Home Equity Commitment and Long-Term Care Insurance Demand

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Abstract

This paper shows how home equity may substitute for long-term care insurance (LTCI). The elderly commonly hold substantial wealth in the form of home equity that is rarely spent before death, except for after moves to long-term care facilities. Absent strong bequest motives, this implies that marginal utility fluctuates less across health states than one would predict based on a standard model without wealth tied up in housing. Numerical examples show that this "asset commitment" may substantially weaken LTCI demand.

1 Introduction

The elderly commonly remain in the same home throughout retirement, moving infrequently except in the event of serious illness or death of a spouse. The elderly also typically owe little mortgage debt, so home equity is spent mostly after a transition out of homeownership if at all. The elderly thus face two forms of commitment that affect demand for financial products that may explain why demand for long-term care insurance (LTCI) is weak, despite the potentially very large costs of long-term care.

The first commitment is a "consumption commitment" to a particular quantity of housing. Because housing consumption is commonly adjusted downward only in the event of

a large financial shock, such as a move to long-term care, spending committed to housing when healthy becomes available for spending on other goods when ill. If housing is a poor substitute for other goods and housing consumption falls when ill, then demand for long-term care insurance (LTCI) will be weaker than it would be with equivalent wealth allocated freely across housing and other goods independent of health.

The second commitment is an "asset commitment" to home equity that is not spent at all while alive, absent a move. To see how this asset commitment differs from the consumption commitment, decompose the market value of a home owned by an older household into two components: (i) the value of the right to occupy the home until the household's death and (ii) the value of the right to occupy the home after the household's death. The household effectively spends component (i) independent of health state, but freely allocates this spending between housing and the other good only in the event of a move. If rational choice or institutional failures limit mortgage borrowing, then some or all of component (ii) is not spent at all as long as the household does not move, but is freely allocated between housing and other goods in the event that the household ceases to own housing. The consumption commitment is to (i) and the asset commitment to (ii). If home equity borrowing were common among the elderly, the consumption commitment would remain, but the asset commitment would disappear.

The asset commitment implies that home equity has a payout highly correlated with LTCI. The ratio of the marginal utility of wealth in long term care to the marginal utility of wealth outside of long-term care is less than it would be if home equity spending were independent of health status. Sufficient conditions for the asset commitment to reduce insurance demand are arguably weaker than the conditions under which the consumption commitment reduces insurance demand: utility over wealth must be concave and the marginal utility of bequeathed wealth must be less than the marginal utility of wealth when ill.

The main contribution of this paper is to illustrate the relevance of the asset commitment to the LTCI market. Chetty and Szeidl (2007) show that when consumption of goods such

as housing is adjusted downward only when large losses occur, consumers may be more averse to smaller than larger risks, and need not exhibit global risk aversion.[1] That LTCI demand can be weakened by commitment to housing consumption follows immediately from that analysis. The theoretical nuance introduced here is to consider the effects of the asset commitment separately from those of the consumption commitment.

Empirically, Chetty and Szeidl (2008) find that homeowners for whom moving is less costly hold riskier liquid investment portfolios. Shore and Sinai (2005) show that holding the probability of individual unemployment constant, couples for whom unemployment is likely to trigger a move purchase larger homes than couples for whom unemployment is unlikely to trigger a move. In both cases, the authors attribute the empirical differences to consumption commitments broken only in the face of adverse wealth shocks. Below, I present suggestive evidence that households consider committed home equity to be a substitute for LTCI. The empirical evidence points to a combined role for consumption and asset commitments, but does not distinguish between the two.

The correlation between home equity liquidation and long-term care needs complements other prominent explanations for the small size of the LTCI market.[2] As in other insurance markets, we might expect those who purchase LTCI to be poor actuarial risks, so that most consumers would find insurance actuarially unfair. Norton (2000) summarizes evidence that consumers who purchase LTCI anticipate greater nursing home use than the uninsured. However, *ex post*, Finkelstein and McGarry (2003) show that those who take on LTCI do not use long-term care any more than those who do not have private coverage.

Several studies, starting with Pauly (1990), argue that partial public insurance through Medicaid may justify weak demand even when LTCI is fairly priced. Brown and Finkelstein (2007) present simulations in which Medicaid justifies absence of coverage up to a fairly high

[1] Postlewaite et al. (2008) also show how consumption commitments can lead consumers to prefer more variability in wealth distributions, in their case considering the choice between either high wages or unemployment or employment at low wages for sure in bad states of the world.

[2] The opposite argument, that uninsured expenditures justify the absence of home equity extraction is put forward by Skinner (1996).

wealth level. They also find that while women face prices much closer to fair than men, women do not purchase LTCI in significantly greater numbers.

