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UNLOCKING HOUSING EQUITY IN JAPAN

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ABSTRACT

Prior literature on asset patterns among the elderly often overlooks housing wealth as a determinant of retiree wealth, particularly in the Japanese context. Yet releasing equity in housing may be a natural mechanism to boost consumption, reduce public pension liability, and mitigate the demand for long-term care facilities in Japan. Our study evaluates what might be needed to implement reverse mortgages (RMs) in this country. Policies could include exempting RMs from capital gains tax and transactions tax, along with mechanisms to make annuity income flows nontaxable, along with interest rate accruals for RMs. In addition, housing market reforms to enhance information flows would be needed, particularly regarding new and existing housing trades, which could permit the securitization of housing loans and lines of credit. Other improvements in capital markets could also help, including the establishment of reinsurance mechanisms to help lenders offer these reverse mortgages while having some protection against crossover risk. In the Japanese case, demand for RMs will be dampened by declining residential housing values as well as low interest rates and long life expectancies. Nevertheless, we conclude that RMs might be a good way to finance elderly consumption in Japan, particularly against the backdrop of governmental financial stringencies.

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Unlocking Housing Equity in Japan

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This study explores the feasibility of developing the reverse mortgage (RM) market in Japan. Though RMs are not yet widely understood, we conclude that they have the potential to significantly ease the fiscal burden which rapid demographic aging is imposing on traditional state-funded retirement provision in Japan. Nevertheless these products will be appealing only when the regulatory infrastructure within which they operate is appropriately developed.

Dependency ratios[1] in Western countries, already high, will rise dramatically in the next 30 years. The OECD average dependency ratio in 2000 was 20.9 per cent, and it will increase to 37 per cent by 2030. Indeed, for Italy, France, Germany, and Japan, the demographic situation is especially painful, since their dependency ratios are projected to exceed 45 per cent within less than 30 years [Disney and Johnson 2001: 12]. Population aging inevitably puts considerable strain on the public purse, since in most nations, the elderly are heavily dependent on a wide range of publicly-provided income and benefit programs. Moreover, labor market behavior has also changed over time: increasingly, people in most developed nations are electing to retire earlier. A recent survey confirms that in the last 30 years, market participation rates for men age 60-64 fell from 70-90 percent, down to 20-50 percent [Bateman et al 2001: 28; Japan is a notable exception, with male participation rates remaining at about 80 percent, though far fewer women work for pay at older ages.] Both factors tend to reduce the tax base and drain public revenue, precisely in uncertain macroeconomic times.

It is not just changing demography and social behaviour that augur badly for current pension arrangements. During the 20th century, many state public retirement systems because very generous, with western countries offering earnings-related publicly funded pensions where replacement rates often came to exceed 70 per cent [Disney and Johnson 2001: 4]. Of course, there is a considerable diversity of systems among the OECD countries; the UK and Australia, for example, provide more austere public retirement programs in which the government offers only a basic retirement allowance and any additional retirement income must be supplemented by private sector arrangements [Bateman et al., 2001].

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[1] This refers to the population aged 65+ as a proportion of the working-age population.

In some western countries, these factors are generating burgeoning public cost projections that compel drastic restructuring of the national pension system. In France, Germany, Italy, and Japan, projected pension spending will exceed 15 per cent of GDP annually by 2040 [Disney and Johnson 2001: 13]. Since government budgets even in the big-spending continental countries amount to no more than 40 or 50 percent of GDP, this will become an enormous burden, probably not a sustainable one.

It is this set of concerns that provides the impetus for the present study of new financial arrangements for financing old-age consumption in Japan. We will show, first, that Japan offers an environment conducive to the implementation and encouragement of RMs. Second, we will illustrate how their use could alleviate some of the financial strain that population aging imposes on the Japanese economy of the future.

What Are Reverse Mortgages?

Reverse mortgages allow the elderly to borrow money against the value of their owned homes, so as to enhance their current consumption. No repayments of interest or principal must be made until the homeowner dies or vacates his home,[2] at which point the residence must be sold and the proceeds used to repay the loan. The borrower is guaranteed tenure in his house until death, and he also receives additional income in his retirement. The RM loan is defined by being "non-recourse" – that is, no other asset may be accessed by the lender to reclaim his loan. The lender therefore faces the risk that he will not recover the full value of his loan for a host of reasons to be discussed below. As a consequence, the lender will set the maximum amount that borrowers can receive, and he will also design alternative methods of paying the borrower this amount, including in the form of a life annuity or a lump sum.

Several features of RMs appeal in the context of retirement provisioning. The delayed repayment schedule, the tenure guarantee, and the non-recourse nature of the loan, are potentially quite attractive to the older homeowner. Yet these instruments are not magic, from the lender's or the borrower's perspective: there is a cost and a benefit for the RM collateralized by the equity in the home. For several reasons, due to the rising debt balance through time, accumulating drawdowns, and the ongoing accrual of interest, RMs can be expensive. Consequently, some retirees' estates will be significantly diminished when owners borrow against their home equity

during their lives. For lenders, there is a risk that the value of the loan will come to exceed the value of the property at the time of sale. Because lenders have no recourse to assets other than the mortgaged house, low home equity could entail a loss for the lender. Consequently, lenders determine a maximum proportion of equity that can be borrowed based upon the life expectancy of the individual, the likely trajectory of property prices, and the anticipated rates of interest. These are the three main risk factors for the lender; additional discussion on these and RMs in general are given below.

RMs are a relatively new financial product. It appears that they have been promoted and used the most in the United States over the past decade. Several research studies have examined the potential for growth in the US market for RMs, though estimates vary considerably. For instance, Merrill et al. [1994] estimate a potential US market of 800,000 households, while Rasmussen et al. [1997] predict a potential US market of 6.7 million households. Whatever the estimates of market potential, the actual take-up of RMs proved initially slow in the US: since 1989, when the Home Equity Conversion Mortgage (HECM) program was launched, only 80,000 such mortgages have been originated. Yet one must note that HECM was intended to be a demonstration program offered by the government for only a limited time. For this reason, the loan value of these RMs was capped to target them on low-income elderly. More generally, there is reason to believe that these products will become more appealing in the near future. For example, in the fiscal year ended September 2002, more than 13,000 RMs were originated in the US, a 68 percent increase over the 2001 figure. Low interest rates and relatively high property prices reinforced the attractiveness of RMs, leading the number of active reverse mortgage lenders in the United States to triple to 191, in the year preceding May 2002.[3] All this suggests that experts agree that RMs should grow rapidly in the US context, as more people become aware of the product (Caplin 2002). Further, lenders should become better at marketing the product over time, enhancing supply. The modest and growing success of RMs in the US thus implies that there is reason to expect some success in Japan, as well.

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[2] RMs can also be for a fixed term, but these are less common since they can necessitate the sale of the residence while the borrower is still alive: a considerable upheaval.

[3] These statistics are taken from the National Reverse Mortgage Lenders Association website, available at www.reversemortgage.org/niche.htm

Key Issues for Japanese Reverse Mortgages

Japan's aging rate is uniquely high among the developed countries. The explanation rests on Japan having experienced a shorter period of high fertility following World War II than other OECD economies. Births per family fell from 4.5 per family in 1947, to 2.7 in 1953, and to just 2 in 1957.[4] Australia, by contrast, had a fertility rate greater than 3 for all years between 1947 and 1961.[5] In Japan, the result has been a rapidly increasing dependency ratio, which in 2030 is predicted to be more than double the 1990 ratio of 21.6 per cent. Some initial social security reforms have recently been enacted in Japan, and others proposed, including raising the eligibility age for the standard pension; nevertheless, projections suggest that these are not yet substantial enough to mitigate the expected cost explosion in public pensions as a result of demographic aging [Disney and Johnson 2001: 16].

The high value of residential real estate is another notable Japanese characteristic. An *Economist* survey recently showed that Tokyo and Osaka's residential property prices are the second most expensive of all western cities: an average 2-bedroom city apartment in 2002 cost over US$800,000.[6] More important, these real estate prices are high relative to Japanese average disposable incomes: housing wealth as a proportion of annual disposable income in 1998 was 381 per cent in Japan, the highest of all developed countries. The second highest, in Australia, was 355 per cent, and the US rate was a much smaller 163 per cent [Ellis and Andrews 2001]. Taken together, these facts indicate that the ability to use housing equity to supplement retirement income might be both timely, offering a partial solution to mounting public pension liabilities, and highly practicable. RMs can facilitate this process.

