

Maintenance and the Home Equity of the Elderly

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Abstract

The empirically observed failure of older households to reduce home equity has long puzzled economists. The magnitude of home equity reduction is understated if self-reported home values of the elderly do not incorporate the market's view of the state of repair. Panel analysis of the American Housing Survey shows that households over age 75 spend approximately \$270 less per year on routine home maintenance than younger households and approximately \$1,100 less in total expenditures, including repairs, alteration and replacements. The homes of older households are significantly more likely to fall into disrepair between waves of the AHS. When older households sell their homes, the new owners consider the home to be less nice than the older occupants did, a phenomenon which occurs to a much smaller extent when the seller is younger. Homes sold by older households exhibit weaker price appreciation than those owned by younger households, but this result depends on whether the base price is the purchase price or the estimated value at the start of the panel. Based on purchase-price to purchase price differences, a year of occupancy by an older household (rather than a younger household) is associated with a 5 to 10 percent reduction in resale value.

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1 Home Maintenance and the Life Cycle

A canonically modeled household with no bequest motive, no direct utility over wealth and no tax or liquidity uses for housing wealth in particular should consume most home equity before death. Artle and Varaiya (1978) implicitly describe the utility costs related to failure to smooth consumption when these complications are not present yet home equity is not spent before death. Findings that the elderly rarely move out of their homes¹ and almost never take on reverse mortgages² suggest that one or more of these complicating factors are important.

Casual empiricism suggests a “third way” in which the elderly might convert home equity to consumption: substituting other consumption for home maintenance expenditures. As Gyourko and Tracy (2003) observe, home maintenance and improvement represent a non-trivial fraction of all US expenditures³ and changes in these expenditures reflect changes in lifetime income. These considerations suggest that we should find economically and statistically significant differences in both expenditures on maintenance and in changes in the quality of housing between older and younger households.

It is not obvious on life cycle grounds that expenditures on durable goods such as home maintenance will decline with age (even if it were clear that the elderly engage in dissaving, see for example Hurd (1989)) since such goods represent both consumption and investment. Further, older households presumably have more expertise, time and tools than younger households, but less stamina. Hence, we would expect older households to mix capital and labor differently in producing home improvements.

These considerations suggest that it is worthwhile asking two sets of questions empirically: first, do older households undertake less home maintenance than younger households? Second, I ask whether the homes of older households appear to suffer the effects of neglect. The first question gives rise to equations of the form:

$$IMPROVEMENTS_{it} = \alpha + X_{it}\beta_1 + H_{it}\beta_2 + \gamma f(AGE_{it}) + \epsilon_{it} \quad (1)$$

in a pooled cross-sectional setting and

$$\Delta IMPROVEMENTS_{it,t-s} = a + X_{it,t-s}b_1 + H_{it,t-s}b_2 + \gamma \tilde{f}(AGE_{it,t-s}) + u_{it,t-s} \quad (2)$$

in a panel setting taking s -year differences. That older households spend undertake fewer home improvements than younger households in a cross section does not imply

¹See, for example, Feinstein and McFadden (1989) and Venti and Wise (2000)

²E.g. HUD (1995).

³They find home maintenance equal to 3.1% of income in the *American Housing Survey*. The 2001 *Consumer Expenditure Survey* shows home maintenance (inclusive of insurance) equal to 2.2 percent of all expenditures, but this figure includes renters. NIPA accounts suggest that home improvement is typically equal to half of the value of new construction.

that the rate of decrease in spending will be greater among the elderly than the young in a cross section.

IMPROVEMENT measures expenditures on home maintenance, repairs and additions or counts the number of improvements. X represents household characteristics and H home characteristics. $f(AGE)$ measures the concept of being old in two different ways. First, I ask simply whether a household head is between 55 and 74 (*YOUNGOLD*) or over 75 (*OLD*); 75 is chosen as a breakpoint because that is the age at which home maintenance repairs appear to fall in aggregate Consumer Expenditure Survey Data. Second, I define $f(AGE)$ as the household head's probability of death (*PROB*), taken from gender-inspecific aggregate data.⁴ Tildes over variables indicate that either levels or differences may appropriately be considered explanations of changes in the degree of home maintenance.⁵

Sets of regressions similar to equations (1) and (2) replace improvements with measures of changes in housing quality on the left hand side. Such measures include interviewer and interviewee assessments of home quality as well as market and owner-estimated prices. These regressions are of the form:

$$QUALITY_{it} = \alpha + X_{it}\beta_1 + H_{it}\beta_2 + \gamma f(AGE_{it}) + \epsilon_{it} \quad (3)$$

in a pooled cross-sectional setting and

$$\Delta QUALITY_{it,t-s} = a + X_{it,t-s}\tilde{b}_1 + H_{it,t-s}\tilde{b}_2 + \gamma \tilde{f}(AGE_{it,t-s}) + u_{it,t-s} \quad (4)$$

in a panel setting taking s -year differences.

2 American Housing Survey National Panel Data, 1985-2001

I use data from the American Housing Survey, a nationally representative panel of approximately 120,000 homes conducted by the Census Bureau every two years. The panel I consider contains up to nine observations per home, from 1985 through 2001. The survey contains detailed information on the characteristics of each home and its residents. Here, I focus on variables describing home maintenance expenditures, home value, location and the age of residents. I confine the sample to houses that were exclusively owner occupied throughout the 1985 to 2000 period.⁶ I delete renters

⁴The next step, to come in a later version, is to consider family structure.

⁵It is difficult conceptually and empirically among maintenance, repairs, replacements and additions; I do not try in this paper.

⁶I do not consciously exclude the relatively small number of owner occupied seasonal housing, cooperatives or condominiums. The results appear to be robust to their exclusion.

and households whose heads do not identify their age from the sample. Incomplete information concerning house values or maintenance costs lead to an annual sample size of roughly 8,000 to 10,000. ⁷ Table 1 provides summary statistics.

