}$$

That is, β is assumed to follow a random walk with drift $d(Z)$, where

$$d(Z) = d_0 + d_1 A + d_2 A^2 + d_3 Y + d_4 W + d_5 Y \cdot W. \tag{9}$$

Here, the terms in age A capture the effect of age on the drift, reflecting the possibility that preferences change with age. The terms in income Y are to recognize that the amount of total wealth that the family prefers to have in housing equity is likely to depend on current income, which along with nonhousing bequeathable wealth can be used to finance current consumption. The disturbance ν reflects random changes in preferences not captured by measured variables.

The allocation of wealth at the beginning of the period is taken as a base indication of preferences, and optimal choices are considered relative to that base. In period $t - 1$, we observe H_{t-1} and W_{t-1}; we set $\beta_{t-1} = H_{t-1}/W_{t-1}$. Desired housing in period t is then given by an estimate based on the proportion of total wealth allocated to housing in period $t - 1$, plus a deviation from that estimate. As the family ages, there may be an increasingly large difference between H_{t-1}/W_{t-1} and desired β_t, and the extent of disequilibrium may increase. The term $d(Z)$ reflects this possibility. In effect, the housing demand

equation predicts desired changes in housing equity. Based on equations (8)–(9) and the definitions above, it is given by

$$(10) \qquad H_t = (H_{t-1}/W_{t-1})W_t + [d(Z)]W_t + \nu W_t .$$

The information to estimate this equation comes primarily from the changes in housing equity for families who move during the survey period. In essence, the model estimates the preferred change in housing equity as a function of age, current income, and current total wealth.[5]

The random term ν may be interpreted in two ways: one is as a maximization error, reflecting, for example, an inability to find a house with precisely the optimal value. The other is as a further indication of heterogeneity among families, reflecting desired housing choices. The implications of both interpretations are considered below.

The data consist of five surveys conducted at two-year intervals. There are two possible outcomes for each family: (1) the family does not move during the entire ten-year survey period; (2) the family moves in period τ and chooses a level of housing equity H_τ. The probability of the first outcome is given by

$$(11) \qquad \text{pr[don't move]} = \int_\lambda \{[1 - \Phi_1] \ldots [1 - \Phi_5]\} f(\lambda) d\lambda,$$

where Φ is defined in equation (7), the subscripts indicate intervals between successive surveys, and $f(\lambda)$ is the density of λ. The probability of the second outcome is given by

$$(12) \quad \text{pr[move between } \tau - 1 \text{ and } \tau \text{ and spend } H_\tau] = \{\int_\lambda \{[1 - \Phi_1] \ldots [1 - \Phi_{\tau-1}]\Phi_\tau\} f(\lambda) d\lambda\} \cdot g(H_\tau),$$

where $g(H\tau)$ is the density of desired housing equity in period τ. Given the family-specific term λ_i, the probability of moving during the ten-year period of the RHS is given by the product of univariate normal probabilities, each representing the mobility decision for a two-year interval. Integrating over possible values of λ_i is accomplished by Gaussian quadrature.[6] In calculating the probability that the family moves, the terms $\ln V_{*t}$ and $\ln V_{0t}$ must be evaluated. The first term represents the value of the optimal wealth allocation and is given by $\ln V_{*t} = \beta_t \ln H_{*t} + (1 - \beta_t)\ln(W_t - H_{*t})$, where $H_{*t} = \beta_t W_t$. The second term is the value of the wealth allocation inherited from the previous period and is given by $\ln V_{0t} = \beta_t \ln H_{t-1} + (1 - \beta_t)\ln(W_t - H_{t-1})$.[7]

In summary, families are followed until they move (or until 1979, when the RHS panel survey ended). It is assumed that the optimal level of housing equity H_{*t} is chosen when the family moves, up to an error component represented by ν. The family moves if the gain from moving outweighs the transaction costs of moving. The predicted level of H_{*t} is used to determine the value of preferred housing equity in period t; the value of current housing equity is

determined by the level of housing equity at the beginning of the interval, $V_{0,t}$. Heterogeneity in resistance to moving, or in attachment to current housing, is represented by a random term with a variance components decomposition. The family-specific component λ_i is assumed to be the same, for a given family, over the period of the analysis. The time-varying component is ϵ_{it}. The family moves between period $t-1$ and t if $G_t = \ln V_{*t} - \ln V_{0t} - m_0 - m(X_t) > \lambda_i + \epsilon_{it}$. The disturbance terms ν, λ_i, and ϵ_{it} are assumed to be mutually uncorrelated.