At high wealth and income levels, running down assets to qualify for Medicaid is a difficult and unappealing prospect. The quality of care and facility amenity that Medicaid will cover is also lower than the rich may be willing to tolerate: Ameriks et al. (2007) present survey evidence suggesting that the elderly are highly motivated to avoid low quality facilities in the event of illness. Still, among retirees in the 2004 wave of the HRS, LTCI coverage is below 25% even in the highest wealth decile. Home equity is a particularly plausible substitute for LTCI among wealthier households, who typically have home equity holdings that are large relative to most of the distribution of long-term care costs.

Section 2 of this paper motivates the analysis of the intersection of home equity liquidity and insurance demand with evidence that home equity commitments and the correlation between spending home equity and entering long-term care are economically significant. Section 3 presents a standard model of LTCI demand modified only to incorporate housing-related consumption and asset commitments. Section 4 presents simulations that show that the effect of housing commitments on demand for LTCI can be very large. Both sections 3 and 4 distinguish the asset and consumption commitment effects on insurance demand. A final section concludes, briefly discussing the prospects for joint provision of reverse mortgages and LTCI.

2 Motivating Evidence

Home equity is a plausible substitute for LTCI only if it is large relative to long-term care costs and if its payouts are highly correlated with the state of being in long-term care. I use data from recent waves of the HRS/AHEAD survey to confirm that these conditions have been satisfied in recent years among a significant portion of the elderly. I also explore the simple correlation between home equity and LTCI coverage, recognizing that this correlation

can only be suggestive of the mechanism I propose. My empirical analysis is closely related to existing work by Venti and Wise (1989) and Walker (2004).

I confine the HRS/AHEAD survey data to households that have no members under age 62 or who are still working. This older group is much less mobile than younger and working households and is also far more likely to enter long-term care.

Long-term care represents a major expenditure. HRS/AHEAD nursing home residents in 2004 who were not covered by either Medicaid or LTCI had median out of pocket medical expenses of $25,550 and mean expenses of $39,190. Respondents not in a nursing home had median and mean expenditures that were just 5 to 10% of these levels. Using an actuarial model from Robinson (2002), Brown and Finkelstein (2007) find that nursing home stays of greater than three years occur with only about 20% probability conditional on entry into long-term care, which itself occurs with approximately $\frac{2}{3}$ probability conditional on being alive at 65. Thus home equity of $100,000 or more can reasonably be characterized as large relative to likely LTCI costs.

For a large share of surveyed older households, home equity is large relative to both total wealth and likely long-term care expenses. 79% of the 2004 sampled respondents are homeowners. Median home equity is approximately $75,000 in the full sample and $110,000 among owners. The median ratio of home equity to total wealth among homeowners is 55%. In the top quintile of the total wealth distribution, where Medicaid is unlikely to be salient, 84% of respondents report home equity over $100,000

Home equity extraction through increased mortgage debt is uncommon in the HRS/AHEAD sample. In the 2004 wave, only 12% of the sampled retiree homeowners owed any mortgage debt. Among mortgagors, median debt was 50,000, and the median debt to home value was 33%. Between 1998 and 2004, despite a massive home price increase, less than ten percent of the older retired homeowners increased mortgage debt. The mean ratio of equity to home value in the 2004 sample rises with age from .84 among owners in their 60s to .96 among owners in their 90s.

Exiting home ownership, trading down owner housing and moving to renting are all uncommon except in the case of a need for long-term care. Figure 1 plots the relationship between time since entry into a nursing home (the horizontal axis) and an exit rate from homeownership (the vertical axis).[3] The "o", "X", "Y", and "Z" series plots on the vertical axis the fraction of HRS retirees that are alive and were homeowners in the prior wave who are no longer homeowners in a particular wave. The series represent groups of retirees who as of 1998 owned a home, did not live in a nursing home, and did not have a spouse in a nursing home. Each group is composed of individuals who subsequently reported themselves or a spouse living in a nursing home. "o" represents all 1998 homeowners who first entered a nursing home in 2006, "X" first entered a nursing home in 2004, "Y" first entered in 2002, and "Z" in 2000. The horizontal axis represents time before or after entry into a nursing home, so 0 represents the 2004 survey for group "X". For that same group, +2 represents the 2006 survey. For group "Y", +2 represents the 2004 survey and -2 the 2000 survey.

There is a jump in the exit rate from homeownership at and around the time of first entry into a nursing home. For example, the group that first entered a nursing home in 2004 reports an exit rate from ownership of around 10% in the years prior to entry, 37% in the year of entry, and 23% in the following wave. The exit rate from ownership is greater prior to entry than the exit rate (unplotted) for those who never entered a nursing home. For the latter group, the exit rate varied between 2.8% and 4.5% between 2000 and 2006.