I consider four measures of *IMPROVEMENTS*: (i) routine maintenance costs (*CSTMNT*), (ii) major alterations and repairs (*RAC*), (iii) the sum of (i) and (ii) (*TSPEND*) and (iv) the number of alteration or replacement projects undertaken (*RAN*).⁸ I consider both logs and levels of these variables and deflate each by the US CPI, using 2001 as the base year. In the case of the first difference in the measures of improvement over s years ($\Delta IMPROVEMENT_s$ in (2)), observations are included only when the owner at time t was also the owner s years ago.

OLD_{it} indicates that the head of the household owning unit i in year t was 75 or older. $YOUNGOLD$ indicates that the head is between 55 and 74. $PROB_{it}$ indicates the average mortality of an individual (male or female) of the same age as the head of household i in year t . H_{it} includes the square footage of the home (*UNITSF*) the age of the home (*BUILDAGE*), the respondent's evaluation of the neighborhood of the home as a place to live (*HOWN*) and a set of 141 dummy variables indicating in which metropolitan area (SMSA) the unit is located. X_{it} includes how long the household head has lived in the home (*STAY*) and in some cases year dummies.

Home maintenance expenditures are not identical to changes to the quality of a home. Quality may have both vertical and horizontal components. Also, the marginal benefit of maintenance and repair expenditures presumably are decreasing, with small expenditures preventing large problems and large expenditures perhaps adding little benefit with lot size fixed and housing quality presumably concave in land and capital. Further, houses which require less maintenance are more desirable than those which require more, all else equal. Hence directly regressing housing quality measures on home maintenance expenditures would not give a good idea of the consequences of home maintenance for housing quality. Hence, one might interpret the results from equations (1) through (4) in a two-stage least squares setting.

Two sets of dependent variables suggest themselves in assessing the effect of home maintenance (through age) on housing quality: the value of the home and the perceived quality of the home. Home values are provided both by the respondents' estimate of

⁷I do not exclude households headed by an older reference person, but containing more than two members. While this may yield spurious results due to younger members performing maintenance tasks, these tasks could also be performed by nonresident younger members.

⁸Following Gyourko and Tracy (2003), I halve *RAC*, which is a two-year sum so that figures are annual. Both variables have somewhat different definitions before, during and after 1995, so I only compare "apples to apples" in the equations of form 2. A notable problem is that *CSTMNT* is defined in the early years as spending on routine maintenance last year and in later years as spending in a typical year - the latter definition elicits many fewer zeroes.

the market value (*VALUE*) of the home and by the purchase price for homes when they are sold (*PRICE*), or at the time of a respondents' initial purchase. Housing quality is measured both by the respondent's answer to the question "On a scale of 1 to 10, how would you rate your unit as a place to live?" (*HOWH*) and by the interviewer's estimation of whether the home is in adequate repair, inadequate repair or severely inadequate repair. I denote a change from adequate repair to inadequate or severely inadequate repair between periods t and $t - k$ by $FALL_k$.

3 Results

3.1 The Elderly Spend Less on Maintenance

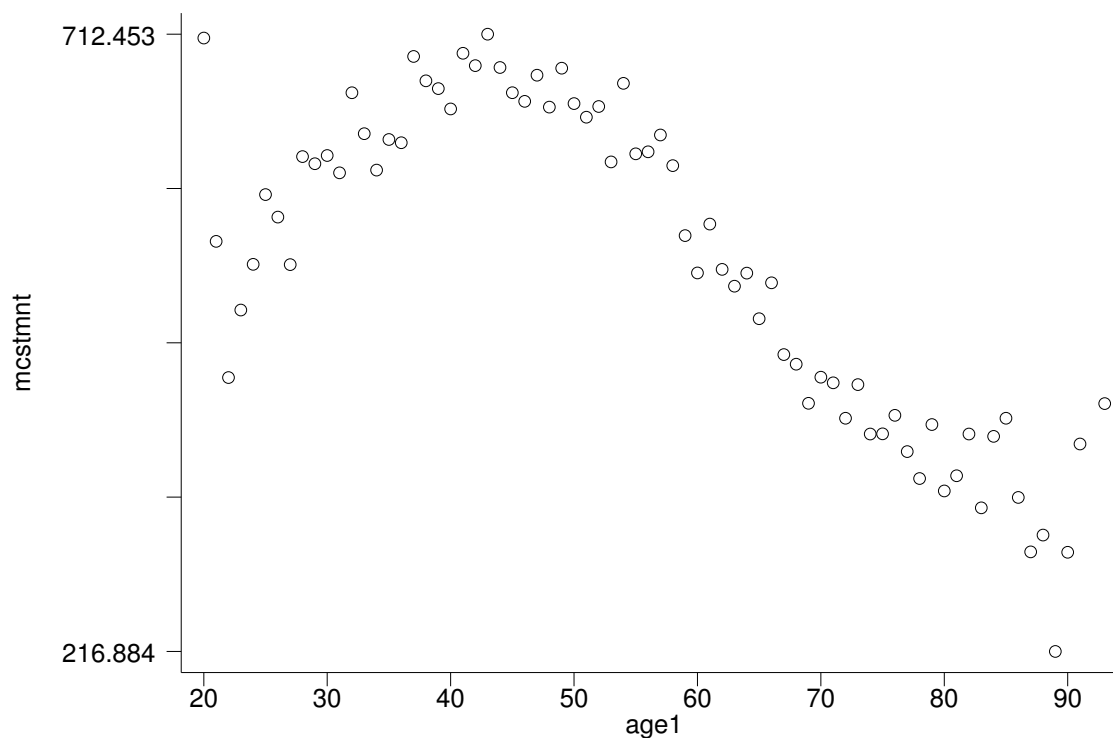
Figure 1 illustrates the cross sectional relationship between age and home maintenance expenditures, plotting unconditional mean spending on maintenance against age. Given that older households live in older but larger homes, the addition of covariates in a regression setting has *ex ante* ambiguous effects. The results of estimating equations (1) and (2) are summarized in Tables 2 through 4. Table 2 reports the pooled OLS equation for the expenditure variables. In each specification, there are controls for each SMSA. On average, we find that households over age 74 spend approximately \$270 less on routine maintenance (*CSTMNT*) than households with heads under 55, and households between 55 and 74 spend approximately \$150 less. The covariates have the expected signs: older and larger buildings require more maintenance, and households who have lived in a home longer spend less on maintenance. The introduction of covariates does not much change the coefficient estimates on *OLD* or *YOUNGOLD*. Likewise, expenditures are smaller for older households on larger improvement projects (*RAC*), so that in sum (*TSPEND*), households 75 or older spend an average of roughly \$1,130 less per year than those headed by heads under 55. In natural logs (column (6)), older households spend approximately like 38 percent less than younger households on all improvements. When age is measured by mortality (*PROB*), we find that the elasticity of total home improvement spending with respect to probability of death is over 5 (this estimate is biased down by the exclusion of zeros from the natural log calculation). A one percent increase in mortality is associated linearly with a \$164 decrease in total spending. The negative effect of age on total maintenance spending is estimated to be considerably larger, approximately 1,750 per year at mean values, when a Tobit is estimated and non metropolitan observations are removed.