1.2 Parameter Estimates

Estimates are based on data from the RHS. The survey covered families headed by persons age 58–63 in 1969. The families were interviewed every two years between 1969 and 1979; there were six waves altogether. The final sample is composed of 3,423 families. Of these, 24 percent moved during the period 1969–79. Selection of the estimation sample is explained in an appendix. Estimates of the parameters in the model are shown in table 1.1. The estimated housing equity function is discussed first, then the probability of moving.

1.2.1 Housing Equity

The disturbance term in the housing equity function is heteroscedastic, with the specification $\sigma_\nu W$. The estimated σ_ν is .2008; the mean of W is $74,465. Thus, given the ratio of housing wealth to total wealth in the last period, current income, current wealth, and age, the standard deviation of the desired change in housing equity is $14,953, evaluated at the mean of wealth. The mean difference between desired and actual equity is small, however, about $1,010, estimated over the whole sample. This means that on average the gain to be had by a reallocation of wealth between housing and other assets is small. The mean of the estimated values of $\Delta \ln V$ is only .041, indicating that the average potential gain, in utility terms, from a reallocation of wealth is only about 4 percent. It is substantially larger than that for some families, however. The standard deviation of the estimated $\Delta \ln V$ is .115.

The mean of the estimated values of β, the desired proportion of wealth in housing equity, is .53. The mean of the estimated values of d, the difference between the current and the desired proportions, is .0107. Thus, on average, the desired proportion of wealth in housing equity is very close to the existing proportion.

There is essentially no effect of age on desired housing equity. As the typical family ages one year, the desired proportion of wealth in housing is reduced by $-.0014$: $.0859 - 2(.000682)$age, evaluated at the mean age of 64.

The housing equity function fits the observed choices of movers very well, as shown in figure 1.1. The estimated values of β—the desired proportion of total wealth in housing equity—and the observed choices $H + W$ are graphed

Table 1.1 Parameter Estimates

	Parameter Estimate	Standard Error
Housing equity:		
Disturbance variance, σ_ν	.2008	.0077
Drift, $d(X)$:		
Constant	−2.6855	.1114
Age	.0859	.0037
Age squared (/100)	−.0682	.0031
Income	.0015	.0001
Wealth	−.0007	.0001
Income × wealth	.0001	.0000
Moving:		
Disturbance terms:		
σ_λ	.6197	.0826
σ_ϵ	.7710	.0837
Transaction costs, ln M:		
Constant, m_0	2.0039	.1951
Retirement status:		
No → no	. . .	. . .
Yes → no	−.3034	.1010
No → yes	−.3810	.0580
Yes → yes	−.2700	.0558
Family status:		
Single → single	. . .	. . .
Married → married	−.2846	.0533
Change	−.5626	.0896
Health status:		
Same	. . .	. . .
Better	−.1728	.0496
Worse	.0508	.0407
Children:		
No	. . .	. . .
Yes	−.0269	.0554
Estimated values:	Mean	Standard Deviation
Mean Δ ln v	.0409	.1152
Mean ln M	1.5578	.2180
Mean β	.5255	.2213
Mean d	.0107	.0108
Log-likelihood	−3,391.0	
Number of observations	3,423	

against total wealth percentile for movers. No systematic deviation of predicted from actual values is revealed.

1.2.2 Moving

Recall that the transaction costs parameter M reflects everything that gives an advantage to current housing, after controlling for the equity value of housing and the wealth allocation that it represents.