Death of a spouse is another common trigger for home sales, and is commonly preceded by a spell of ill health and expensive medical care.[4]

Important for modeling purposes is whether homeowners in long-term care sell their homes due to cash need or because the need for care eliminates the disutility associated with selling the home. There is some evidence that the latter explanation is more salient. Among homeowners in 1998 still alive in 2004, the correlation between the ratio of home equity to

[3] I measure owning a home rather than sale of the initial home for data quality reasons. Venti and Wise (2000) note that trades more often increase than decrease, home equity.

[4] see e.g. Venti and Wise (2000) and Walker (2004).

total wealth in 1998 and continued homeownership in 2004 is -.07, much weaker than the relationship between continued ownership and family nursing home status. Moreover, the correlation between exiting homeownership and entering a nursing home is .23 among those covered by LTCI in 2004, not far from the correlation of .28 among those not covered by LTCI.

Given that home equity is commonly large relative to both total wealth and long-term care costs, and has payouts highly correlated with those of LTCI, it is worth asking whether older households perceive home equity and LTCI as substitutes. Figure 2 shows that long-term care insurance is, in fact, negatively correlated with the ratio of home equity to total wealth. The horizontal axis plots deciles of the ratio of home equity to wealth. The vertical axis plots the mean LTCI holdings for individuals in that wealth decile. A working version of this paper includes an effort at establishing a causal role for home equity, but Figure 2 is only meant to be suggestive.

3 A model of LTCI demand

A retiree derives utility from consuming housing h and another good c during a single period. Renting a unit of h costs the same as buying a unit of c. The consumer is endowed with c_0 units of the non-housing good. The consumer's housing endowment can be sold for $h_0 + H$. h_0 is what it would cost to rent the retiree's home until death. $H > 0$ is the value of the home in excess of h_0: the market value of rents starting at the retiree's death and continuing for the useful life of the home.[5] If homeowners always stayed in their homes until death then H would be the maximum reverse mortgage proceeds that a homeowner would be able to borrow. However, in this model there is no reverse mortgage market, approximating the thinness of the real world market for home equity lending to seniors.

At the beginning of the single period, the consumer buys insurance and at the end she learns whether or not she needs long-term care, decides whether or not to sell her home,

[5]For younger homeowners, the assumption that $H > 0$ is less obviously tenable.

and enjoys consumption. Because there is no bequest motive, H is wasted if the home is not sold, so it would be profitable to sell the housing endowment for $h_0 + H$ and then rent housing at a cost of 1 per unit. If the retiree wished to pass on at least H to heirs, there would be no gain to the sale other than through reoptimization, and the results presented below would not apply.

I impose two key assumptions concerning housing and illness. First, the consumer faces a prohibitively high utility cost of moving b if and only if she is healthy. Second, bad health (the need for long-term care) affects utility through the direct monetary cost x and by eliminating the utility cost of moving. The probability of being in bad health is p. LTCI provides t units of non-housing consumption if sick in exchange for $t\pi$ units if healthy.[6]

The utility cost of moving b is separable from utility over housing and the other good, and the utility function u is independent of health status. Total utility if healthy is thus $u(c, h) - bI$, where I is an indicator for moving, c is non-housing consumption, and h is housing consumption. In light of the correlations in Section 2, assume that b is so large that there are no relevant values of h_0 and c_0 for which it is optimal to move if healthy. Utility if healthy is thus simply $u(c_0 - t\pi, h_0)$. In numerical examples below, I note the necessary magnitude of b to rationalize staying in place while healthy.

Housing may enter utility when sick, as care facilities vary in amenity. Because there is no utility cost to moving if ill, the consumer will sell her house if ill. Denote by $v(c_0 + h_0 + H + t - x)$ the indirect utility that arises from maximizing u over the choice of c and h subject to the budget constraint that expenditures on medical needs, housing, and the other good are less than available wealth from endowments and insurance proceeds.

[6]This section explores the effect of the housing endowment $H + h_0$ on insurance choice t. There is an almost equivalent formulation of the problem in which the consumer first chooses levels of owner housing h_0 (and given fixed financing, $H(h_0)$) and then learns health status and allocates expenditures between housing and the other good. The alternative formulation would consider the effect on t of shifters of h_0 and H such as an intervening price or interest rate change change or a preference parameter that enters utility by increasing initial demand for housing (e.g. α in the simulations below).

The problem of maximizing expected utility can be written as:

$$\max_t U = pv\left(c_0 + t + h_0 + H - x\right) + [1-p]u(c_0 - t\pi, h_0). \tag{1}$$

The optimal insurance purchase satisfies:

$$\frac{\partial U}{\partial t} = pv'\left(c_0 + h_0 + H + t - x\right) - \pi[1-p]u_1\left(c_0 - t\pi, h_0\right) = 0. \tag{2}$$

We can distinguish the effects of the "asset commitment" to not spending excess home equity H while healthy and the "consumption commitment" to the level h_0 while healthy by considering the separate effects of H and h_0 on t. This analysis is meaningful as long as there is separate variation in h_0 and H that is not chosen earlier in life with LTCI choice also in mind. Such variation seems plausible given the possibility that households learn about long-term care risks over time and the presence of unpredictable changes over time in housing prices and amenity across time and location.