Table 3 estimates the effect of aging on the number of alteration or repair projects undertaken (*RAN*). *RAN* is available only in panel years 1995 through 2001, but has the virtue of including the effects of both capital and labor expenditures. Here, we find that old households undertake approximately one less major project per year, around

a population mean of 1.81 projects. The elasticity of number of projects with respect to the probability of death, found in column (5) is approximately 3.5.

Table 4 reports results for regressions of the first difference form 2. In this case, I focus on six year differences. Shorter differences yield similar results, but we might be concerned that short differences may reflect mostly noise.⁹ An absence of age effects in this regression could be consistent the age effects seen in the pooled cross section. However, finding differences in the rate of change in home improvements across age groups might ease some concerns regarding unobserved individual effects that might be correlated with old age. Turning to results, we find across specifications that the effect of age is almost always insignificant and of mixed sign. There does appear to be some decrease in the number of projects with age as measured by probability of death. This measure puts greater weight on households at the very high end of the age distribution.

Figure 1: Mean unconditional home maintenance expenditures by age



3.2 Expenditure Typology

One might argue that the differences between the home improvement expenditures of older and younger households are driven by increases in the “quantity” of housing on the

⁹This is a concern in answering the question: how much is spent in a typical year on routine maintenance and particularly below with owner estimates of home value.

Table 1: Summary Statistics: Data From the American Housing Survey

Variable	Obs	Mean	Std. Dev.	Min	Max
YEAR	101,032	93.19	5.12	85.00	101.00
MOVE	100,873	78.02	14.07	5.00	101.00
VALUE	96,064	134,167	104,011	10,000	681,012
HOWN	99,236	8.38	1.73	0.00	10.00
RAN	45,964	1.81	2.77	0.00	47.00
UNITSF	93,605	2,062	862	99	5,001
LPRICE	80,582	77,189	74,786	10,000	548,029
PER	101,032	2.86	1.43	1.00	15.00
HOWH	99,514	8.73	1.40	1.00	10.00
ZADEQ	101,032	1.05	0.27	1.00	3.00
RAC	95,470	2,969	8,462	0	578,356
CSTMNT	93,552	578	1,060	0	16,608
BUILT	91,951	1,958	22	1,919	2,001
AGE1	101,032	53.00	15.36	20.00	93.00
OLD	101,032	0.10	0.30	0.00	1.00
YOUNGOLD	101,032	0.34	0.47	0.00	1.00
STAY	100,873	15.17	13.32	0.00	86.00
BUILDAGE	91,951	35.68	21.69	-16.00	82.00
PROB	101,032	0.015	0.022	0.001	0.192
TSPEND	89,061	2,095	4,491	0	293,144
OWNHH	101,032	10,748	6,173	1	22,082
NOHAND	101,032	0.52	0.50	0.00	1.00
DCOST6	20,409	-52	1,369	-16,608	13,032
DHOWN	97,591	0.00	1.84	-10.00	10.00
DRAC6	19,739	-121	9,542	-298,278	226,432
DTSPEND6	18,063	-78	4,978	-96,851	113,882
DHOWH	77,035	-0.05	1.46	-9.00	9.00
SBMSA	85,850	2,224.06	1,453.03	1.00	5,260.00
DPRICE	3,424	0.77	0.75	-1.98	3.42
STAYSALE	100,811	21.52	14.17	0.00	84.00
YEARSOLD	5,851	0.91	2.96	0.00	19.00
OLDSALE	101,032	0.20	0.40	0.00	1.00
DHOWHSELL	7,659	-0.16	1.72	-9.00	8.00
FALL6	45,190	0.03	0.17	0.00	1.00
DVALUE3	40,798	0.20	0.46	-3.12	4.22
SALEGROUP	99,392	492.12	511.39	1.00	1,644.00
OLDYEARS	101,032	0.95	3.01	0.00	16.00
TSPENDPERU	83,061	1.09	2.32	0.00	135.58
DPRICEPERU	3,188	336.90	844.82	-2,354.56	39,039.98