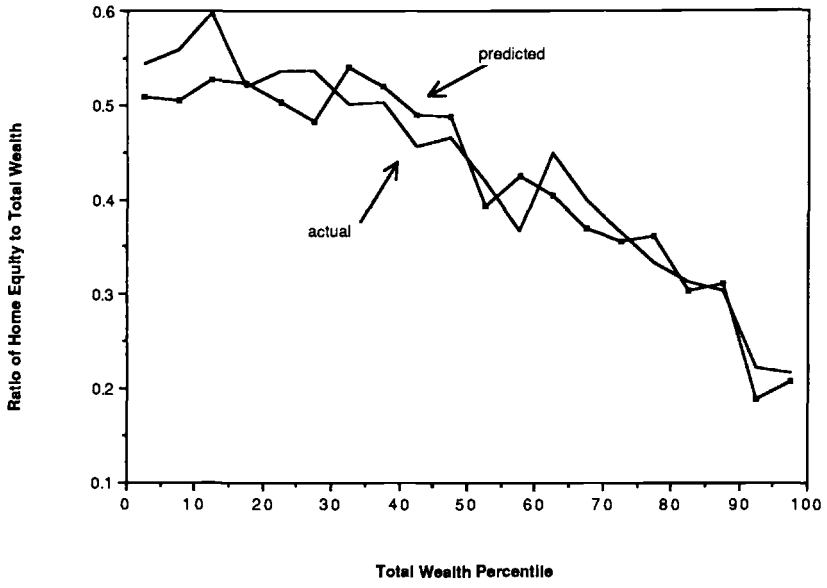

Fig. 1.1 Predicted vs. actual values of H/W by total wealth percentile

It is informative first to report the results from a two-stage estimation procedure: the housing equity equation (11) is estimated by nonlinear least squares in the first stage, using data for movers only. The prediction of desired housing equity from the first stage is used to calculate $\Delta \ln V$. A simple probit equation with $\Delta \ln V$ and other variables that are assumed to determine the probability of moving is estimated in the second stage. The relevant probabilities are of the form $\text{pr}[\text{move}] = \text{pr}[e < \Delta \ln V - \ln M]$, where e represents both the individual-specific and the period-specific random components of moving, $e = \lambda + \epsilon$. The larger $\Delta \ln V$, the greater the probability of moving, as expected.[8] But $\Delta \ln V$ explains only a small part of moving behavior. With no change in retirement, marital, or health status, the transaction costs parameter $\ln M$, which is the constant term in the probit equation, is large, say on the order of 1.5. Because $\Delta \ln V$ explains so little of moving behavior, the constant term must be large to yield the small probability of moving that the data exhibit. Thus, the results from this procedure indicate that the value associated with housing equity, and the wealth allocation that it represents, must be increased substantially—about 50 percent—for a family to move. Indeed, without a change in family status or retirement, the "transaction costs" of moving are apparently prohibitive for many families; the family is simply not going to move. This is consistent with the small moving probability in any two-year interval, about .08 on average.

Now consider the maximum likelihood estimates reported in table 1.1. Three key parameters determine the estimated transaction costs: m_0, estimated

to be 2.00; σ_ϵ, estimated at .77; and σ_λ, with an estimated value of .62.[9] The mean of the estimated values of ln M is 1.56. Thus, the estimates suggest a mean transaction costs parameter of 1.56, with a standard deviation in any time interval of 1.39. For a few, then, the resistance to moving is very small if the estimates are taken literally; for many more the resistance is quite large. On average, the value associated with the allocation of total wealth would have to be increased by over 50 percent to induce the family to move.

Much more important than a potential reallocation of wealth—Δ ln V—in the decision to move are changes in retirement, marital, or health status. The probability of moving in the base case[10] is .075. If the family head retires during the interval, the probability is increased to .122. If there is a change in marital status—from married to divorced or from married to widowed, for example—the probability increases to .150.[11] A much larger proportion of families in these circumstances have very low transaction costs, by our definition, assuming the same disturbance variance. Families who otherwise would find moving extremely unattractive find that it is much less so at the time of these precipitating shocks.

1.3 Simulations

There are two distinct questions about the desired reallocation of wealth among housing equity and other assets: one is the magnitude of the desired changes; the other is whether they are positive or negative. The magnitude of the desired changes is shown in table 1.2. The entries in the table are the average (and median) of the absolute values of the difference between actual and desired housing equity. For a given family, the comparison is made for each survey year until the family moves; thus, a single family may contribute several observations. Actual housing equity is the value inherited from the previous period. To predict desired housing in the top half of table 1.2, the disturbance term in the housing equity equation (10) is not considered; it is assumed to reflect maximization error. The overall average, including both movers and stayers, is $5,377. It is $9,886 for movers but only $5,117 for stayers. The medians show comparable differences, but the magnitudes are reduced; the overall median is $2,315; it is $5,159 for movers and $2,195 for stayers. The difference apparently reflects the fact that, on average, families who move have more to gain from wealth reallocation than families who do not move. That is, to the extent that a reallocation of housing equity is a motivation for moving, the difference should be greater for those who have chosen to move than for those who have not. As emphasized above, however, it is clear that this is not the major reason for moving. The difference increases with both income and housing wealth quartile, especially the latter. The mean difference among movers with high incomes and high housing equity is $20,069; the median is $10,189. Among those with low income and low housing equity, the mean is only $3,744, with a median of only $2,233.

Table 1.2 **Mean (and Median) of Absolute Values of Preferred Minus Actual Housing Equity, by Move Status and by Housing Equity and Income Quartiles, Both Excluding and Including Disturbance Term**