Yet establishing a RM tradition in Japan will not be easy. Simply making the Japanese people aware of RMs will not produce a viable market, because a strong financial infrastructure is required to ensure the success of these products. In short, there must be safeguards for borrowers against unscrupulous lenders; there must be insurance available for lenders, who otherwise might not involve themselves with what are inherently risky contracts; and there must be a secondary market for reverse mortgages so that lenders have the option of selling some

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[4] See National Institute of Population and Social Security Research, *Selected Demographic Indicators for Japan*, Table 9, available at www.ipss.go.jp/English/S_D_I/Indip.html#t_9

[5] See the ABS Year Book Australia 2002, available at www.abs.gov.au/Ausstats/abs@.nsf/Lookup/8A473DD330B6176DCA256B350010B3F8

proportion of their RMs to other parties and thus avoid the high risk charges that accompany mortgages in general.[7] A thorough understanding of the riskiness of RMs and the appropriate level and cost of their insurance in the Japanese context is necessary to facilitate a Japanese RM market.

Furthermore, Japan has experienced a very long recession, falling property prices, and extremely low interest rates. Each of these facts will impinge upon the likely success of RMs. The latter two circumstances in particular will reduce the amount of money that households can borrow in relation to their property's value, while the first will promote a lack of confidence generally and diminish the appeal of little-known financial products. Nevertheless, RMs, properly implemented, do offer Japan a sound mechanism by which it can increase the consumption of its elderly and in the long term even reduce its public pension liabilities and health care costs. These considerations underscore the practical importance of this study.

The remainder of this paper deals with the above issues in more detail, and where appropriate, compares the Japanese situation to those of other developed countries.

Housing Wealth Among the Elderly

A necessary precondition for the use of RMs is the existence of private housing equity.[8] In developed countries, enormous wealth is held in residential property. Viewed from the perspective of strategic asset allocation, an owner-occupied dwelling is illiquid and undiversified. Indeed, elderly people on average possess greater housing wealth than the population average, but they can also have incomes that are much lower than those received by younger groups.

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[6] See *The Economist*, 28th May, 2002, available at www.wsu.edu/~hallagan/Econ198/Weeks/Week11/housing/housing.html

[7] When lending institutions hold assets that are perceived as relatively risky, such as mortgages, regulatory agencies will insist that the institutions increase their proportion of capital to facilitate greater confidence in repayment. Thus lenders like to sell some proportion of their mortgages to avoid the associated capital charges. Indeed, the new Basle Capital Adequacy provisions of 1999 specifically emphasise the importance of risk weighting in relation to assets. The relative riskiness of assets in institutions' portfolios is becoming a more important determinant of their capital requirements. This issue is therefore very relevant for RMs.

[8] It is interesting to note that the whole issue of RMs has become relevant for the formerly communist countries of Russia and Eastern Europe. There, the sudden surge of private housing equity following economic liberalisation has created a potential market for RMs, and the often-precarious state of public finances in these countries further reinforces their potential efficacy. See Syzmanoski and DiVenti [2001] for a detailed exposition of this topic.

Wealth in Housing

We next turn to an examination of the characteristics of housing wealth and ownership among the elderly in three countries: the United States, Japan, and Australia. It should not be surprising to find that, in all three countries, home equity represents the largest component of household assets. In Japan, for instance, 51 percent of total assets were non-financial in 1996, and of these, home equity was by far the largest component [Ellis and Andrews 2001: 5]. In Australia, housing assets amounted to 50 percent of all household assets according to a government 1996 survey.[9] In the United States, housing equity comprised 44 per cent of all household wealth, much higher than the second largest component, interest-bearing securities, according to a Census Bureau survey in 1995.[10] We caution that these figures are not precisely comparable, since each deals with slightly different accounting measures. Yet the implication is clear: residents in each country hold a substantial amount of wealth in residential property. Moreover, these heavy weightings in property might indicate that households seeking to increase current consumption by reducing assets would, in line with modern portfolio theory, look to home equity first.

In all three countries, the amount of housing equity generally increases with age. Japan exhibits this trend in the most consistent fashion. Figure 1 reports average net and gross dwelling values for Japanese households of varying ages in 1999. The positive association of home equity with age is clear: the most senior households in Japan have the greatest housing equity, with at least 35 million yen. Australia, too, offers a similar picture, but unlike Japan, the oldest cohort does not have the greatest amount of housing equity. Among people age 65+, mean home equity was $A155,000 in 1995/96, 8 percent higher than the average for all owner-occupiers.[11] Figure 2 illustrates the United States data, which demonstrate the same general pattern as Australia: housing equity rises for younger people, but then it begins to decline after the age of 64. Yet the elderly still have substantial median housing equity, in 1995 being worth at least one third more than the median housing equity ($US 50,000).[12] These figures demonstrate that, on average,

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[9] See ABS Australian Social Trends 1998, available at www.abs.gov.au/Ausstats/abs@.nsf/94713ad445ff1425ca25682000192af2/c1b75964822d74f9ca2569ad000402be!OpenDocument

[10] See the US Census Bureau, Asset Ownership of Households, available at www.census.gov/hhes/www/wealth/1995/wealth95.html

[11] See footnote 8, current dollars

[12] See footnote 11.

elderly people hold more housing equity than do their younger contemporaries. Moreover, the value of this equity is significant, and it could easily be used to supplement retirement income.

Figure 1 and Figure 2 here

In the case of Japan at least, Figure 1 shows that income and assets are not positively correlated; indeed, average income falls with age after age 50-59. This might indicate that elderly Japanese households would be desirous of some mechanism that would enable them to maintain their income at a reasonably sustained level. This substantial home equity could be the means by which they facilitate this end.

Figure 3 compares the housing wealth of all households and of the elderly in thousands of $US across the three countries. Data have been adjusted to reflect year 2000 prices and have been converted using Purchasing Power Parity exchange rates. The gross and net values for the elderly in each country do not vary much, indicating that these households have relatively little housing debt. The salient feature of this graph is the huge discrepancy between the high values of Japanese properties on the one hand, and the lower Australian and US properties on the other. Evidently, elderly Japanese have housing equity almost 50 per cent greater than their foreign counterparts.

Figure 3 here

One reason this is so is that living patterns in Japan differ from those in western countries, there being a strong tendency for many elderly in Japan to live with their children. Consequently this pattern might be biased toward rich elderly Japanese households.[13] As Figure 3 indicates, however, the value of houses held by other age groups in Japan, though less than that of the elderly, is also vastly higher than Australian and US values for elderly people. Further, Japanese living arrangements are rapidly approaching those in western countries. In 1998, some 45 percent of elderly Japanese lived apart from their children, compared to only 27 percent in 1980 [Ishikawa and Yajima 2001].

All these facts augur well for RMs in Japan, since they demonstrate that elderly households have substantial housing equity, as a proportion of total assets, absolutely, and in comparison to other age groups. Moreover, in light of these statistics, Japan seems to offer a

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[13] This issue has arisen a number of times in the literature. Hayashi et al [1988] try to correct for this possible bias, while Takayama and Kitamura [1994] contend that it is not material.

potentially even more favourable environment for such products than do Australia and the United States.

Owner-Occupation Rates

A second essential pre-condition of a successful RMs market is that people must own their homes. Renters lack home equity to convert to current consumption, and thus they cannot avail themselves of the benefits of RMs. The data show, however, that aggregate owner-occupancy rates are quite high in all three countries of special interest here. Figure 4 compares the owner-occupancy rates for the three countries by age group, and it confirms that the clear trend is for owner-occupancy rates, like home equity, to increase with age. Indeed, rates hover around 80 per cent for owner-occupiers age 65+, implying that a very high proportion of the elderly occupies and owns the same home. Such high rates, combined with the high housing equity examined above, underscore the substantial potential for RMs in Japan.

Figure 4 here

How Risky is Housing Wealth?

The tendency for households to retain much of their wealth in the form of housing equity is discussed above, and it has been well documented in the western nations.[14] This pattern no doubt flows from both social tradition and tax policy favoring housing, yet it may not be such a good idea from an economic perspective, given the price volatility of real estate.[15] Figures 5 and 6 show the price movements of real estate in five major international cities and four major countries, respectively.

The graphs clearly indicate that real estate can be quite volatile over the medium and long term. Price increases and decreases of over 40 per cent within five years are not rare; Tokyo prices, in particular, exhibit erratic price behavior. Consequently, there is concern that elderly households could be concentrating too much of their wealth in a home, subjecting themselves to a single volatile investment in real estate.