Table 2: Regressions of maintenance expenditures on age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.	CSTMNT	CSTMNT	RAC	TSPEND	TSPEND	TSPEND	TSPEND
OLD	-290 (12)**	-268 (14)**	-855 (47)**	-1,128.13 (53.593)**		-0.383 (0.026)**	
YOUNGOLD	-150 (9)**	-152 (10)**	-365 (38)**	-521.715 (41.672)**		-0.108 (0.016)**	
UNITSF		0.115 (0.006)**	0.794 (0.058)**	0.260 (0.015)**	0.516 (0.030)**	0.111 (0.020)**	0.113 (0.020)**
PROB					-16,435.95 (737.362)**		-5.782 (0.377)**
HOWN		1.033 -0.701	3.146 -1.801	4.766 (2.218)*	4.719 (2.213)*	0.472 (0.016)**	0.469 (0.016)**
BUILDAGE		1.479 (0.250)**	8.600 (1.005)**	10.668 (1.109)**	10.427 (1.100)**	-0.104 (0.008)**	-0.104 (0.007)**
STAY		-0.871 (0.186)**	-3.141 (0.983)**	-4.118 (1.088)**	-4.785 (1.127)**	0.181 (0.010)**	0.182 (0.010)**
Constant	657 (6)**	365 (16)**	614 (70)**	966.449 (72.005)**	939.937 (72.052)**	2.849 (0.135)**	2.868 (0.134)**
Observations	93,552	78,608	79,302	74,958	74,958	61,502	61,502
R-squared	0.01	0.04	0.02	0.03	0.03	0.06	0.06
functional form	level	level	level	level	level	ln	ln
SMSA Dummies?	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors in parentheses. * significant at 5%; ** significant at 1%. *CSTMNT* is annual spending on routine maintenance, *RAC* spending on larger improvement projects and *TSPEND* the sum of *RAC* and *CSTMNT*. *HOWN* is the assessment of neighborhood quality made by the unit's occupant. *BUILDAGE* is the age in years of the home. *STAY* is how many years the household has lived in the same unit. *PROB* measures mortality probability.

Table 3: Regressions of Number of Home Alteration and Repair Projects Undertaken on age

	(1)	(2)	(3)	(4)	(5)
	RAN	RAN	RAN	RAN	RAN
OLD	-1.037 (0.032)**	-1.149 (0.042)**		-0.254 (0.017)**	
YOUNGOLD	-0.477 (0.030)**	-0.536 (0.035)**		-0.094 (0.013)**	
UNITSF		0 (0.000)**	0 (0.000)**	0.07 (0.011)**	0.068 (0.011)**
PROB			-15.299 (0.585)**		-3.523 (0.238)**
HOWN		0.005 (0.009)	0.001 (0.009)	0 (0.02)	-0.001 (0.02)
BUILDAGE		0.009 (0.001)**	0.009 (0.001)**	0.104 (0.008)**	0.104 (0.008)**
STAY		-0.003 (0.001)**	-0.003 (0.001)**	-0.082 (0.006)**	-0.089 (0.006)**
Constant	2.099 (0.021)**	1.689 (0.089)**	1.673 (0.089)**	0.138 (0.098)	0.165 (0.098)
Functional Form	level	level	level	ln	ln
SMSA FE?	Yes	Yes	Yes	Yes	Yes
Observations	45,964	37,688	37,688	22,422	22,422
R-squared	0.02	0.03	0.03	0.05	0.05

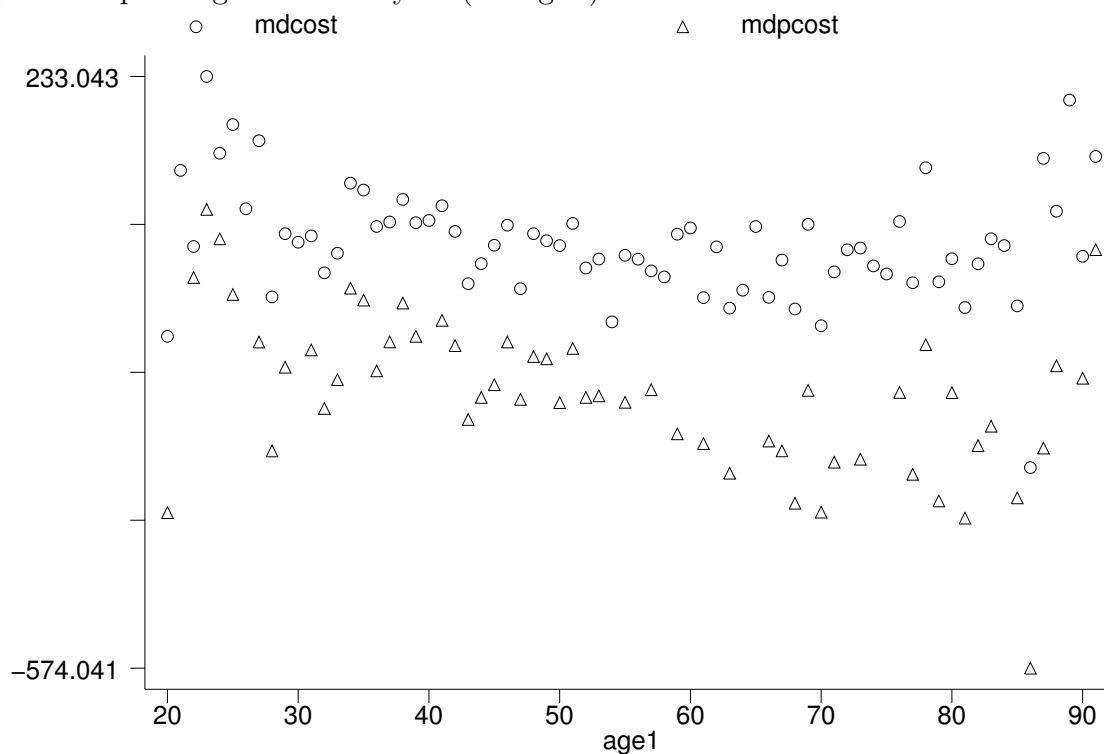
Notes: Robust standard errors in parentheses * significant at 5%; ** significant at 1%. In natural log regressions, OLD and YOUNGOLD are measured in levels, other variables in logs.