	Housing Equity				
Income	Low	2d	3d	4th	Total
Excluding disturbance term:					
All:					
Low	1,734	3,415	4,590	8,243	3,555
	(660)	(1,685)	(2,244)	(5,384)	(1,360)
2d	2,569	3,663	4,918	7,844	4,503
	(1,162)	(2,176)	(2,617)	(4,270)	(2,187)
3d	2,888	3,742	5,155	8,285	5,054
	(1,324)	(2,125)	(2,806)	(4,420)	(2,496)
4th	4,052	4,317	6,409	12,394	8,396
	(1,705)	(2,101)	(3,367)	(6,016)	(3,717)
Total	2,435	3,737	5,343	9,980	5,377
	(963)	(2,020)	(2,815)	(4,996)	(2,315)
Movers:					
Low	3,744	8,899	8,352	11,060	7,473
	(2,233)	(6,205)	(7,861)	(11,272)	(4,932)
2d	4,526	6,716	8,328	16,509	9,062
	(2,584)	(3,598)	(5,340)	(9,264)	(4,865)
3d	6,883	6,156	5,707	13,064	8,099
	(3,552)	(3,966)	(4,243)	(8,286)	(4,587)
4th	8,635	8,247	10,829	20,069	14,211
	(3,187)	(6,314)	(6,008)	(10,189)	(7,171)
Total	5,699	7,432	8,257	16,407	9,886
	(2,707)	(4,662)	(5,337)	(9,707)	(5,159)
Stayers:					
Low	1,658	3,147	4,413	8,038	3,372
	(629)	(1,624)	(2,058)	(4,077)	(1,265)
2d	2,445	3,523	4,717	7,128	4,224
	(1,130)	(2,137)	(2,456)	(3,935)	(2,089)
3d	2,575	3,627	5,127	7,953	4,873
	(1,206)	(1,990)	(2,793)	(4,175)	(2,406)
4th	3,516	4,132	6,185	11,897	8,031
	(1,535)	(2,005)	(3,251)	(5,801)	(3,510)
Total	2,238	3,563	5,191	9,528	5,117
	(900)	(1,926)	(2,729)	(4,709)	(2,195)
Including disturbance term:					
All:					
Low	3,259	6,661	9,628	17,993	7,257
	(1,976)	(4,715)	(6,759)	(12,056)	(3,774)
2d	5,078	8,019	11,131	18,391	10,039
	(3,274)	(5,797)	(8,251)	(12,503)	(6,233)
3d	5,998	9,693	13,164	20,245	12,462
	(4,066)	(7,102)	(9,864)	(14,606)	(8,195)
4th	9,405	12,052	17,608	30,355	21,306
	(6,132)	(9,012)	(12,683)	(21,384)	(13,348)
Total	4,946	8,852	13,257	23,982	12,766
	(2,915)	(6,249)	(9,368)	(15,937)	(7,164)

Table 1.2 (continued)

Income	Housing Equity				
	Low	2d	3d	4th	Total
Movers:					
Low	5,395	11,430	12,065	16,727	10,546
	(3,071)	(7,371)	(10,255)	(13,238)	(6,969)
2d	7,118	9,368	14,742	26,544	14,546
	(5,107)	(6,276)	(11,029)	(16,448)	(8,465)
3d	10,234	13,601	15,903	21,743	15,539
	(6,542)	(10,102)	(12,349)	(16,605)	(10,621)
4th	14,578	18,375	21,636	36,847	26,698
	(7,856)	(13,333)	(17,182)	(23,704)	(16,643)
Total	8,877	12,736	16,504	28,251	17,283
	(5,301)	(8,264)	(12,593)	(17,795)	(10,242)
Stayers:					
Low	3,179	6,428	9,514	18,085	7,103
	(1,946)	(4,629)	(6,622)	(11,875)	(3,694)
2d	4,948	7,958	10,918	17,718	9,763
	(3,160)	(5,778)	(8,159)	(12,257)	(6,145)
3d	5,666	9,507	13,024	20,141	12,278
	(3,906)	(6,993)	(9,711)	(14,481)	(8,067)
4th	8,800	11,754	17,405	29,935	20,967
	(5,834)	(8,775)	(12,500)	(21,243)	(13,154)
Total	4,709	8,668	13,088	23,681	12,506
	(2,824)	(6,157)	(9,214)	(15,828)	(7,013)

The second half of table 1.2 is analogous to the first, but the disturbance term in the housing equation is assumed to reflect desired housing choice instead of a maximization error or deviation from the optimal level. To incorporate the disturbance term, a random draw is made from the estimated error distribution—normal with mean 0 and variance $.2008 \cdot W$—each time that desired housing is predicted. Although this does not affect the expected value of housing equity since the expected value of ν is zero, it does affect the absolute values of the deviation. This can be seen by comparing the values in the second half of table 1.2 with those in the first. For example, the average of the absolute values of the desired change over all families is $5,377 when the disturbance term is not accounted for and $12,766 when it is.

The values in table 1.2 indicate the change in housing equity that would occur if transaction cost were zero. On average, the desired change in housing equity may be substantial.