Unfortunately, there is relatively little economic research that evaluates housing price volatility into models of life cycle asset allocation, despite the obvious importance of owner-

[14] For a discussion of this phenomenon in relation to consumption smoothing see Hurst and Stafford [2001].
[15] For an Asian example, McCarthy, Mitchell and Piggott (2002) discuss this problem in Singapore.

occupier housing in the portfolios of most retirees. For instance, Poterba [2001] points out that in the US, real property accounted for about 1/3 of total financial assets in 2000, or about US$13 trillion. Flavin and Yamashita [2002] also confirm that few studies of household asset choice incorporate housing as an asset. They then propose that substantial transactions costs for housing purchase and sale mean that portfolio adjustment occurs on margins other than housing. Their analysis finds that the return to housing in the US is uncorrelated with stocks, Treasury bills, and bonds. Because young households are often highly leveraged with a housing mortgage, one response is to hold bonds when young, and increase the weighting on stocks when households grow older. This view is supported by Cocco [2000], who also argues that the life cycle pattern of home ownership can explain why the proportion of wealth held in stocks tends to increase with age.

Even if households wished to reduce some of their exposure to real estate, high transaction costs and a lack of appropriate financial products might prevent them from doing so. As Caplin [1999] argues, method to unlock home equity could therefore be a very valuable risk management tool and also a mechanism to meet consumption needs for elderly households.
Figure 5 and Figure 6 here

Do the Elderly Decumulate their Housing Wealth?

A RM type product will only succeed if homeowners are prepared to draw down their housing wealth in retirement. There is substantial debate about whether and to what extent this occurs, and the empirical evidence is mixed. US research by Venti and Wise [2001] shows that a decline in housing equity only takes place at the age of 75 and then at a rate of 1.76 per cent per annum. Moreover, if households receiving adverse financial shocks are excluded, the decline is a mere 0.11 per cent per annum. The authors conclude that the American elderly do not liquidate their homes to support their general consumption needs as they age. Sheiner and Weil [1993] however come to a different conclusion, finding instead a decline in home equity at older ages, mainly associated with shocks to family status and health, or the death of a spouse. Figure 7 shows the decline in both owner-occupancy rates and dwelling values in the years leading up to, and after, the death of a spouse.

Figure 7 here

Such information demonstrates that housing equity at older ages does decline. Figure 8 further illustrates this phenomenon by examining cohorts of elderly at different ages and at five-year intervals. Each cohort exhibits a decline in its ownership rate as it ages; again, however, notable declines mainly take place at considerably advanced ages, especially after age 80. Thus reductions in home equity in America are primarily incited by adverse unforseen shocks, and even then these are most seen among the 'old' elderly.

Figure 8 here

Such findings must be interpreted with some caution, especially if seen as a possible indicator of the likely behaviour of future cohorts. First, depreciation of the housing stock could be occurring unrevealed by the data. Second, low drawdown may be associated with a lack of means of secure drawdown – home equity loans leave the owner vulnerable to foreclosure. Third, RM contracts are now proliferating in the US. Hence the currently working generation, in all three exemplar countries, has fewer children and so may reduce the target value of intended bequests to reflect this.

The pattern of housing value drawdown by age in Japan is investigated by Ishikawa and Yajima [2001]. These authors note that the Japanese elderly do exhibit negative saving after the age of 65, but it appears to happen via the liquidation of financial assets, not housing assets. This finding can be seen as consistent with the analysis of Flavin and Yamashita [2002] cited above. The authors posit that elderly Japanese households on average leave an estate equivalent to 25.8 years of consumption. The untouched value of the home equity accounts for 20.5 years, and the remainder is accounted for by unused financial assets (bank deposits, securities etc). By contrast, they estimate that the elderly in the United States leave behind only 5 years of consumption.

Of course, this huge disparity might not reflect different intentions or preferences, but rather a poorly performing Japanese housing market and financial sector that do not provide secure means of housing wealth drawdown. This point is expanded upon later in this study, but for now, we note the low level of market activity in the Japanese housing market. Figure 9 shows that this market is only one tenth as active as the American market, and it focuses on the construction of new dwellings rather than the purchase of existing ones. Furthermore, the Japanese elderly only move one quarter as frequently as their American counterparts, which could be the result of the emaciated housing market.

Figure 9 here

Current related research suggests that in Australia and Japan, at least, households have mostly paid off their mortgages at retirement. This behaviour is consistent with a reluctance to draw down housing wealth in retirement. In the US, however, retirees have more housing debt. A possible explanation for this lies in tax provisions. Interest on housing debt in the US is tax-deductible, whereas this is not the case in Australia or Japan. In turn, this points to the importance of clear regulations and rules concerning concomitant liability with RMs, if such an initiative is to succeed. It would be of interest to further investigate whether, and to what extent, Japanese households draw down their housing wealth. Nishimura et al [1999] argue that housing, and particularly land, operates as a tax shelter under Japan's tax structure.

Various attempts have been made to explain why housing wealth is not drawn down sooner and more fully by the elderly. Two frequently proffered reasons are the desire to leave bequests, and precautionary saving. A bequest motive presumes that the elderly wish to leave some or all of their estate as a gift for their heirs. Again, there is conflicting evidence surrounding this issue. Hurd [2001] constructs a model for bequests and tests it using US data; he finds that when one's mortality risk becomes sufficiently high, housing decumulation does indeed commence. Furthermore he reports that the extent of decumulation is invariant across households with different numbers of children. Similar results have been reproduced by Haider et al [2001], who find that in the 1970s and 1980s, households with and without children dissaved at the same rate. Moreover, some experts have argued that the Japanese do not exhibit strong bequest motives [Horioka, 2002; Ishikawa and Yajima 2001]. Further, little hard evidence supports the importance of bequest motives for the average worker or retiree, in fact. Of the people who applied for a RM in the US, over 75 percent reported having no children [Caplin 2002]. At least in relation to RMs, then, it seems that people ostensibly less inclined to leave a bequest have been more frequent customers. The low Japanese fertility rate thus suggests that the development of a viable RM market in Japan may be more rather than less feasible.

Precautionary saving is another reason the elderly might wish to retain equity in their home. Older people may keep substantial equity in case unplanned expenditures arise, such as those associated with severe health problems. As yet, very little is known about how these events actually affect dissaving patterns [Haider et al., 2001]. In any event, it seems unlikely that

households would want to retain the entire value of their property for precautionary savings, especially as people knowingly come closer to their life expectancy.

It may be also be true that these reasons affect consumption only at the margin. Thus elderly people might want to use their housing equity more frequently, but their desire to remain in their homes might be a strongly dominant consideration, barring a health shock or marital status change. Indeed, Venti and Wise [2000] reported that 95 percent of Americans age 75+ expressed a desire to remain in their current home for as long as possible. Transaction costs aside, such sentiments are inimical to the suggestion that a household simply move to a smaller residence in order to liquidate some of its housing equity. Given a pent-up desire to reduce home equity but remain in the family home, the utility of a RM becomes apparent.

We have seen that households generally do not decumulate their housing equity with age to the extent consistent with the simple life-cycle hypothesis. The desire to leave a bequest and for precautionary savings are logical explanations for this contradiction, but it seems unlikely that they can fully explain the enormous amount of housing equity that elderly households leave upon their death. In theory at least, the RM seems to be an excellent financial instrument for that proportion of elderly households who both wish to use *some* of their home equity to better enjoy their life but who also wishes to remain in the home. Finally, it is worth remembering that all these empirical results and research are endogenous to the currently prevailing pension systems. Were state sponsored pensions to become substantially less generous, retirees might boost their reliance on home equity to finance old age consumption.

How to Unlock Home Equity

As noted earlier, a reverse mortgage is a home loan to a homeowner, which the borrower need not repay as long as he remains resident in his home. It is only at the time the house is sold, or the owner moves permanently, that the loan plus interest must be repaid. One appeal of this contract is that it provides homeowners, many of whom may be elderly, with a means to gain access to their home equity without giving up title to the house and without being forced to move out of their home.[16] There are several different formats such contracts can take.

[16] For further discussion of reverse mortgages see AARP [2001], NRMLA [nd], and Rasmussen et al. [1997].

Varieties and Structures of Reverse Mortgages

A range of different products may be grouped under the reverse mortgage heading, but what all have in common is that "the lender pays the borrower rather than vice versa" [NRMLA:1]. In other words, the lender promises to pay the homeowner a sum of money which the borrower can then convert into current consumption. In exchange, the lending institution accumulates interest on this loan and earns a stake in the homeowner's equity. The home loan is repaid only when the borrower leaves the house due to death, permanent move, or sale.

The size of the reverse mortgage, or loan, available to the homeowner is a function of the property's initial value and projected future appreciation, the owner's initial home equity, interest rates, and the owner's age and that of his/her spouse. In the US, income and credit records are not used to determine the loan value, and the borrower's medical condition cannot be used to underwrite the terms of the loan.