Table 4: Regressions of Number of Home Alteration and Repair Projects Undertaken on age

Dep. Var.	(1)	(2)	(3)	(4)
	$\Delta RAN6$	$\Delta RAN6$	$\Delta TSPEND6$	$\Delta TSPEND6$
$\Delta HOWN6$	0.165	0.169	-0.038	-0.037
	-0.087	-0.088	-0.059	-0.059
$\Delta STAY6$	-0.164	-0.184	-0.09	-0.075
	(0.068)*	(0.066)**	(0.034)**	(0.032)*
$\Delta BUILDAGE6$	0.179	0.174	0.354	0.368
	(0.092)	(0.092)	(0.074)**	(0.074)**
OLD	-0.096		0.007	
	(0.082)		(0.082)	
YOUNGOLD	0.007		-0.064	
	(0.05)		(0.038)	
$\Delta PROB6$		-3.981		0.727
		(1.976)*		(1.632)
Constant	-0.124	-0.089	-0.111	-0.15
	(0.047)**	(0.041)*	(0.035)**	(0.030)**
Observations	2186	2186	11600	11600
R-squared	0.01	0.01	0.00	0.00
Functional Form	ln	ln	ln	ln
SMSA FE?	NA	NA	NA	NA

Notes: Robust standard errors, clustered on home occupant, in parentheses. * significant at 5%; ** significant at 1%. $\Delta RAN6$ is the change in number of home repair projects over a six year horizon. Differences in *BUILDAGE* and *STAY* are not equal across individuals because of the logarithmic functional form.

Figure 2: Mean Change in Expenditures by Age: unconditional (circles) and conditional on positive spending in baseline year (triangles)



part of younger households. That is, we might expect that older households maintain their homes to the same extent as younger households, but younger households add more. This proposition can be countered on two grounds. First, it is difficult to disentangle depreciation arising from wear and tear from depreciation arising from changing quality standards. The means by which older households arrive at excess depreciation does not affect our estimate of the extent of comparative depreciation.¹⁰ Second, assuming that it matters on what dimension of investment spending occurs, we can determine what types of expenditures explain the differences in spending across older and younger households.

Table 5 reports pooled probit estimates of the probability that a household engages in particular types of expenditures. We find remarkably consistent differences in the fraction of older versus younger households performing the improvement across types of home improvement projects. When covariates are included, older households are approximately 2.7% less likely to replace all or part of a roof, build an addition to their home or to replace major equipment such as a furnace. It thus appears that older households spend comparably less on both “flat of the curve” and preventative home improvement.

¹⁰We would certainly want to know if younger households invest in projects with slower depreciation. This is difficult to determine empirically.

Table 5: Probit Estimates of Effect of HH Head over 75 (OLD) on different expenditure types

	(1)	(2)	(3)	(4)
	ROOF	ROOF	ADD	MEQ
OLD	-.0099 (.0078)	-.0284** (.0849)	-.0270** (.0041)	-.0274** (.0075)
STAY		.0010** (.0002)	-.0010** (.0001)	-.0004** (.0002)
BUILDAGE		.0013** (.0001)	.0000 (.0001)	
UNITSF		0 (0)	0** (0)	0** (0)
Obs	31,584	25,813	25,976	25,976

Notes: ROOF implies a roof replacement project. ADD is a new addition and MEQ implies replacement of major equipment.

3.3 Consequences? Changes in Housing Quality and Age

3.3.1 Changes in Perceived Quality and Value

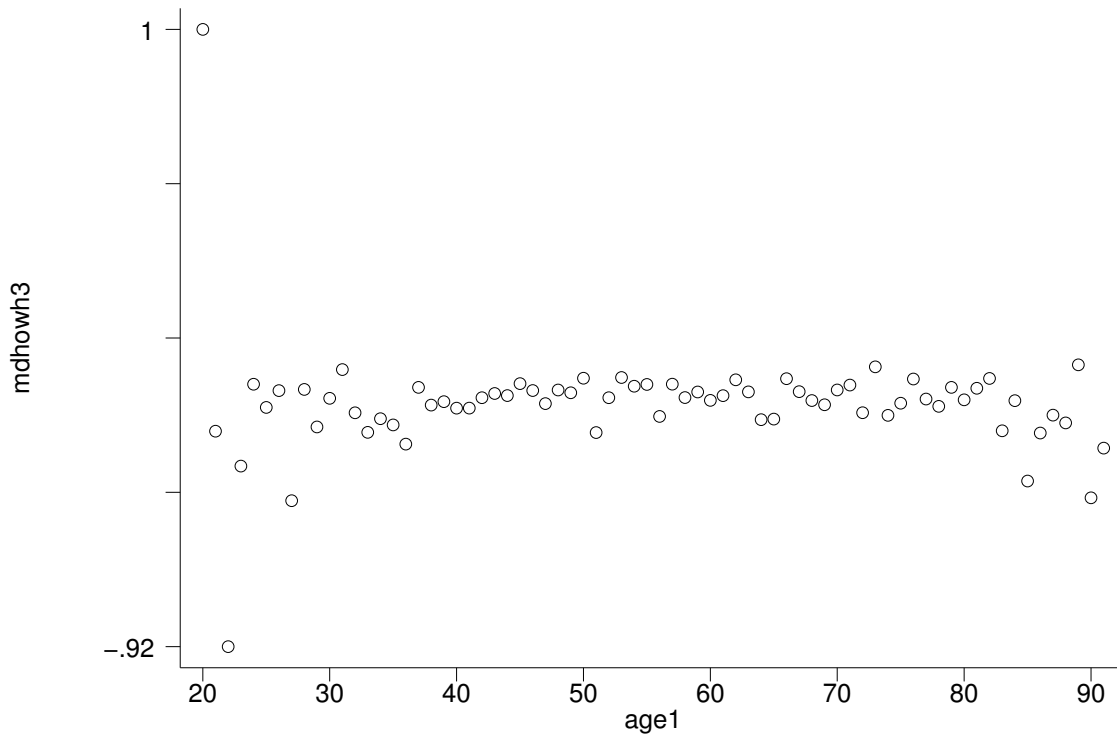
Given that older households spend less on home maintenance, we might expect that their homes suffer a loss in observable quality or value. This is not the impression received when we compare changes in owner's perception of their homes quality (*HOWH*) over time. Column (1) of Table 6 shows that older households tend to have impressions of their own homes almost identical to the population average in the AHS. The mean change in this subjective assessment of housing quality is plotted against age in Figure 3, which illustrates the absence of an effect. Columns (6) and (7) show that the market does not share this indifference to the age of the seller. The dependent variable here is the two-year change in owner's assessment of unit quality when the unit has been transferred between one survey round and the next, so that the home is identical but the owner different. The seller being over age 74 is associated with a significant decrease of roughly one-quarter of a point on a ten point scale in the new owner's view of the unit's quality. Not surprisingly in a differencing setting, this result is robust to the inclusion of year built and unit square footage controls.