Differentiating equation (2) gives the effect of the asset commitment on insurance demand:

$$\frac{dt}{dH} = -\frac{pv''\left(c_0 + t + h_0 + H - x\right)}{pv''\left(c_0 + t + h_0 + H - x\right) + \pi^2[1-p]u_{11}\left(c_0 - t\pi, h_0\right)}. \tag{3}$$

This effect is negative by the concavity of direct utility in the consumption good and indirect utility in expenditures. Intuitively, H acts almost exactly the same way in utility (1) as t, except H has no cost in good health. Hence home equity crowds out insurance.

The effect of the level of the consumption commitment is given by:

$$\frac{dt}{dh_0} = -\frac{pv''\left(c_0 + t + h_0 + H - x\right) - [1-p]\pi u_{12}\left(c_0 - t\pi, h_0\right)}{pv'' + \pi^2[1-p]u_{11}\left(c_0 - t\pi, h_0\right)}. \tag{4}$$

A higher level of housing consumption reduces demand for insurance as long as insurance is not too unfairly priced and housing is a poor substitute for the other good, so that u_{12}

is not too negative. Increasing housing consumed when healthy both induces the same substitution effect as increasing home equity due to the release of money when ill (the first term in the numerator), and affects marginal utility when healthy (the second term). The second effect is ambiguous and has the opposite sign as u_{12}. While a higher commitment level likely reduces LTCI demand, the existence of the consumption commitment may increase demand relative to the case of no commitment (e.g. a transient renter) if h_0 is sufficiently small.[7]

3.1 Medicaid

In the US, Medicaid provides limited social insurance against long-term care expenditures. Specifically, Medicaid pays for long-term care provided the facility accepts payment from Medicaid and the consumer has sufficiently low income and asset wealth.

Medicaid's eligibility requirements provides an additional reason why home equity would crowd out insurance demand. Whereas non-housing wealth must be quite low to qualify, housing wealth is virtually exempt from Medicaid means tests. For married couples, non-institutionalized spouses and qualified caretaking relatives may be allowed to remain in the home until their death. A lien is sometimes placed on proceeds from sale of the home, but the free rent up until sale has economic value. Medicaid treatment of singles' homes is somewhat less generous.

With Medicaid as an alternative to private payment, expected utility can be written:

$$\max_t U = p \max \left(v \left(c_0 + h_0 + H + t \right), z \left(c_0 + t + f(h_0) \right) \right) + \left[1 - p \right] u(c_0 - t\pi, h_0). \qquad (5)$$

In equation (5), z is utility over wealth under Medicaid. The function f maps housing wealth into an equivalent quantity of non-housing wealth conditional on being in Medicaid.

[7]This could occur, for example, if utility were separable between h and c and consumption of h_0 were suboptimally low when healthy, leaving a low marginal utility of non-housing expenditures when healthy.

Medicaid's asset tests likely render z' small, so LTCI has little value when Medicaid is chosen. However, the relatively generous treatment of housing, presumably renders $f' > 1$, so $f'z'$ may be large. An increase in housing wealth holding total wealth constant may thus crowd out insurance both through concavity of v, z, and u in wealth, and by making Medicaid more attractive.

4 Numerical Example

I now ask whether the liquidity of home equity can meaningfully affect LTCI demand by parameterizing a somewhat expanded version of the simple model given above. I continue to employ a one-period setup to abstract from complications related to mortality risk. Davidoff (2007) shows that the degree of annuitization affects not only demand for reverse mortgages and LTCI, but also their complementarity.

The most natural application of the one-shot analysis would be to a single consumer late in life, but some features of the parameterization allow for broader relevance. To allow imperfect correlation between sale of the home and long-term care, and to allow something like a bequest motive, the consumer randomly loses the disutility from moving and sells the home if healthy with probability .25. As this probability approaches one, the model approaches a standard insurance problem. A similar effect could be obtained by allowing the consumer to fail to sell the home in the event of illness.[8]

There are five different health states: one healthy, and four in long-term care. The four long-term care states occur with equal probability and require expenditures of \$25,000; \$50,000; \$100,000; and \$200,000. I set the probability p of any long-term care event at .5, so that each of the four expenditure levels occur with probability $\frac{1}{8}$. These probabilities and expenditure levels are meant to roughly match different outcomes for prospective lifetime LTCI expenditures for a single 65 year old based on calibrations of expenditures and

[8]Loading the imperfect correlation between home equity liquidation and illness onto healthy states avoids the need to impose a correlation between mobility and the severity of illness.

probabilities in Brown and Finkelstein (2007) derived from Robinson (2002).