But, also on average, the desire is not to reduce but rather to increase housing equity, as shown in table 1.3. This table shows the mean (and median) difference between desired and existing housing equity, again by housing equity and income and for movers and for stayers. This table indicates the housing choices that families would make were there no moving transaction

Table 1.3 **Mean (and Median) of Preferred Minus Actual Housing Equity, by Move Status and by Housing Equity and Income Quartiles**

	Income Housing Equity				
	Low	2d	3d	4th	Total
All:					
Low	243	50	285	−1,924	−86
	(−29)	(−89)	(0)	(−1,008)	(−64)
2d	866	814	191	−225	468
	(50)	(275)	(427)	(−511)	(30)
3d	1,133	897	1,323	649	1,009
	(71)	(205)	(275)	(269)	(185)
4th	2,497	1,923	2,438	3,940	3,007
	(674)	(552)	(819)	(915)	(721)
Total	827	835	1,165	1,569	1,010
	(24)	(199)	(221)	(151)	(106)
Movers:					
Low	2,054	3,406	718	−2,815	1,210
	(1,048)	(269)	(−2,567)	(−2,912)	(357)
2d	2,812	2,647	2,655	−833	1,775
	(906)	(364)	(−524)	(−3,840)	(37)
3d	4,834	2,586	2,976	−1,566	2,127
	(2,041)	(794)	(1,754)	(−1,487)	(810)
4th	7,625	5,328	4,310	9,337	7,326
	(2,627)	(4,868)	(1,194)	(4,405)	(3,109)
Total	4,044	3,321	2,877	2,822	3,258
	(1,324)	(704)	(930)	(−795)	(854)
Stayers:					
Low	176	−114	264	−1,860	−147
	(−39)	(−94)	(2)	(−939)	(−67)
2d	743	731	46	−175	388
	(26)	(275)	(−126)	(−439)	(30)
3d	843	817	1,238	803	943
	(50)	(183)	(230)	(338)	(176)
4th	1,897	1,762	2,343	3,590	2,736
	(450)	(479)	(801)	(770)	(619)
Total	633	718	1,076	1,481	975
	(5)	(176)	(207)	(185)	(89)

costs and if all families chose housing equity to optimize the allocation of wealth between housing and other assets. The average difference is $1,010, and the median difference is $106. Families with low income and high housing wealth would like to reduce housing equity, but those with high income and low housing equity would like to allocate more wealth to housing.

The predicted mean increase for movers is $3,258; the median is $854. Like the predictions for all households together, those for movers show some reallocations that increase housing equity and others that reduce it. On average, the increases outweigh the reductions. The results in the second panel of the

table are very similar in pattern to the findings reported in Venti and Wise (1989), although the magnitudes are smaller here.[12] The mean predicted change in the housing equity of stayers, were they to move, is $975, with a median of $89. Comparison of the panels for movers and for stayers shows that the predicted changes within the cells are typically greater for movers than for stayers.

The averages of predicted percentage differences between actual and desired housing equity are shown in table 1.4. Two features of the table stand out. The

Table 1.4 **Mean (and Median) Percentage Difference between Actual and Preferred Housing Equity, by Move Status and by Housing Equity and Income Quartiles**

	Income Housing Equity				
	Low	2d	3d	4th	Total
All:					
Low	3.4	.3	.9	−3.3	1.3
	(−.4)	(−.5)	(.0)	(−1.9)	(−.5)
2d	10.4	4.1	.7	.0	4.2
	(.5)	(1.3)	(−.4)	(−1.0)	(.2)
3d	10.9	4.3	4.1	1.3	4.8
	(.8)	(.9)	(.9)	(.5)	(.8)
4th	24.9	8.8	7.5	7.0	9.4
	(5.9)	(2.5)	(2.6)	(1.5)	(2.2)
Total	9.1	4.0	3.6	2.9	4.9
	(.3)	(.9)	(.7)	(.3)	(.6)
Movers:					
Low	28.2	17.9	2.2	−3.5	14.3
	(18.2)	(1.2)	(−7.2)	(−6.9)	(2.2)
2d	47.2	14.4	8.3	1.1	18.9
	(13.5)	(1.8)	(−1.7)	(−8.7)	(.2)
3d	44.3	12.4	9.1	−.7	16.1
	(17.6)	(3.7)	(5.4)	(−3.6)	(2.8)
4th	71.9	26.9	12.0	18.7	28.2
	(35.5)	(23.0)	(3.8)	(8.0)	(11.1)
Total	46.2	17.0	8.5	7.2	19.7
	(18.8)	(3.4)	(2.8)	(−1.4)	(3.8)
Stayers:					
Low	2.5	−.5	.8	−3.3	.7
	(−.5)	(−.5)	(.0)	(−1.8)	(−.6)
2d	8.1	3.6	.3	−.1	3.3
	(.3)	(1.3)	(−.3)	(−.8)	(.1)
3d	8.3	3.9	3.8	1.5	4.2
	(.5)	(.9)	(.7)	(.6)	(.8)
4th	19.4	8.0	7.3	6.2	8.2
	(4.3)	(2.2)	(2.5)	(1.3)	(2.0)
Total	6.8	3.4	3.4	2.6	4.1
	(.1)	(.9)	(.7)	(.4)	(.5)