Columns (2) and (3) of Table 6 show that the probability of a home (with a constant owner over six years) falling into disrepair increases by one percent when the household head is 75 or older. This effect is significant and large relative to the population average of 2.5 percent falling into disrepair over a six year period. The result is depicted graphically in Figure 4. There is no effect between 55 and 74. Alternatively formulated,

a one percent increase in the probability of death is associated with an increased probability of a fall into disrepair of roughly .14 percent. Unfortunately, no outside assessment of overall unit quality other than the gross measure of disrepair is available in AHS.

While older owners do not seem to believe that their homes have declined in quality as a place to live, they do perceive less appreciation in price relative to other owners of similar homes. This effect is shown graphically in Figure 5. Controlling for SMSA dummies and changes in neighborhood characteristics, columns (4) and (5) of Table 6 show that older households perceive a small but significant relative decrease of approximately 2.4 percent over a six year horizon.

Figure 3: Mean Change in Owner’s Assessment of Unit Quality: Same owner for 6 years



3.3.2 Changes in Market values of homes

There are two plausible measures available in the American Housing survey of price appreciation among households selling their homes. The variable ΔPP is the change in log price of a home present in the 1985 sample from its purchase (generally before 1985) until its first observed sale (always after 1985). The variable ΔPV is the difference in logs between the first sale price for a home and the owner-reported value in 1985. Presumably, both measures of initial price are subject to considerable measurement error. Controlling for regional appreciation consumes fewer degrees of freedom when the 1985 self-reported value is used as a baseline.

Table 6: Regressions of Changes in Owner and Interviewer Assessment of Housing Quality

Dep. Var	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	dHOWH6	FALL6	FALL6	dVALUE6	dVALUE6	$\Delta HOWH_{sell}$	$\Delta HOWH_{sell}$
dHOWN2						0.402	0.402
						(0.014)**	(0.014)**
OLD	-0.027	0.011		-0.024		-0.235	
	(0.03)	(0.004)**		(0.011)*		(0.071)**	
YOUNGOLD	-0.003	-0.001		-0.018		-0.157	
	(0.01)	(0.00)		(0.005)**		(0.046)**	
dHOWN6	0.348	0	0				
	(0.007)**	(0.00)	(0.00)				
dPROB6					-0.89		
					(0.244)**		
BUILDAGE						0.002	0.003
						(0.001)*	(0.001)**
UNITSF						0	0
						(0)	(0)
STAY						0	0
						(0.001)	(0.001)
PROB			0.139				-3.718
			(0.045)**				(0.801)**
Constant	-0.075			0.209	0.207	4.725	4.968
	(0.009)**			(0.003)**	(0.003)**	(1.912)*	(1.902)**
Observations	43854	43,987	43,987	39,692	39,692	6,343	6,343
R-squared	0.17			0.02	0.02	0.25	0.25
F'n. Form	OLS	Probit	Probit	OLS	OLS	OLS	OLS

Notes: Robust standard errors in parentheses. In columns (2) and (3), the coefficients are changes in probability of a home falling into disrepair over a six year period. HOWH refers to the owner's assessment of the unit's quality on a scale of one to ten. Columns (1) through (5) consider differences over six years when the owner is the same over time. Columns (6) and (7) consider the two year difference when the house has been transferred from one owner to another. OLD indicates that the homeowner was 75 or older in the baseline year. FALL6 indicates that a unit owned by the same household over six years has fallen from adequate to inadequate repair in the eyes of the interviewer. dVALUE6 is the change in owner's estimated log value. These results are based on slightly different data than elsewhere in the paper.

Figure 4: Fraction of Households Whose Houses Fall into Interviewer-Assessed Disrepair by Age