A crucial aspect of the reverse mortgage is that it is a "non-recourse" loan. This means that the total value of the loan cannot exceed the sale value of the home. In other words, even if the principal plus interest borrowed by a homeowner were to exceed the property's value, the lender's repayment would always be capped at the value of the home. This is important since reverse mortgages tend to grow over time, consistent with elderly homeowners' desire to draw down their home equity. The fact that the loan is capped, even as payments to the homeowner continue, imposes on the lender the risk that the debt on the house might exceed the home value. In order to protect against that eventuality, lenders tend to limit the size of the loan provided, and also to require an insurance premium to help protect against that risk.

Other key aspects of reverse mortgages are that payment is due to the lender when the borrower moves out of the home, sells it, or dies; in addition, the lender can also require repayment of the reverse mortgage in the event that the borrower fails to pay property taxes, fails to keep up the home, or fails to purchase hazard insurance. Also the loan may come due if the homeowner were to rent the home, change the property's zoning classification, take out new debt against the home, or add a new owner [AARP, 2001:19].

A Taxonomy of Reverse Mortgage Types

RMs may be classified according to the types of institutions that offer them. In the US context, the three most important types include the following:[17]

- *Single purpose RMs*, also known as *Deferred Payment Loans (DPLs)*, tend to pay out a single lump sum used to help pay property taxes, cover home repair bills, or allow enhanced building accessibility for elderly residents [Hersh, 2001]. These tend to be offered by state and local government groups to lower-income individuals; some are limited to the disabled or elderly. They generally have no or low up-front costs (e.g. no origination fee or closing costs), and a portion of the loan may be forgiven if the homeowner remains in the home a specified period of time after closing. Often the programs are subsidized through property taxes or general revenue. A homeowner may repay the DPL with interest at any time, and the balance must be repaid at the time of the sale of the house or the borrower's death.

- *Lender-insured proprietary RMs* are offered by private-sector firms, banks, and mortgage companies on more expensive homes, which provide age 62+ homeowners of any income level home loans that may be used for any purpose. These loans are not backed by government reinsurers, so lenders charge a risk premium to protect against the possibility that the loan balance exceeds the home value. To date, relatively few sellers operate sell these RMs in only a few states; one of the best known cases is the California-based Financial Freedom Senior Funding Corporation, backed by Lehman Brothers. Proprietary RMs tend to be more costly than federally-insured HECMs (see below) and other government-backed home loans.

- *Home Equity Conversion Mortgages* (HECMs) are US federally-insured loans available to homeowners age 62+ for any purpose. They can be sold by banks and mortgage companies without regard to the homeowner's income level. The maximum loan amount, called the "203-b limit", is set by law and rises annually; in 2001, it was about $132,000 for non-urban areas and $240,000 in urban areas. The loan may be taken in the form of a single lump sum, a line of credit (available on demand), or a monthly cash advance (payable as a fixed nominal value for either a specified term or as a life annuity); combinations of these are also available. HECM lenders are protected against the risk that the loan plus interest will exceed the home's value by the Federal Housing Administration (FHA). This form of RM imposes substantial up-

[17] This discussion draws on AARP [2001] and Mayer and Simons [1994].

front costs, including an origination fee totalling up to 2% of the home value (or the 203-b limit); closing costs that cover fees for title search and title insurance, legal and appraisal services, surveys and inspections, mortgage taxes, credit checks, and other related services; and a HECM insurance premium, equal to 2% of the home value (or the 203-b limit). In addition, HECM originators charge a servicing fee which is a monthly charge limited to $30-35/mo, and additional insurance costs totalling 0.5% of the rising loan balance on top of the monthly interest rate. Most lenders charge a variable interest rate which adjusts annually; in this event, the rate may vary no more than the change in the 1-year Treasury bill rate, and it cannot change more than 2 percentage points per year, with a cap of 5 percentage points over the life of the loan.[18] The HECM must be repaid at the time of the sale of the house or the borrower's death; also the lender can require repayment if the homeowner leaves the home, does not pay property taxes or hard insurance, or fails to maintain the property.

HECM-type RMs, more generically termed 'tenure' RMs, offer both income until death and repayment at time of death. This combination has proved the most attractive. Implicit in these tenure RMs are four guarantees for the borrower, each of which must be borne by the lender [Philips and Gwin 1993]. These include:

- *Residency Guarantee:* The homeowner can remain in the property until death, regardless of the loan balance.
- *Income Guarantee:* Income support will continue for as long as the homeowner lives in the home.
- *Repayment Guarantee:* There is no repayment obligation until the homeowner dies or sells the home.
- *Nonrecourse Guarantee:* The homeowner's other assets cannot be used to repay the loan.

Payout alternatives

The manner in which borrowers choose to receive their RM loan payments can vary. In the US, cash can be accessed as a lump sum, as a life annuity, as a line-of-credit, or as some combination of these. The most popular method has been the line-of-credit option, which by 1999 had been chosen for more than two-thirds of the RMs issued [Syzmanoski and DiVenti

[18] Alternatively the lender may provide a lower rate that adjusts monthly, and in this event the lifetime ceiling is 10

2001]. This is the most flexible option, as it allows borrowers to draw down money at their own time, up to some maximum amount. Interest accrues only on money that has been drawn. Nevertheless, the lump sum and annuity options lend themselves to a general exposition; intuitively, the line-of-credit option lies in between these two schemes.[19]

Determining the Payout Values: Analytical Considerations

At a general level, all reverse mortgage offerings that are self-financing must be priced so that the lending institution can expect to make back the money loaned plus interest over the term of the contract, after pooling risks across the set of loans sold. Here we provide an analysis of the lump-sum and annuity options for the reverse annuity product.

A simplified model of the loan amount can be specified by supposing a single borrower took out a loan in the form of a lump sum *(LS)* using his future home value as collateral. Then in a competitive market, the actuarially fair amount he could borrow would be set so the loan balance would equal in present value the anticipated value of the house at the time of sale. This may be defined as follows,

$$LS = \sum_{t=1}^{\max Age - x + 1} HEQ * \left(\frac{1 + r + g}{1 + r + m} \right)^{t} * {}_{t}p_{x} \qquad 1)$$

where:

r = expected future riskless rate of return;

g = additional risk premium expected on housing investment above the riskless rate;

m = additional risk premium expected on mortgage loans above the riskless rate;

HEQ = home equity amount at the time the loan is taken out;

${}_{t}p_{x}$ = probability of survival t periods from age x;

maxAge = oldest possible survival age from life table (e.g. 110).

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percentage points.

[19] Because people choose when to draw down their line-of-credit, this option cannot be modelled simply; but it embodies elements of both a lump sum (since people can presumably drawn down large amounts of credit), and an annuity (since people can obtain credit on more than one distinct occasion.)

The lump sum (*LS*) simply grows at the mortgage rate (*r* + *m*), and the total amount repayable (*Q*) after *t* periods is:

$$Q = LS(1 + r + m)^t \qquad 2)$$

The mathematics for a life annuity are more complicated. Again, the lender determines the actuarially fair maximum present value of an annuity *(LS)* that a borrower can purchase. The borrower then receives a fixed nominal payment per period until death. The nominal payment (*PMT*) is calculated thus:

$$PMT = \frac{LS}{\sum_{t=1}^{\omega} {}_t p_x \frac{1}{(1+r)^t}} \qquad 3)$$

where *r* is the risk-free rate of interest, *t* is the number of payment periods until death, and ${}_t p_x$ is the annuitant's probability of survival *t* periods from age *x*. These equations form the basic structure of the RM products.

Determining the Payout Values: Practical Considerations

In a practical setting, a RM lender would specify each of the model parameters, including the initial home value, the pattern of expected future riskless returns, expected future risk premia on the appreciation of the house and on mortgage loans, and the future mortality table that would apply to the borrower as well as the maximum possible age of survival.

This simple model could also be made more realistic in a practical setting, in several ways. First, the initial home value must be specified net of any remaining mortgage, if there is one. Second, the lender often demands that the home be brought into good repair at the outset, to protect the value of the lender's investment. In practice, needed repairs may be not only included in the value of the loan, but they also might be stipulated on an ongoing basis. Third, lenders must develop a forecast of future returns in developing the loan amount that can be provided, most importantly, for the riskless rate and the future mortgage rate. Since these are unknown, some sensitivity analysis is usually required.

Fourth, the lender must devise a forecast of each home's likely future appreciation, and here there is a distinct possibility of adverse selection and/or moral hazard. For instance, a

homeowner who believed that his own home was deteriorating in value would be more likely to seek a RM than average; furthermore, once a RM was obtained, the homeowner might be less likely to keep up the property.[20] Fifth, the lender must model not only the probability of home sale due to the borrower's death, but also the chance that the homeowner will terminate his residency due to other reasons including the need to move into a nursing home and or to move in with children. Data on actual termination rates are virtually impossible to obtain [Rodda et al., 2000], though early evidence in the US indicates that younger homeowners are terminating their HECM loans more quickly than anticipated by the government insurers [Syzmanoski and DiVenti, 2001].