desired changes are positive on average and are greater for movers than for stayers. And the desired increases are much greater for families with high income and low housing wealth than for families with low income and high housing equity. This pattern is especially evident among movers. On average, movers with high income and low housing equity would like to increase housing equity by 72 percent; the average mover with low income and high housing equity would like to reduce housing equity by only 3.5 percent. Were there no moving transaction costs, and if all families moved to optimize the allocation of wealth between housing and other assets, housing equity would increase by 4.9 percent on average; the typical family would not change housing equity, as indicated by the median percent change of .6 percent.

1.4 Summary and Conclusions

Mobility among elderly families is very low. Approximately 8 percent of RHS homeowners move during a two-year period. The percentage increases very substantially, to about 15 percent, at the time of precipitating shocks like change in marital status or retirement. Thus, most elderly people are apparently reluctant to move. In our analysis, this is reflected in large transaction costs of moving. The analysis emphasizes the potential gain in utility to be had by moving and the resulting opportunity to reallocate wealth between housing and other assets, under the presumption that many elderly would like to withdraw wealth from housing to finance current consumption of other types. This potential gain is very small, however, for most elderly. Thus, relative to the potential gain from a reallocation of wealth, the transaction costs of moving are large.

Nonetheless, the transaction costs evidently have very little effect on the housing equity of the elderly. The evidence suggests that, although some elderly would make substantial changes in housing equity were they to choose new housing, some would choose to add to housing wealth and others to reduce it. On balance, were all elderly to move and choose optimal levels of housing equity, the amount of housing equity would be increased slightly. Thus, the results reinforce our earlier findings and those of Feinstein and McFadden (1989). Most elderly are not liquidity constrained. And, contrary to standard formulations of the life-cycle hypothesis, the typical elderly family has no desire to reduce housing equity. This is true even among families with low total wealth, for whom housing equity is a large fraction of total wealth. The desired reduction of housing equity is largest among families with low income and high housing wealth. Even in this case, however, the desired reductions are rather small, and these desired reductions are more than offset by the desired increases of other families, especially those with high income and low housing wealth.

The evidence of high moving transaction costs, however, suggests that some families may be prevented by such costs from moving, even though they would like to reduce housing equity. It is for these families that reverse annuity

mortgages would apparently be most beneficial. Limited demand, though, may explain the absence of an active market for such financial instruments.

Appendix
Selection of Estimation Sample and Variable Definitions

The estimates are based on data from the RHS. The survey covered families headed by persons between ages 58 and 63 in 1969. The families were interviewed every two years between 1969 and 1979; there were six waves altogether. The initial sample contained slightly over 11,000 families. Over 8,000 families were interviewed in the last survey in 1979.

To obtain the sample for this paper we began with all families who owned homes in 1969. A family was omitted from the sample if the first move was to a rental unit or if data used in the analysis (other than housing wealth) were missing in any year prior to the first move. The remaining sample consisted of 4,106 families. In addition, housing equity was sometimes missing or misreported. In some cases, housing equity was not reported in one or more years; in other cases, it was apparently either incorrectly reported or incorrectly coded in one or more years. This latter problem is clearly evident in the tremendous year-to-year variation in housing equity. In our model, a large error in reported housing equity for a family that does not move in a given interval means that the family must be dropped from the sample. This is because a family, at each point in time, must choose between its current level of housing equity (inherited from the previous period) and the optimal allocation of housing wealth. If housing equity is incorrectly reported to be unusually high in period t, then in some cases housing equity in period t will exceed total wealth in period $t + 1$. Unless nonhousing wealth is negative or housing values dropped sharply between periods t and $t + 1$, such cases reflect error in year-to-year reported housing equity. Instead of deleting all such cases from the sample, the median of housing equity (in 1979 dollars) over all periods prior to a move is used as the measure of housing equity in each period that the family does not move. If a family moves, the median represents the equity of the old unit; the equity of the new unit is the reported amount. The final sample includes 3,423 families.

Initial estimates were obtained using reported housing equity throughout. This meant that a disproportionate number of families with low housing equity and low total wealth were deleted from the sample. In fact, the central conclusions of the paper are not affected by the sample selection procedure, although individual estimates are.

The definitions of most of the variables are straightforward. Housing equity is the market value of the house less mortgage and other debt on the house.

Nonhousing wealth includes real property (less debt), motor vehicles (less debt), savings bonds, corporate stocks and bonds, checking accounts, savings accounts, and the face value of life insurance. Total wealth is the sum of housing and nonhousing wealth. The changes in health, retirement, and family status pertain to the two-year intervals between surveys.