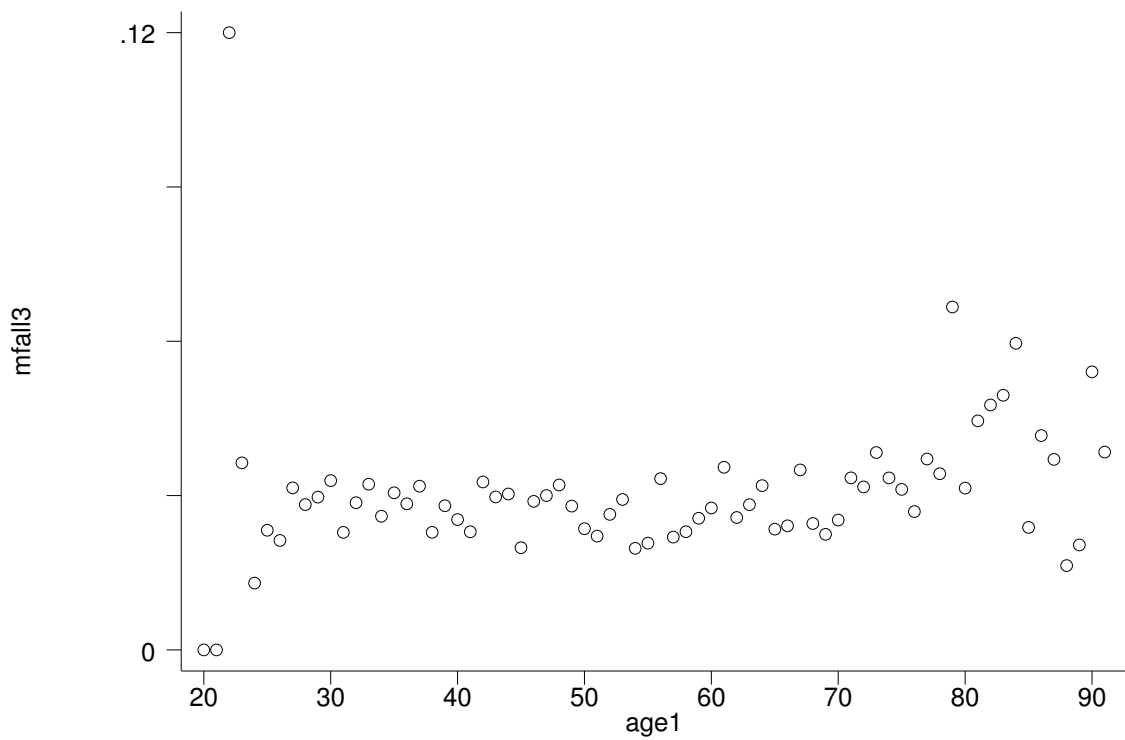


Figure 5: Mean Change in Owner's Estimate of Home Value: Same owner over 6 years

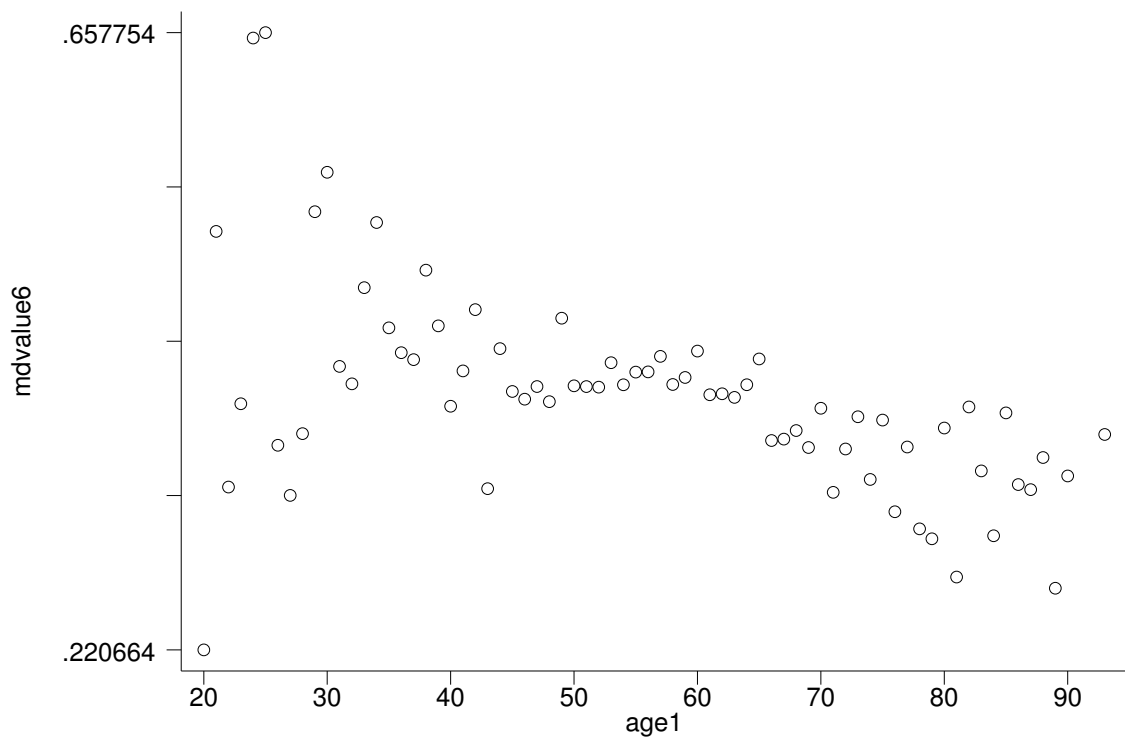


Table 7 displays estimates of equations (4). Here the coefficient of interest is on OLDYEARS which counts the number of years between acquisition and first observed sale in which the household head was 75 or older. The first column regresses the log change in home value between the date of purchase and the date of sale on the number of years that the occupant was over 75 before selling the home. I control for metropolitan area fixed effects and a linear effect of the number of years the home was occupied before sale. We find that an additional year of occupancy by an older household, controlling for years of occupancy, results in a capital loss of approximately one percent.

The specification in column (1) of Table 7 is troubling in that we would expect an interaction between MSA and years of occupancy to affect the size of the capital gain. For example, an extra year between purchase and sale will add more to the capital gain in San Francisco than it will in Pittsburgh. Further, we might be concerned that older homeowners choose to sell their homes under different conditions, so that holding the length of occupancy constant, older homeowners might sell in years with relatively low or high prices. Columns (2) through (4) of Table 7 deal with both of these problems. Column (2) displays the change between the estimated value in 1985 and the sale price in the year sold. Fixed effects are present which group the data into cells with constant MSA and year of sale. Thus a sale by an occupant who sold their home in Pittsburgh in 1992 is compared only with other sales in Pittsburgh in 1992, over the same horizon. Here we estimate a somewhat larger effect of 3.5% relative depreciation for older homeowners.