I specify direct utility over consumption as:

$$u(c,h) = [1-\alpha]\,\frac{c^{1-\gamma}}{1-\gamma} + \alpha\frac{h^{1-\gamma}}{1-\gamma}. \tag{6}$$

I vary α with γ so that the optimal expenditure share for rental housing is always .2 when freely chosen. This value roughly matches data for renters in the Consumer Expenditure Survey. Indirect utility v is the value of u when wealth is optimally allocated.

To investigate the effects of consumption and asset commitment, I consider insurance choice with no reverse mortgage (both commitments), with a reverse mortgage (consumption commitment), and for a renter who freely chooses housing consumption in both health states (no commitments). The rental value of consuming the home until death is worth 40% of the market value of the home and mortgagors may borrow the remaining 60% of the home value.[9] Sale of the home and long-term care occur at the beginning of the period in question, so the home can be sold for 100% of its value. To achieve constant housing consumption across states the homeowner must spend 40% of the proceeds on rental housing.

If wealth is sufficiently low, an expenditure need of $200,000 can drive the consumer into negative wealth. As the commonly used CRRA utility is not defined over negative consumption, I set consumption in the event of negative wealth to $100; this lower bound may be thought of as home equity neutral social insurance. The important comparative statics are not highly sensitive to choice of the dividend rate or minimum consumption.

Given the parameters, expected utility is:

[9]Because the borrower is ill or sells the home with positive probability, a larger mortgage could be issued with zero profits. Utility is monotonically increasing in reverse mortgage debt, so I only consider extreme values.

$$EU = [1-p]\left[[1-q]\,u\left(c_0 - \frac{ptEx}{1-p} + .6I_m h_0, .4h_0\right) + qv\left(c_0 - \frac{ptEx}{1-p} + h_0\right)\right] \qquad (7)$$
$$+ p\sum_{s=1}^{4} \frac{v\left(\max\left(c_0 + h_0 - x_s\left[1-t\right], y\right)\right)}{4},$$

where notation is as above. q is the probability of a move if healthy, set to 25%. s indexes health states, y is the socially provided expenditure floor, t LTCI coverage, and I_m indicates whether a reverse mortgage is in place. s indexes health states and Ex is expected cost if sick ($93,750).

Table 1 presents numerical examples of how much LTCI coverage consumers optimally choose and their willingness to pay for a reverse mortgage under different levels of h_0, c_0 and γ. The first three columns list different combinations of non-housing and housing endowments and the risk aversion coefficient γ. Columns (5) and (6) present the utility maximizing fraction of costs that consumers insure without and then with a reverse mortgage worth 60% of the home's value. All solutions are numerical.

Columns (7) through (9) display the value of the right to purchase the optimal LTCI fraction and/or take on a reverse mortgage for 60% of the home's value. These values are calculated by computing a baseline expected utility with different combinations of the right to purchase optimal LTCI coverage or to take on a reverse mortgage at fixed levels of non-housing and housing wealth c_0 and h_0. Holding housing wealth constant at h_0, I then ask what level of initial non-housing endowment c_1 would be required to leave the consumer as well off as with the different LTCI and reverse mortgage combinations. The difference $c_1 - c_0$ is the equivalent variation associated with the different institutional arrangement.

The first nine rows of Table 1 consider the problem of a homeowner. The last three consider a renter who can always optimally allocate the non-housing endowment c_0 between the two goods. Naturally, the reverse mortgage is irrelevant to the renter. Borrowing through a reverse mortgage eliminates the "asset commitment" to housing while healthy, but not the

"consumption commitment." Renting eliminates both.

Table 1 shows that the liquidity of home equity has large effects on insurance demand. When home equity is liquid (as in column (6) with a reverse mortgage or the last three rows, which apply to renters), the homeowner always demands insurance for more than 50% of expected costs conditional on illness. Insurance demand is almost constant across specifications of wealth and risk aversion. By contrast, the first nine rows of column (5) show that when housing wealth is large and illiquid, insurance demand falls well below 50% to as low as 4%. Because home equity is proportional to housing consumption, the difference between insurance demand with and without a reverse mortgage grows with the value of the home.

Columns (7) through (9) show that LTCI and reverse mortgages are highly complementary, and increasingly so with rising housing wealth. This can be seen in the fact that the value of the right to take on both LTCI and a reverse mortgage is almost always greater than the sum of the values of taking on the products separately. The only exception is in the case where total wealth ($150,000) is less than the maximum cost of illness, so that the lower bound of consumption is attained without insurance. The complementarity grows with risk aversion and the value of the home.