Notes

1. The findings of the predecessor paper were very similar to those of Feinstein and McFadden (1989), which are based on the Panel Survey of Income Dynamics; our findings were based on the Retirement History Survey (RHS). These findings are also consistent with the results reported earlier by Merrill (1984).

2. More "structural" specifications based on the asset value and the consumption value of housing, and on a budget constraint limiting the user cost of housing to current income, were rejected in favor of this simple specification.

3. In this sense, the model is consistent with models explicitly incorporating both consumption and investment demands for housing, as in Henderson and Ioannides (1983, 1987), e.g.

4. In their work, Feinstein and McFadden strongly reject the null hypothesis of no unobserved household effects on mobility decisions.

5. It is clear from eq. (10) that the specification may be interpreted as a disequilibrium model, where $d(Z)$ represents the extent of disequilibrium in the proportion of wealth allocated to housing. An alternative procedure is to predict desired housing wealth directly as a function of age, current income, and total wealth, without incorporating the term H_{t-1}/W_{t-1}. The use of the predetermined ratio is a way to control directly for heterogeneity; otherwise, it would be concentrated to a greater extent in the disturbance term. Because the estimation procedure does not integrate over possible values of desired housing equity, given the right-hand variables in eq. (10), more accurate predictions can be had by using the procedure that is followed here.

6. For more explanation in the context of a different application, see Butler and Moffitt (1982).

7. In principle, both probabilities might involve integration over possible values of $H_{*\tau}$ since not all families have the same preferences and, even if they did, the optimal housing level may not be available at any point in time. Integration would be over the random term ν, when V_* is evaluated. This is the procedure followed in Venti and Wise (1984). It is not done here for two reasons. It adds substantial complexity to the likelihood calculations. And the method used to predict desired H_t already incorporates substantial heterogeneity in housing preferences; the remaining residual variance is small.

8. In this specification, unlike the standard probit model, the error variance is in fact estimated by the coefficient on $\Delta \ln V$.

9. These estimated values are sensitive to errors in reported housing equity. If, instead of the median of the several housing values reported by each family in the biannual surveys before a move (see the appendix), the actual recorded values are used, all these estimates are considerably larger.

10. With $\Delta \ln V$ evaluated at its mean and with all the dummy variables assumed to be zero.

11. In fact, divorce or marriage are associated with a much higher probability of moving, about .43 (see Venti and Wise 1989).

12. The earlier results were actual changes in housing equity among movers by housing equity and income quartile, after controlling for age, calendar year, children, and changes in retirement, health, or marital status. A correction was also made for reporting errors. The predictions here may provide more accurate information because the continuous functional form does not allow measurement error—which would be most prevalent among families who enter the upper right and the lower left portions of the table—to exert as large a force on the results as the dummy variable specification used in our earlier paper. It could also be that the specification used here does not fit the data as well as the flexible form used there.

References

Butler, J. S., and R. Moffitt. 1982. A computationally efficient quadrature procedure for the one-factor multinomial probit model. *Econometrica* 50, no. 3 (May).

Feinstein, J., and D. McFadden. 1989. The dynamics of housing demand by the elderly: Wealth, cash flow, and demographic effects. In *The economics of aging*, ed. D. Wise, 55–86. Chicago: University of Chicago Press.

Henderson, J. V., and Y. M. Ioannides. 1983. A model of housing tenure choice. *American Economic Review* 73 (1):98–113.

_____. 1987. Owner occupancy: Investment vs. consumption demand. *Journal of Urban Economics* 21 (2):228–41.

Merrill, S. 1984. Home equity and the elderly. In *Retirement and economic behavior*, ed. H. Aaron and G. Burtless. Washington, D.C.: Brookings.

Venti, S. F., and D. A. Wise. 1984. Moving and housing expenditure: Transaction costs and disequilibrium. *Journal of Public Economics* 23 (½):207–43.

_____. 1989. Aging, moving, and housing wealth. In *The economics of aging*, ed. D. Wise, 9–48. Chicago: University of Chicago Press.

Comment Alan J. Auerbach

The main result of this paper is that, when elderly people move, they do not reduce their housing equity, on average. To the authors, this suggests that programs that allow households to reduce housing equity without incurring moving costs have not really caught on because there is little underlying demand for them.

I believe this finding, that people in the sample do not, on average, wish to reduce their housing equity. I am less convinced that this explains the lack of demand for reverse annuity mortgages. Further, I am troubled by certain details of the model specification that, while not necessarily influencing the

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basic result about housing equity demand, do make it difficult to interpret the paper's two-stage model of housing demand and moving costs.