A sixth consideration is that a lender must identify and/or develop the mortality table(s) appropriate to RM users. The illustration above specifies the survival pattern of a single individual, whereas in practice many elderly seeking RMs might be married couples. In that instance, using a joint and survivor table would likely be more appropriate than a single female table. In addition, one must determine whether to use population or annuitant mortality tables, since the former expresses the entire nation's mortality experience, whereas the latter tends to have lower-than-average mortality patterns due to the fact that annuitants tend to be self-selected to live longer than average [McCarthy and Mitchell, 2002]. A lender who uses a population table would then potentially be exposed to the possibility that those people who seek to borrow against their equity might actually have lighter-than-average mortality experience, akin to the degree of adverse selection found among annuity buyers. Whether this is appropriate is not yet known given relatively little experience with RMs, though RM buyers may be in worse health and require the housing loan to pay medical bills (in which case they would likely die earlier).[21] It is also unlikely that a lender would use a period life table, instead of a cohort table, since the

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[20] Such problems might alter the terms of the RM policy, as suggested for example by Shiller and Weiss [1998] who propose that the loan be keyed not to the homeowner's own property appreciation but to a national housing index.

[21] In the US case, a white female population period mortality table (the Decennial 1979-1981 life table) is used to price HECMs [Quercia 1997]. Using female instead of sex-specific cohort tables tends to make the loan amounts lower than they would be using male tables, whereas using population period tables rather than annuitant cohort tables would make the loan amounts higher than the alternative. It is not known whether RM borrowers have experienced actual mortality substantially different from projections. While Syzmanoski recognizes that HECM mortality might differ from population rates, he was unable to distinguish empirically between houses sold due to death versus termination for other reasons [Syzmanoski and DiVenti, 2001]. Lenders cannot take medical conditions into account when pricing RMs [Syzmanoski, 1999], though Mayer and Simons [1994] suggest this might be a group likely to prefer RMs. In the latter case, underwriting could actually make the product more attractive for precisely those people who need it the most.

former assumes fixed mortality rates over time whereas a cohort table builds in anticipated improvements in life expectancy. The latter is a more conservative stance, which would lead to a reduction in the amount that could be loaned on the house.

Computing Payout Values: An Example

To compute either the appropriate annuity payments or the lump sum amount that can be borrowed, a lender must develop assumptions regarding the evolution of interest rates, future home values, and mortality tables, as well as termination probabilities. Compared to the lump sum approach mentioned above, both the line-of-credit and the annuity payout approach would postpone the time path of funds borrowed. In this event, the lender might either charge a lower mortgage rate for the delayed payout arrangement, or permit the borrower to obtain a larger fraction of his initial home equity, than under the lump sum approach.

The data in Figure 10, below, illustrate a range of results for the US context. The results are computed using a website calculator provided by the AARP, a prominent and nationally-known senior citizen organization. The data assume the 1-year Treasury bill rates in effect at the time of computation and national average closing costs for RMs. Two sets of results are provided, those that would be available under the HECM program which are insured by the Federal Housing Administration, and those available via a proprietary RM program developed by Fannie Mae, known as the HomeKeeper Mortgage. [22]

Figure 10

These data indicate that a 75-year old with $100,000 in net home equity could obtain a federally-insured HECM lump-sum home equity loan of about $62,000, versus a HomeKeeper loan of about or 44% less or $34,800. Alternatively, the borrower could take the loan as a monthly payment as long as he remained in his home. For the 75-year old with $100,000 in net equity, this would amount to around $402 per month, or $4,800 per year, in the Homekeeper case; this annuity is 25% above the annual $3,600 generated by the HECM product. It is interesting that tripling the available home equity to $300,000 raises the lump sum obtainable by three times in the HECM case, but more than triples the lump sum payable by the HomeKeeper product. In the annuity flows, the HECM annuity remains higher than the HomeKeeper payout, but the disadvantage shrinks at higher levels of equity: thus the former annuity would total

$14,000 per year, versus $11,700 for the latter (only a 15% difference). This shrinking gap probably reflects the fact that the HomeKeeper loan is intended to attract homeowners with more valuable properties.

Other Techniques to Access Home Equity

In addition to RMs, various other financial arrangements have been suggested to help older homeowners access the equity in their homes. Caplin et al. [1997] advocate housing partnerships, where the homeowner becomes the "managing" partner and operates the property jointly with an investor who is a limited partner. The latter has no personal liability so the investment could potentially be securitized on the secondary market. Several new or potential products are reviewed by Shiller and Weiss [1998]. With home equity insurance, the homeowner could purchase insurance on the price of his home at resale (a 'put'), enabling him to participate in some of the upside potential but gain protection against the downside. To reduce the potential for moral hazard, they suggest that the insurance would be linked to an area housing price index rather than one's own house. Under a shared equity or appreciation mortgage program, the homeowner would receive a low-interest loan from a lender, with the repayment date linked to the date when the owner moves or sells. The lender then shares in future appreciation of the home's value but does not take on depreciation. These have been sold by the Bank of Scotland, with an interest rate of zero and the lender receives three-quarters of the home's appreciation. Finally, under a sale of remainder interest arrangement, the homeowner would sell all or a portion of his home to investors; after the owner's death, investors would receive the entire value of the house (this has been sold in the state of California as the "Lifetime Security Plan.")

RMs and Forward Mortgages[23]

It is instructive to consider the differences between a RM and a traditional, or forward, mortgage. Traditional home purchase mortgages depend primarily upon the borrower's ability (income) and willingness (credit history) to repay the loan. The home equity (collateral) acts as additional security for lender. For reverse mortgages however, full repayment depends *only* on

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[22] Fannie Mae provides homeowners with RM loans having higher limits than can be provided under the HECM program, namely $322,700 for 2003 (see http://www.reversemortgage.org/homekeep.htm).
[23] This section draws on Syzmanoski [2001].

home equity being adequate; borrowers often have very low income and current credit problems (which in many cases is why they need a reverse mortgage). Secondly, and consequently, the borrower does not have to repay the principal or interest until the loan becomes due at the single repayment date. Thus the loan balance is in fact increasing through time. Forward mortgages by contrast generally exhibit decreasing loan balances through time, since the principal and interest are continually being repaid.

The implications of the above differences between reverse and home purchase mortgages are that reverse mortgages may be theoretically simpler to analyse from the perspective of needing to examine credit and employment histories. Indeed, this is not necessary. However, when one considers the need to predict economic conditions (property values) and terminations (based on exogenous factors) many years into the future, the complexity of pricing RMs becomes apparent. The difficulty in making such predictions is a reason why reverse mortgages have either been very conservatively priced (which reduces their marketability) or else been more liberally priced only with a government guarantee (more on this later).

Key Supply Risks

After having chosen to acquire a RM, the principal risk for the individual borrower is the possibility of an eventually bankrupt lender. This may not be material in the event of a lump sum loan. For the lender however, the risks surrounding the supply of RMs are far more complicated. Figure 11 indicates the essential risk issues surrounding the supply of RMs. It shows a graphical representation of the model described above.

Figure 11 here

In this setup, the house price, the lump sum, and the loan due to an annuity payout all grow with time. Taken together, these curves represent “crossover risk,” or the risk that the property might be worth less than the value of the loan at the time the loan becomes due. Such a scenario is quite feasible, since the growth rate of the value of the property is presumably less than that of the mortgage rate; and thus, given time, the loan will ‘catch up’ to the property. Although an apt graphical description, “crossover risk” is actually a generic term that veils the more precise sources of risk. Philips and Gwin [1993] identify five specific categories of risk confronting an RM lender. These are longevity risk, interest rate risk, general home appreciation risk, specific home appreciation risk, and expense risk. We deal with these in turn:

- ***Longevity Risk***

This risk is the most easily explained. If borrowers remain in their homes for a long period of time, there is a greater chance that the value of the loan will exceed the value of the property. This phenomenon results from the loan's having had relatively more time to catch up to the more slowly growing property value. This risk will be exacerbated the greater is the difference between the mortgage rate and the property growth rate. The saving grace of longevity risk is that through diversification and pooling of risks the lender can considerably attenuate this risk. Mortality tables tell us, and lenders are aware, that some people will die early and some people will die late. The profits on the former should be able to subsidise the latter. Nevertheless, adverse selection can make this relationship difficult if more healthy people are applying than sickly ones.