Columns (3) and (4) return to the use of purchase price as the baseline for capital gains comparisons. However, here the MSA fixed effects are interacted with both the year of purchase and the year of sale. So, for example, a homeowner that purchased a home in Pittsburgh in 1968 and sold the home in 1989 is compared only with other homeowners that purchased a home in Pittsburgh in 1968 and sold the home in 1989. Not surprisingly, this leads to a very large reduction in the number of observations once sellers who are unique in terms of their MSA-year bought-year sold combination. While the remaining sample is small, we find a significant effect. There are 209 homeowners whose capital gains are compared, and they come from 96 MSA-bought-sold combinations, leaving 113 degrees of freedom. The results are yet larger than those found in the value regressions and suggest that older homeowners may be more willing to sell in years with relatively low prices than other homeowners when considered in comparison with the results in column (1). Whether or not we control for the size of the unit, we find that a year of occupancy by an older homeowner, instead of a homeowner under the age of 75, is associated with a relative reduction of approximately 5% in the value of the home.

Table 7: Changes in Home Prices and Age

	(1)	(2)	(3)	(4)
	ΔPP	ΔVP	ΔPP	ΔPP
OLDYEARS	-0.011 (0.004)**	-0.035 (0.007)**	-0.053 (0.016)**	-0.053 (0.031)*
HORIZON	0.047 (0.001)**			
UNITSF				0 0
Constant	0.054 (0.019)**	0 -0.011	0 -0.019	0 -0.019
Observations	3545	3228	209	209
R-squared	0.45	0.01	0.18	0.18
Robust SE?	No	No	No	Yes
Fixed Effect: MSA \times	1	sell	buy-sell	buy-sell

Notes: Standard errors in parentheses. ΔPP is the change in price between the time of reported acquisition and first observed AHS sale. ΔVP is the change between estimated 1985 value and price at the time of reported sale. Horizon is the length of the interval between purchase and sale. This horizon is implicit in the MSA-buy-sell fixed effects described in the text.

4 Concluding Remarks

American Housing Survey data show that older households spend significantly less money on both routine home maintenance and on alterations and repairs than younger households. The cross sectional estimate of approximately \$250 dollars per year on routine maintenance is consistent with the within-household decrease in expenditures over time among those reporting positive maintenance expenditures in the AHS. An annual difference of approximately \$850 exists between the elderly and other households with respect to major alterations, repair and additions. Translating these difference in home maintenance into a relative reduction in housing wealth is not a trivial exercise; depreciation, inflation and likely decreasing returns to capital investment in homes imply that an inframarginal dollar spent on home improvement will not in general add exactly one dollar to the resale value of the home.

Households purchasing homes from older households typically perceive the home to be of lower quality than the seller did, an effect that is much weaker when the seller is not old. While older homeowners perceive their homes to have inflation rates slightly smaller than younger homeowners, they do not perceive their homes as falling into worse quality. Among homeowners who do not sell, the probability of the home falling into disrepair is greater among the elderly. It thus seems quite plausible that older households spend less on home maintenance not only due to different costs of maintenance, but also due to different tastes from younger homeowners.

Older homeowners enjoy price remarkably smaller price appreciation by approximately three to five percent less per year than younger homeowners between purchase and resale.

Venti and Wise (2000) cite an AARP report stating that most elderly homeowners strongly wish to remain in the same home. This appears to be a costly preference, in that older homeowners enjoy smaller capital gains on housing than younger households at the time of sale. It should be noted that the smaller rate of appreciation may be due not to a greater rate of depreciation among the elderly, but rather to a greater rate of upgrade to existing homes among younger households. It is difficult to distinguish between repairs required to keep a home in constant condition from alterations and repairs which enhance quality. To the extent that these results can be viewed as older households failing to make high return investments in home maintenance, and seeing large depreciation as a result, the puzzle of elderly homeownership has been extended. A wish to stay in place does not explain the lack of demand for reverse mortgage products.¹¹ The utility of housing wealth as a sheltered investment in the

¹¹It could be argued that the absence of a market for reverse mortgages is a result of a lack of supply, or of high interest rates (which only matter if there is a bequest motive or intent to move) which could arise from recognition of the deteriorating quality of older households' homes. Neither appears to be the case,

event of catastrophic health crises is attenuated if there is an inability or unwillingness to protect the asset's value.

Summing routine and large maintenance and alteration costs, older households appear to invest approximately \$1,100 less per year in their homes. By way of comparison, according to an AARP web calculator, a 75 year old with a \$150,000 home could obtain roughly \$9,000 per year in annuitized reverse mortgage payments. The reduction in expenditures represents a nontrivial fraction of the available gains while staying put. However, diminished home maintenance does not explain away the failure of the elderly to consume their housing wealth and it must entail risk of major expense or loss of utility from a home. An alternative view, based on the size of the depreciation estimate relative to the expenditure difference would be that consuming most of the \$9,000 available from a reverse mortgage and spending more on home maintenance could likely yield a Pareto gain for the owner and any heirs, since the \$1,000 saved in maintenance expenditures is considerably less than 1.5 (the diminished appreciation per year of elderly homeownership on a purchase-to-sale basis) percent times the average home value. Showing such a gain formally would require ruling out the absence of an age effect in estimated value to resale appreciation and would require estimating differences in labor costs associated with maintenance between the older and younger households.

In any event, the results modify the conventional view that older households are over-invested in housing. For a given level of housing wealth, older households appear to enjoy a greater level of non-housing consumption, when non-housing consumption is considered net of investments in home maintenance and improvement.

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as discussed in HUD (1995). Rather there appears to be widespread lack of appreciation for the benefits of reverse mortgages.

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