The consumption commitment to h_0 has a different effect from the asset commitment to H. To see the pure effect of the consumption commitment, we can compare insurance demand for a renter, who faces neither sort of commitment, to that of an owner with a reverse mortgage, who faces only a consumption commitment. Comparing the renter to the reverse mortgagors with the same amount of available wealth (rows 4 through 6 compared to rows 10 through 12), we find that the renter may have more or less demand for insurance, so that the consumption commitment has an ambiguous effect on insurance demand. The key to the effect of the consumption commitment on insurance demand is whether the marginal utility of wealth is greater or lesser with the commitment in place than without the commitment in place, holding wealth constant. With the additively separable preferences considered here,

this is determined by whether the commitment level h_0 of housing consumption is greater than or less than optimal with free choice. When the commitment level is greater than with free choice (e.g. row 3), the marginal utility of wealth is high when healthy, so insurance with a reverse mortgage is less than with no commitment but the same total wealth (row 12). When h_0 less than with free choice (e.g. row 1), insurance demand is greater with a reverse mortgage than under free choice.[10] The consumption commitment would have no effect on insurance if housing and the other good were perfect substitutes.[11]

Given the utility specification, the utility cost b to moving while healthy must be substantial to rule out sale when healthy. With no reverse mortgage, the willingness to move with no utility cost would be worth up to 50% of the consumer's wealth, depending on the curvature γ and the distance of the current dividend on the owner home to the optimal 20% expenditure share.

5 Conclusion

The HRS documents that home equity pays out cash in a way similar to LTCI. Liquidation of home equity is rare among the elderly except around the time of a household member's entry into long-term care. Among households sufficiently affluent that Medicaid is a poor substitute for LTCI, a large majority hold enough home equity to cover most of the distribution of potential long-term care costs.

The size and illiquidity of home equity have significant effects on optimal demand for LTCI in a simple one-period insurance problem. The consumption commitment reduces demand if housing consumption is suboptimally high while healthy. The asset commitment to home equity can almost eliminate demand for fair insurance when the home is worth more than expected medical costs. To the extent that other asset holdings such as cars and

[10] In an earlier version of the paper, α was fixed across specifications of γ, so that the optimal share of expenditures going to rental housing varied considerably and was generally above 0.2. In that case, insurance demand was substantially greater with a reverse mortgage than for renters.

[11] If the choice of insurance were over deductible size rather than the fraction of coverage, the consumption commitment would likely have a stronger effect on insurance demand.

furniture are large and liquidated primarily when ill, the simulations here may understate the extent of effective substitution.

Expanding demand for LTCI may require simultaneously expanding demand for home equity extraction among the elderly, an idea that has been put forward by Ahlstrom et al. (2004) and others. Likewise, a reverse mortgage typically has substantially less value when home equity serves as a buffer against medical expenses. Just as several papers (e.g. Turra and Mitchell (2004), Sinclair and Smetters (2004), Ameriks et al. (2007), Spillman et al. (2001) and Webb (2006)) have proposed bundling LTCI and annuities, so bundling LTCI and reverse mortgages may make sense on both demand and supply grounds. The supply side argument is that those who are at highest risk for large medical expenditures are unlikely to live long enough for the value of the home to fall below accumulated principal and interest on a reverse mortgage. If pricing is more favorable in a bundled product than a stand-alone product, then the complementarity demonstrated in Table 1 would be even stronger.

Eliminating Medicaid coverage of long-term care alone may not dramatically expand LTCI demand. Home equity represents a large share of wealth for poorer homeowners, and for many affluent homeowners home equity exceeds almost all of the distribution of potential long-term care costs. If homeowners anticipate using home equity to finance long-term care, it is not clear that Medicaid should treat home equity more favorably than other assets. A more complete welfare analysis would require an understanding of the role of Medicaid in savings and asset allocation (see, e.g. Coe (2007)). Eliminating Medicaid's favorable treatment of home equity might spur LTCI demand by making home equity a less favored asset and hence reverse mortgages more attractive. To the extent that regulatory barriers prevent financial institutions from bundling mortgages with insurance products, there would seem to be a gain to making an exception for joint LTCI-reverse mortgage policies.

The analysis suggests that housing may affect demand for other financial products in old age through asset and consumption commitments. A follow-on paper, Davidoff (2007) shows that if home equity is only cashed out late in life, then it may serve as a substitute

for annuities, which transfer funds from early to late retirement. If widows and orphans are likely to trade down in housing after loss of an earner, then home equity may also substitute for life insurance. If the elderly sell off home equity when stock prices fall, there may be important general equilibrium consequences such as increased asset price correlation in crises, along the lines of those considered by Chetty and Szeidl (2004).

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Figure 1: Exit rates from homeownership at, and after first report of self or spouse living in a nursing home among those 62+ and alive in the HRS/AHEAD panel. "o" represents all 1998 homeowners who first entered a nursing home in 2006, "X" first entered a nursing home in 2004, "Y" first entered in 2002, and "Z" in 2000. 0 is the survey year of first report of living in a nursing home, e.g. 2006 for the "o" cohort.