- ***Interest Rate Risk***

Interest rate risk is complicated. The degree of interest rate risk will depend on whether the lender is dealing in fixed-rate or variable rate mortgages. In the case of fixed-rate RMs, the lender is unable to control the change in its assets following an increase or decrease in market interest rates. For example, an increase in market rates will decrease the value of its fixed-rate RM assets, which will now be earning a lower comparative rate of return. Such an event would reduce the profit margin of the lender. On the other hand, variable interest rate RMs will avoid the latter problem, but will prevent the lender from knowing the future value of its assets with certainty. Even small changes in interest rates can have large effects on the future loan value, since the interest charges are capitalised as additions to a burgeoning loan balance rather than paid as they accrue. Moreover, interest rate rises, by increasing more rapidly the borrower's debt, can increase the probability that a loan balance will exceed the value of a property at the time of repayment.

Lenders typically incur liabilities in the form of bonds or other contracts and then reinvest the proceeds in RMs. The process of matching asset income with debt-servicing requirements is known as immunisation. Because of the unusual cash-flow pattern of RMs, it is often difficult to maintain a completely immunised asset-liability dichotomy. A poorly immunized portfolio can further exacerbate the detrimental effects of interest rate changes, since liability-servicing requirements will be out of step with income, and thus the time difference between receipt of income and payment of debt will be host to a variable and unpredictable rate of interest.

Finally, Boehm and Ehrhardt [1994] show empirically that interest rate changes are far riskier for RMs than for other types of interest-bearing assets. The intuition is that the small balance sheet values of newly originated RMs belie the growing future assets that these new RMs imply. Interest rate changes have little effect on these small initial balance sheet values, yet future asset values can be changed enormously. In contrast, the effect of interest rate changes on forward mortgages can be observed directly from the balance sheet.

- ***General House Appreciation Risk***

The future values and growth rates of property are unknown to lenders, yet lenders rely on these values in order to make a profit. Consequently, general house appreciation risk is obvious. Further, this risk is not wholly diversifiable as is longevity risk (for the most part). It is true that having RMs attached to properties of a wide type and geographical location will reduce the risk of declining property values due to a regional recession, but such a strategy cannot avoid a national (or international) housing price decline. The expectation of housing price appreciation at the commencement of loan will also determine how much the lender is willing to lend, and thus it is not an issue only for lender. Thus borrowers, too, have a vested interest in the expected property price appreciation at origination of a loan.

- ***Specific House Appreciation Risk***

Even if the general house appreciation takes place as the lender predicts, there is no guarantee that the particular portfolio of homes on which it has sold RMs will appreciate at this particular rate. Indeed, there will be a distribution of possible rates around the general appreciation rate. The variance of this distribution will depend on the proportion of the market that a particular lender services. It is virtually guaranteed that losses will result from the specific house appreciation risk, since values on the higher side of the distribution do not generate any extra profit for the lender who only receives (at most) the loan balance back at the time of the house sale. Further, lower rates of home equity growth can definitely produce larger losses for lenders.

- ***Expense Risk***

Since the RM market is small in the United States and still incipient elsewhere, a prospective lender would incur considerable expenses in marketing and soliciting sceptical customers for a product the details of which are little known outside a specialist community. Moreover there are legislative burdens to overcome, and much experimentation will be necessary

to determine what are the most effect methods of administration and selling. All this costs money: hence there is a risk that the products will fail, and these costs might not be recouped. This is termed expense risk.

Risks For the Borrower

Turning now to *risks faced by the borrower*, some concern has been expressed that older homeowners might not understand that they are pledging their home equity when they take out a RM, or they might not realize that the value of the loan is compounded over time as long as they live in their house. For this reason, the HECM loan structure in the US requires that borrowers receive educational counselling, and further that all fees be disclosed according to a strict government-set format [Rodda et al., 2000]. A related concern is that many elderly homeowners who lived through the Great Depression are strongly averse toward taking on debt [Rodda et al., 2000].

An additional consideration arises when a homeowner opts for an annuity payout stream rather than a lump sum. This arises because of the chance that a borrower might die "too early," or before his life expectancy. Of course this possibility must be weighed against the security of the borrower knowing that he could not outlive his asset, precisely due to the annuity structure. Alternatively, a homeowner may convert his home equity into different segments, for instance, partitioning the cash available into a life annuity as well as a lump sum. This approach not only affords a mixture of upfront cash and longevity protection, but it also offers elderly homeowners a means to preserve some equity to help pay for future medical bills, or even to provide a bequest to their heirs after death. More recently, some insurers have begun to offer combination annuity plan that offers healthy elders a life annuity, but it then pays an additional sum if the elder becomes disabled [Warshawsky et al., 2001]. This sort of product innovation could certainly be transferred to the RM context, to the extent that people feel they wish to preserve some cash to cover long-term care needs.

Yet a different risk facing homeowners taking a reverse mortgage is the possibility that the lender might file for bankruptcy after the contract is in force. If the borrower had taken a lump sum loan, there would presumably be no additional risk, but if the borrower were expecting a life annuity, the credit of the insurer would be key. In the special case of a federally insured RM, borrowers would probably continue receiving annuity payments, but it is less clear what

would happen in the event of bankruptcy of a lender-insured privately-originated RM.[24] It is clearly critical to raise borrower awareness of the importance of purchasing annuities from highly-rated private insurers, in protecting against this possibility.

There are several ways in which tax and transfer policy interfaces with RM practice, all of which also expose the homeowner to risk when he takes out a reverse mortgage. One problem arises if a homeowner moves and sells his home for more than he paid, this could produce a taxable capital gain. But if he also held an RM, it is possible that what he owed on the RM loan might exceed what was netted from the house sale [Caplin, 2002]. In such a case, the homeowner might be unable to pay the tax bill despite having made a gain on the house.[25] Another as-yet-unresolved question is how the tax authority (the Internal Revenue Service, in the US) views the reverse mortgage contract. If it deems the RM transaction a *sale* of the house rather than a loan against the home value, the income received by the household could be treated as taxable ordinary income, which would clearly be disadvantageous. Furthermore, life annuities are subject to higher marginal tax rates late in life [Brown et al., 2001], which makes it crucially important for the older homeowner to pay close attention to the timing of the income flow generated by the RM product.

Yet a different issue crops up for very low-income households who are eligible to receive subsidies from government programs. In the US context, regular old age Social Security and Medicare benefits are not offset by RM payments, and a loan advance from an RM would not be counted against SSI/Medicaid benefits if the recipient spent the entire amount in a given month. On the other hand, a RM loan paid out as an annuity does offset Supplemental Security Income (SSI, for those with little income and virtually no assets) at a 100% tax rate, and eligibility for Medicaid can also be cut. Furthermore, if a poor homeowner were to save any portion of a RM loan, this too would threaten his receipt of welfare benefits. Evidently, the decision to take a RM loan, and the form in which the loan is taken, may greatly influence a low-income homeowner's wellbeing, which makes the product seem additionally complex for poorer individuals.

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[24] Individual states have solvency pools backing insurance products including annuities, but more research is required on exactly how secure these RAM payments would be in the event of a non-reinsured lender bankruptcy.
[25] Inasmuch as elderly homeowners are currently exempted from capital gains taxes in the US this would not be a widespread problem under current tax law.

The Need for RM Insurance

Because of the aforementioned risks, lenders are unlikely to offer RMs unless they can purchase some insurance to pool these risks. In the US context, mortgage insurance has been needed to protect against the circumstance where the value of the loan may come to exceed the value of the collateral. The concern is on the part of risk-averse lenders worrying they might not be repaid all of the principal advanced and interest accrued when the loan becomes due and payable. We also note that it is not only the lender that would be partial to some insurance; the borrower might like protection against a bankrupt lender if he had adopted the annuity payout structure.

The US experience offers an example of a government-sponsored system of insurance that provides such guarantees for both parties. The Home Equity Conversion Mortgage Program (HECM) was instituted by the Department of Housing and Urban Development (HUD) in 1989 to 1) allow the conversion of home equity into liquid assets to meet the needs of elderly home owners; 2) determine the extent of market demand for RMs; and 3), to encourage would-be lenders to participate in the RM market. In order to encourage 1) and facilitate 3), the program had to include some form of insurance. The HECM program stipulates that borrowers are to pay a mortgage insurance premium to insure both themselves and lenders. The insurance premium consists of two parts, both of which may be financed [Case and Schnare, 1994]. First, there is an immediate premium of 2 per cent of the property value paid at loan origination. Second, there is a consequent annual premium of 0.5 per cent of the loan's outstanding balance, which accrues to the outstanding balance on a monthly basis. If the borrower chooses to finance his premium then the maximum amount of credit to which he is entitled is reduced accordingly. For the borrower, the insurance premium allows the HECM program to guarantee three borrower-protections [Szymanoski and DiVenti, 2001]:

- The loan can never become due as long as the borrower remains in the home.
- Should the lender fail to make repayments, HUD will step in and forward the payments instead.
- Lender-independent counselling must be provided prior to a borrower's assenting to the terms of a RM.