The modeling approach taken here is quite sensible and straightforward. In each period, each household evaluates its optimal level of housing and compares it to the current level. If the economic benefit from moving exceeds the cost of doing so, the household moves. Loosely speaking, we can identify the determinants of housing demand from the sample of people who move and the determinants of moving costs by imputing housing demand to the entire sample and then seeing who moves.

The first problem one encounters with the model is in the definition of housing. There are really three relevant housing variables: the value of housing owned, the value of housing equity net of mortgages, and the value of housing consumed. Imposing the constraint of owner occupation leaves us with two independent measures since ownership must equal consumption. Still, there are determinants of housing demand distinct from housing equity demand that, because of data limitations, must be ignored in the paper, which considers only housing equity as an argument of utility. Given that household preferences are actually affected by both, how are we to interpret the paper's empirical findings? The answer depends on the relation between these two variables.

My intuition is that there could be present in the population a general desire to decrease housing equity that is hidden by a desire not to decrease housing consumption. To make the argument simple, suppose there were no mortgage market at all, so housing equity would have to equal housing consumption. Then a household wishing to reduce housing equity would have to reduce housing consumption by the same amount. Balancing these two factors might lead to a small average decrease in housing demand; yet, if mortgages were now introduced (or made easier to obtain), we might observe significant decreases in home equity. An important question to which I do not know the answer is how freely households in the sample can vary housing equity and housing consumption if they move or if they do not move. The paper's logic suggests that housing equity can be changed only by moving. If it can be changed without moving, then why *should* we expect housing equity to be related to the moving decision?

Let me turn now to the model itself. Using six waves of the Retirement History Survey from 1969 to 1979, Venti and Wise follow each family until it moves or until the sample period ends. That is, moving is treated as an absorbing state. The decision to omit observations on families that have moved during the sample period does formally constitute choice-based sampling and introduces potential bias into the estimation procedure. Given the low probability of moving in any given year, this may not be a serious problem, but I am not sure what the authors gain in terms of simplicity by omitting such observations.

The ability to observe households several times permits the specification of an error structure that includes household-specific moving costs. One might

also have imagined a role for time effects as well, to account for macroeconomic factors such as mortgage rates, overall housing demand, etc. The authors assume that households begin each period with an optimal amount of housing but that preferences drift (according to eq. [8]) because of changes in observable and unobservable household attributes. This leads some households to move, if the desired change in housing is sufficiently large to overcome the costs of moving, which also vary by household. Unfortunately, since few households move in any given period, this specification of the typical household's preferences is not time consistent. Even if it does not move to its optimal point in period t, a household is assumed during period $t + 1$ to have done so.

A more appropriate specification would be a disequilibrium model in which, at the beginning of the sample, households are assumed to have some distribution around their optimal housing equity values. Indeed, the notion of disequilibrium is clearly what Venti and Wise have in mind, even though their model is not formally specified that way. The preference drift function $d(x)$ described in (9) is ostensibly a measure of how preferences change over time to induce movements from a previous optimum to a new one. In fact, the function is based on levels rather than changes in such variables as income and wealth. Indeed, what the estimates in table 1.1 tell us is that high income leads people to wish to consume more housing and low wealth leads them to wish to consume less. This is perfectly consistent with the disequilibrium approach and, I think, only with this approach. My sense is that the model could be reworked to be consistent with this approach without the basic story being fundamentally altered. It is likely that the econometrics of my preferred modeling approach would be more complex, however. This is because one would lose the independence of current from past decisions; that is, the probability of a move would relate to past moving decisions, how long ago the family last moved, etc.

My next problem with the model as estimated deals with the difficulty of distinguishing the determinants of housing demand and moving costs. Certain variables, such as health status, are included in the moving cost function and ought to be there. One could argue for including such variables in the housing demand function, too. Other variables, such as change in marital status, seem appropriate primarily as determinants of demand shifts but instead are included only in the moving cost function. How should one interpret the reported result that moving costs are reduced significantly by a change in marital status? My intuition is that people in this situation move more because of a change in desired housing arrangements than because of a decline in moving costs. The exclusion of this and other variables from the demand shift function seems quite likely to have induced biased estimates of the moving cost function. This may have a significant effect on the model's policy implications, as well, since the apparently small average change in desired housing equity indicated by the model could be an artifact of the decision to put all the demographic variables

into the moving cost function and to exclude them from the demand shift function.

In summary, I am reasonably convinced by this paper that the elderly do not, on average, wish to reduce their housing equity. This is an important result in itself. Without intending to diminish this positive contribution, I must confess to being less convinced by the paper's explanation of the determinants of moving costs and the demand for housing equity and its attempt at resolving the puzzling lack of demand for reverse annuity mortgages. More work on these questions seems warranted.