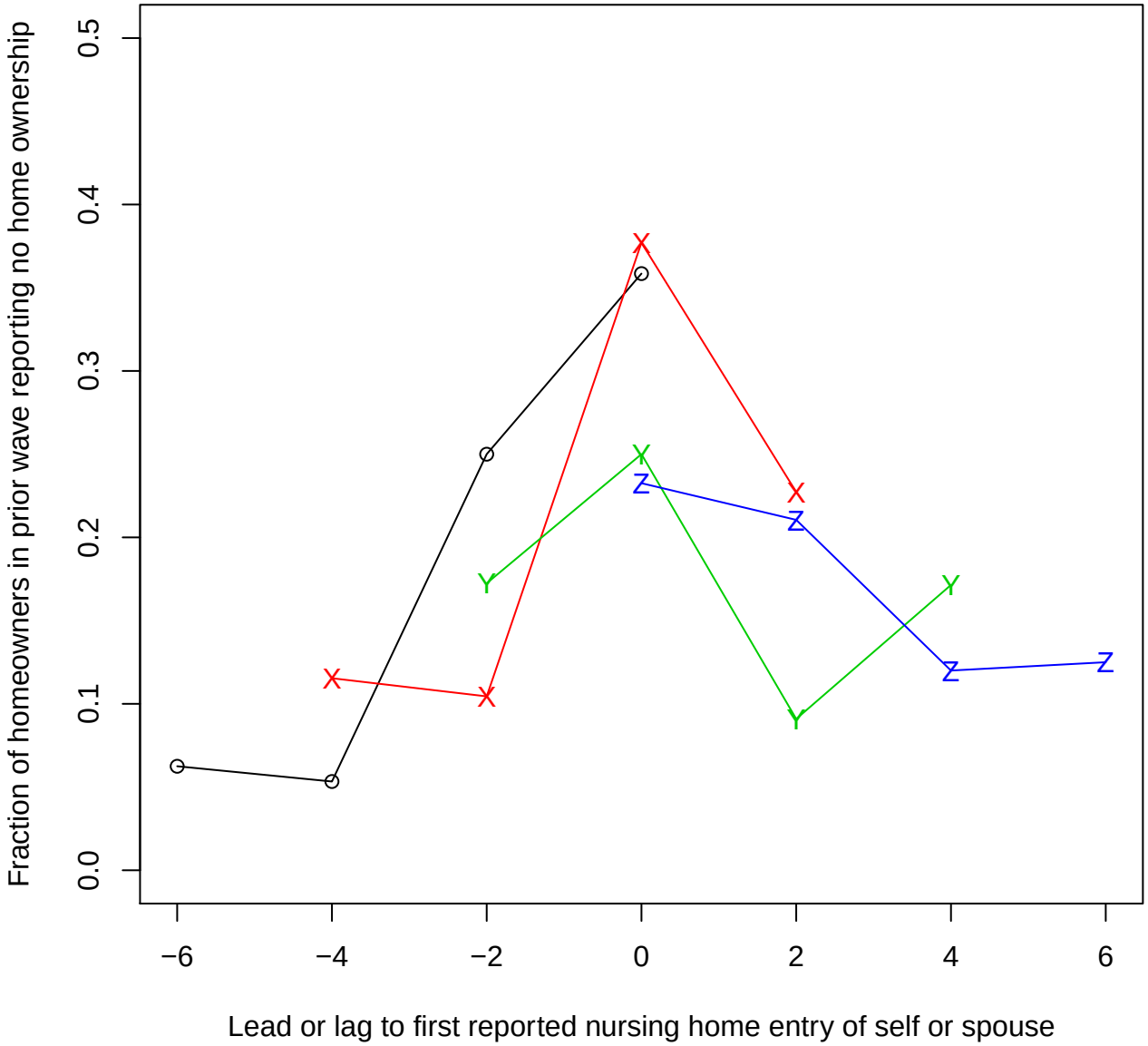

Figure 2: Deciles of Home equity to total non-pension wealth and average of an indicator for LTCI coverage. 2004 wave of the Health and Retirement Study