For the lender, this premium ensures that if a loan grows to equal 98 per cent of the property's value, the lender can assign the loan to HUD, after which the lender would file an

insurance claim with HUD and obtain an amount equal to the mortgage balance at the time of assignment. Henceforth the lender would have no obligation to service that particular RM.

Administration Costs and Regulation

Some writers have attributed the lacklustre performance of the US RM market to high administrative costs and regulatory confusion. Apart from insurance-related matters, these are the other practical issues that need to be adequately addressed for a viable RM market. The problem of high administration costs has been noted by Caplin [2002]. He notes that the average total of transaction costs per HECM loan originated, excluding insurance premium, has amounted to more than $4,500, or about 10 percent of the total loan (compared to the median principal limit that people are able to borrow – around $47,000). These costs mainly pertain to fees charged to borrowers by lenders, which can relate to appraisal costs, title search and recording costs, credit checks, and loan processing costs [Case and Schnare,1994]. These high costs are partly due to the relative newness of the RM product, and the presently small size of the market; and these factors should diminish with time. Nevertheless, they remain an impediment to the growth of the market.

In the US, RMs have been somewhat of a regulatory nightmare, as they sit "at the intersection of many different, confusing, incomplete regulatory systems" [Caplin 2001: 17]. Due to restrictive financial laws, even the sale of RMs in certain US states has been problematic.[26] More relevant now is the legal classification of RMs, which are considered an "open end consumer credit plan under which extensions of credit are secured by a consumer's principal dwelling" [ibid: 20]. Because of this, the federal Truth in Lending Act requires lenders to warn their customers that "loss of dwelling may occur in the event of default" [ibid: 21]. Such a statement bears little resemblance to the truth, because the nature of RMs is such that 'default' is a concept more relevant for the lender than the borrower, and borrowers lose their property only if they fail to pay taxes or intentionally harm their homes. Moreover, Case and Schnare [1994: 344] note that the same Act requires the sending of a brochure to all RM customers that details traditional home equity lines of credit, and includes such contextually alarmist statements like "failure to repay the line of credit could mean the loss of your home".

The tax treatment of RMs also needs to be explicitly (and perhaps favourably) delineated. Currently, the treatment of annuity-income from a reverse mortgage is ambiguous, and the issue

of property capital-gains tax in the context of a reverse mortgage is not stipulated. More significantly, the Internal Revenue Service is deliberating as to whether RMs are really loans or sales. The latter decision would be disastrous for the elderly, since income would likely be considered wholly taxable, and social security benefits would consequently be threatened. These points highlight the need for a co-ordinated financial and legal framework for the establishment of a viable RM market in Japan or elsewhere. The US experience can deliver some lessons of what not to do in Japan or elsewhere.

Advantages and Disadvantages of Reverse Mortgages

Mechanisms that give elderly homeowners access to their home equity have privately beneficial as well as problematic aspects, both of which bear mentioning. One appealing result of a RM is that the borrower can diversify his wealth portfolios, instead of keeping a substantial share of the portfolio in a single, nondiversified, and hence risky, asset. Another beneficial outcome of a RM loan is that it can boost consumption by the elderly without forcing a house sale. Avoiding the sale of the home implies that an elderly homeowner can remain relatively independent for longer, avoiding the substantial monetary and psychic costs associated with moving. Staying in one's home also provides the homeowner a degree of insurance against fluctuations in the cost of rental housing [Sinai and Souleles, 2001]. Of course, linking the RM to an annuity affords the elderly homeowner the peace of mind associated with not running out of money, since the borrower is guaranteed a continued income flow for life. Finally, RMs can play a role in inheritance, offering heirs the possibility that some housing value may remain to be passed along in the form of a bequest, if the elderly owner dies early enough or if housing appreciates fast enough. Conversely, the older homeowner is less likely to pass on unintended bequests since more of the home asset can be accessed and annuitized.

A potential negative result of RMs is that some prospective heirs might be disappointed if their parents consume part or all of their home equity. That is, many adult children hope to receive their parents' housing asset in bequest form, and some of these will certainly receive less under the RM arrangement, than if the parents had not take a loan against the asset. Of course, such adult children might have subsidized their parents' medical bills and other consumption

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[26] Texas, for example, had laws prohibiting lenders from making mortgages for any reason except home renovation

needs if they wanted to help them avoid tapping home equity via RMs. Another problematic aspect of RMs is the fact that their inherent complexity makes them difficult to explain to elderly homeowners and their offspring. A related concern is that the nature and size of up-front origination costs make RMs expensive to hold for a short period. It is only when these costs are spread over a long time period will they amortize sufficiently to make the investment appear appealing. For all of these reasons, the US government requires that counselling and "truth in lending" disclosures be made to all borrowers. Perhaps similar measures could be recommended for prospective heirs as well, to reduce potential liability concerns. As we have noted above, tax issues must also be taken into account, since turning one's housing equity into a life annuity could boost the elderly person into a higher income tax bracket and reduce his transfer income, as well.

RMs can also have social spillovers, in addition to the private outcomes just enumerated. One important social benefit is that enabling the elderly to remain at home instead of moving into a long-term care facility could ease pressures on safety-net programs serving the elderly (e.g. including publicly provided long-term care and welfare benefits for the indigent). Hence, RMs could reduce current and future needs to tax workers and directly subsidize the asset-rich but cash-poor elderly. Using RMs to retrofit homes to make them more accessible to people with mobility problems and other disabilities would generate similar social as well as private benefits. Another spillover from the spread of RMs is that the real estate market might become more liquid, and older homeowners might gain a better idea of the value of their homes. Particularly in countries where housing markets are poorly developed, RMs could enhance the usefulness and timeliness of housing price information and make the housing market more complete.

Turning to the social cost side, it is possible that state and local government tax revenue would fall if the elderly opt for RMs instead of selling their homes. Whether on net capital gains, property tax, and other tax revenue would rise or fall, and the timing thereof, would have to depend on the specifics, topics that demand future attention. A widespread move to RMs,

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or purchase; and Tennessee has rescinded a law that prescribed a 20-year maximum for open-ended credit facilities.

particularly of the HECM form, might also end up being costly if the government mispriced insurance offered to lenders.[27]

Implementation in the Japanese Context

To determine where and why RMs would work well in the future and for whom, we next explore conditions supportive of, and detrimental to, the process of unlocking home equity for elderly homeowners. We begin by focusing on general conditions, and then we turn to some specific conditions that may be particularly relevant to Japan.

Conditions Supportive of Unlocking Home Equity:

As mentioned above, implementing the RM model for the elderly requires the lender to assemble several key pieces of information regarding the homes and their owners:

- Accurate initial home values, net of remaining mortgage and repairs to bring the property to code or zoning standards;
- Estimated transaction and closing costs, as well as expected servicing costs;
- Accurate forecasts of expected future home appreciation rates, taking into account adverse selection and/or moral hazard on the part of the borrowers;
- Accurate forecasts of residents' future expected mortality and termination patterns;
- Accurate forecasts of future expected riskless rates, mortgage rates, and annuity rates of return;
- Accurate forecasts of future tax/transfer policy, which influence the net costs and benefits of the RM options.

Clearly these data demands are substantial, and even after more than a decade of experience in the US, much remains to be learned to enhance the workings of the RM market [Szymanoski and DiVenti, 2001; Rodda et al., 2000]. On the positive side, US housing markets operate relatively transparently and it is possible to obtain up-to-date house price series at the national and regional levels as illustrated above. Housing experts have also produced price indexes for specific cities over time (http://www.cswv.com/), though time series for a specific house or set of houses is, of course, more difficult to obtain. Nevertheless, the data tend to exist

[27] The US General Accounting Office and Congressional Budget Offices suggest that Fannie Mae and Freddie Mac benefit from government subsidies, though it is beyond the scope of the present paper to investigate the size of these subsidies; this is a topic for future research.

and are being collected since home sale information is generally a matter of public record and is increasingly being listed on the internet. This may help in the development of forecasts for future home appreciation, though Shiller and Weiss [1994] find a reasonably high level of price inertia in the US market. In general, lenders would probably demand insurance against the vagaries of the housing cycle, or diversify accordingly, so as to protect against the risk of housing market crashes such as those that have been noted in earlier sections.

Less easy to obtain is information on likely transaction, closing, and servicing costs for RMs, though past experience probably provides a decent guide in the US case. Little analysis has been done on the question of whether mortality and loan termination patterns are consistent with the underlying assumptions, and more should be done on this. Ultimately lenders would probably prefer protection against some massive change in mortality risk (e.g. a cure for cancer) but to date this is probably not diversifiable by private insurers.