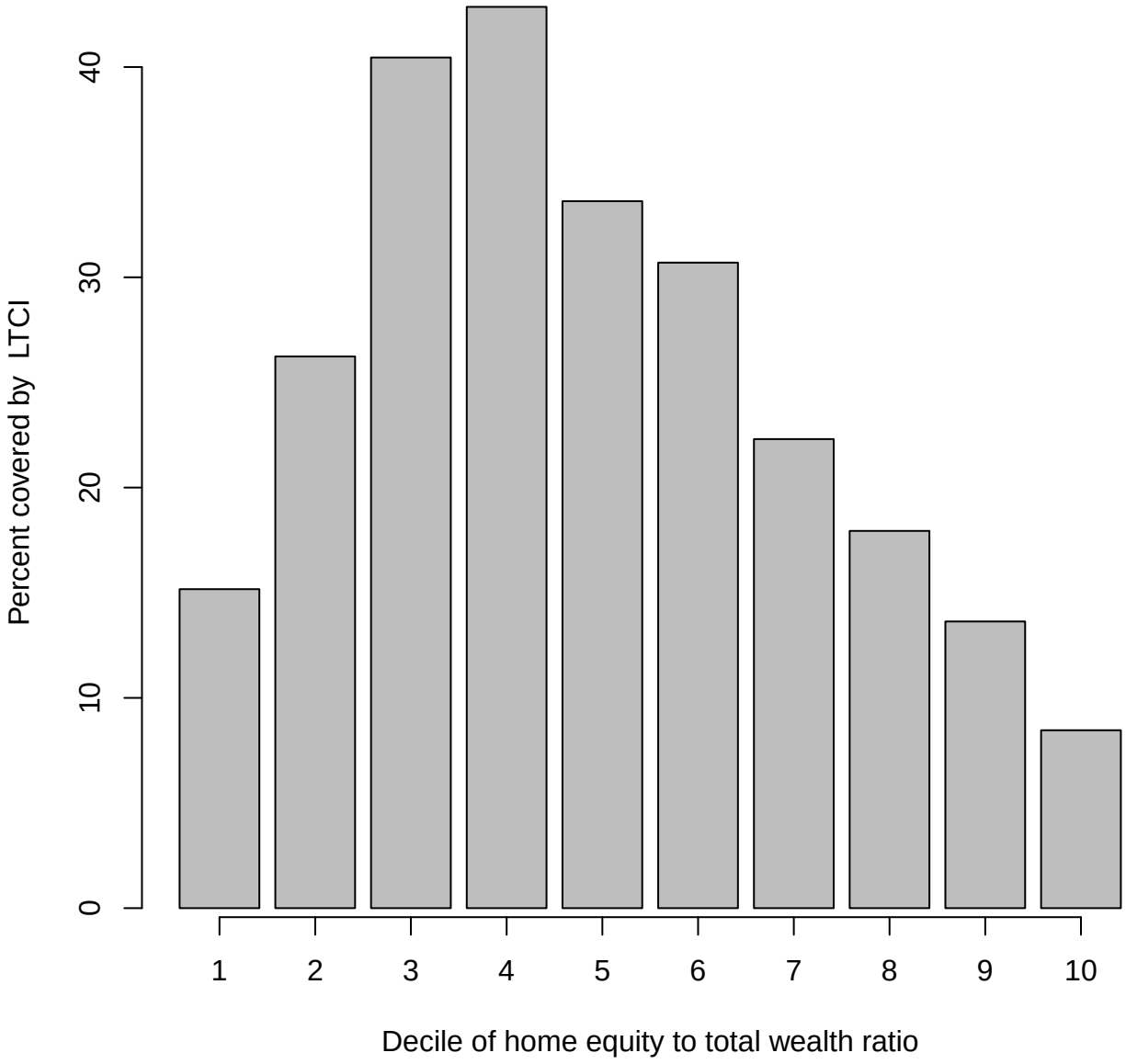

Table 1: Optimal LTCI coverage and willingness to pay for actuarial products.

Endowment			Risk	Optimal LTCI %			Value of	
Other	Housing		aversion	No RM	RM	RM Only	LTCI Only	RM + LTCI
c_0	h_0	$h_0 + H$	γ					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				Owner				
200	20	50	2	58	68	3	33	43
200	40	100	2	43	65	12	16	40
200	80	200	2	11	57	40	1	55
200	20	50	4	59	69	1	62	72
200	40	100	4	44	65	3	36	61
200	80	200	4	12	58	30	3	64
100	20	50	2	53	63	7	69	75
100	40	100	2	37	59	1	33	54
100	80	200	2	4	50	40	1	60
				Renter				
250	NA	NA	2	NA	62	NA	34	NA
300	NA	NA	2	NA	62	NA	25	NA
400	NA	NA	2	NA	61	NA	16	NA

Notes: Columns (1) through (3) are the endowment of the other good, the value of the rental dividend h_0, and the market price of the home $h_0 + H$. Column (4) is the curvature parameter γ. Utility is otherwise as parameterized in Section 4. Column (5) presents the optimal fraction of losses covered by actuarially fair LTCI, when no reverse mortgage is available. Column (6) presents the optimal fraction when a reverse mortgage for 60% of the value of the home is available. Columns (7) through (9) present the units of the other good that would have to be added to the consumer's endowment to make the consumer as well off with no reverse mortgage or LTCI as with: a reverse mortgage only (7), an optimal LTCI policy only (8), and both (9).