Least easily predictable of all, probably, are future interest rates (including the riskless rate, mortgage rate, and rate used to price annuities) and future tax/transfer policies. In financial terms, the most critical issue is probably whether lenders can appropriately diversify their book of RM business, either by spreading investment pools geographically, by selling off their RMs in a secondary mortgage market, or by buying reasonably priced insurance to protect against key uncertainties. Some have argued that the private market can securitize reverse mortgages, though the US market has not developed particularly rapidly. This is in part because RMs require monthly servicing and periodic credit re-evaluations, requiring expensive and ongoing oversight. Life insurers might thought to be natural entities that would buy these loans, since the life insurers take in cash up front and pay out later in life, while RM providers have the opposite cashflow pattern.[28] In general however, a RM lender requires up-front liquidity given nature of product, since the loan or the annuity is paid immediately, but the house sale may be deferred long into the future.

Potential Payoffs of Reverse Mortgages In Japan

To illustrate the value of unlocking home equity in the international context, we use the model developed above to evaluate loan balance and annuity payments under alternative reverse mortgage scenarios. Figure 12 illustrates possible payouts for two home equity levels, $100,000

and $300,000, values which bracket illustrative elderly homeowners' equity values in the US and Japan, respectively.

Figure 12 here

We focus mainly on the results for age 85 here, though for completeness the tables also show results for ages 65 and 75 as well. Our computations employ economic assumptions relevant to each country, regarding the inflation rate and the riskless real rate of return, as well as real annuity and mortgage rates.[29] These represent rather different economic conditions, with Japan is assumed to experience deflation and negative real home equity growth (RG) as has been the case for several years; by contrast, the US simulation assumes low but positive price inflation and real home equity growth. We use country-specific mortality data, namely period population mortality tables for US females provided by the Office of the Chief Actuary of the Social Security Administration (reported in Mitchell et al., 1999), and data for Japanese females from the JLT18 mortality tables [Ministry of Health and Welfare, 1998]. Finally, for this experiment, we presume that lenders would charge the same real loan rate (RM) on the reverse mortgage in both countries.

The simulation model generates a range of outputs for reverse mortgage potential payouts.[30] The first panel of Figure 12 indicates that an 85-year old in the US would, under this formulation, be eligible to borrow a lump sum of approximately $238,000 against her home equity of $300,000. Longer Japanese life expectancies combined with less favorable projected rates of home equity growth imply that an 85-year old Japanese woman would anticipate receiving a lump sum 12% lower, around $210,000. The second panel shows the real annuity

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[28] On the other hand, prior research has shown that life insurance and annuities are not necessarily a good hedge for each other; see McCarthy and Mitchell [forthcoming].

[29] For Japanese historical data, the following assumptions were employed:
Inflation rate = -0.6% annually ('01 estimate; www.cia.gov/cia/publications/factbook/fields/2092.html)
r = -1.2 - (-0.6) = -0.6% (last 12 mos as of Oct '02: www.boj.or.jp/en/siryo/sk/ske4.pdf)
r + a = -0.6 + 1 = 0.4%
r + g = -3-(-0.6) = -2.4% (www.boj.or.jp/en/siryo/sk/ske4.pdf)
r + m = 2.5 + (-0.6) =1.9% (same real rate assumed for US and Japan)
For the case consistent with US assumptions, we used the following:
Inflation rate = 1.5% (last 12 most as of Dec '02; www.econedlink.org/lessons/index.cfm?lesson=EM222)
r = 3.5 - 1.5 = 2% (1-yr Treasury rate Dec '02; www.federalreserve.gov/releases/h15/data/a/tcm1y.txt)
r + a = 2+ 1 = 3%
r + g = 1% (as per Tom Davidoff)
r + m = 2 + 2.5 = 4.5% (same real rate assumed for US and Japan).

[30] To simplify computations, they assume no closing or servicing costs. Consequently payouts are an upper bound as compared to results with such costs incorporated.

that the 85-year old woman could anticipate. For the US case, the woman would expect an annual real benefit stream of almost $38,000 per year over her remaining lifetime. By contrast, under Japanese assumptions, the woman could anticipate a real flow of $24,300 annually, or one-third less than in the US case. On these grounds, it might be reasonable to conclude that the lump sum approach to reverse mortgages might be more strongly preferred in Japan versus the US, as compared to the annuity approach, since the lump sum offers a relatively larger bite of the home equity value. Nevertheless, it is worth noting that an elderly Japanese woman receiving a real lifetime annuity of over $24,000 would have a replacement rate of almost 60%, assuming average income for retired households [reported in Clark and Mitchell, 2002].

A different way to visualize the output of this model is to graph the expected patterns by age, comparing real home appreciation (or depreciation), and the growth rate of the loan under a reverse mortgage. This is provided in Figure 13, assuming two different scenarios. Panel A posits an 85-year old Japanese female along with all the "Japanese case" assumptions, while Panel B uses female Japanese mortality tables but posits more optimistic assumptions consistent with the "US economic scenario." Results are given for both a lump sum and an annuity payout profile for the reverse mortgage.

Figure 13 here

Both cases assume that the homeowner has initial home equity worth $300,000 and applies for the loan at age 85. Under assumptions relevant to Japan over the last decade, represented in the top panel, the home's value sinks in real terms over time. If the reverse mortgage were taken as a lump sum, the loan would initially be worth about $210,000. If the borrower reached age 90, the cumulative loan plus interest would grow to roughly $231,000, and by age 95, the loan would be worth on the order of $254,000. If, instead, the borrower took an annuity payment option, her loan value would initially be about $24,000, growing to $141,000 conditional on survival to age 90, and to $254,000 by age 95. Under the Japanese economic assumptions the loan balance crosses over, or equals the home equity, at around age 95. It is interesting that the age of crossover is virtually identical for both the lump sum and the annuity payout approach. Of course, the size of the shortfall is higher in the lump sum case than in the annuity case, since the payout is more gradual with the annuity. Further the shortfall rises with

the mortgage loan rate and the annuity interest rate, and falls with the rate of appreciation expected on the home, all else equal.[31]

The second scenario uses Japanese mortality tables but the more optimistic US economic forecasts. Not surprisingly, the projected growth in home equity permits a higher initial lump sum loan, of about $226,000, which grows to $281,000 by age 90, and $350,000 by age 95, conditional on survival. The starting annuity is also higher, almost $30,000 per year, growing to $188,000 and $360 five and ten years out. It is interesting that the crossover age in Scenario A and B are about the same, age 95, despite the different economic assumptions. In other words, RM lenders in the Japan market would worry about "crossover risk" just as in the US. The larger size of the loans under the US assumptions, however, mean that the size of the potential shortfall as modelled here would be greater than under the more conservative Japanese economic assumptions.

Feasibility of Reverse Mortgages in Japan

Inasmuch as the evidence suggests that older Japanese homeowners could substantially enhance their consumption with reverse mortgages, we next explore what factors might facilitate the development of these products in the Japanese context. We identify two types of issues that must be addressed in this discussion, first those having to do with the housing market, and second, those having to do with the financial market more generally.

One serious problem confronting the Japanese housing market, and an issue that especially challenges the RM market, is the low volume of trades in established housing. This is a problem since the development of RMs requires accurate home valuation methodologies and data. Yet information on housing trades in Japan is sparse, partly because few elderly move [Ishikawa and Yajima, 2001]. Some argue that the lack of information regarding housing values and housing trades has directly impeded the development of RMs in Japan [ibid]. Unlike in the US, Japanese realtors appear to provide very little information to the public on housing quality and housing market values. Indeed, outside of commercial property, there appear to be no real estate indexes available.[32] Such information asymmetry makes it extremely difficult for borrowers as well as lenders to develop accurate forecasts of future returns (and volatility) for housing values. Lack

[31] It should be noted that these computations are deterministic so they do not allow for volatility in any of the key rates, nor do we include correlations between the various rates. Studies of the HECM product do make simplifying assumptions about means, standard deviations, and correlations of key variables; see Szymanoski [1994].

of standard property pricing data also deters the development of a secondary market for reverse mortgages, which above we have argued could make much more liquid the market for housing equity.

A related concern is that a well-functioning housing market requires high-quality credit information on potential borrowers, which also may be less widespread in Japan as compared to more financially-integrated economies. For example, US credit bureaus readily provide very low-cost credit ratings to actual and potential customers, whereas in Japan this is not as common. Perhaps the discrepancy may explain why such a high fraction of a home's purchase price is required in Japan as a down payment, typically 30-50% of the purchase price of the property, versus 10% or less in the US. Seko [1994] argues that high down-payment rates result from the Japan Housing Lending Corporation's approach as the main mortgage lender in the country, financed mainly from the postal savings system and mostly dedicated to new homes (fewer than 10% of the loan volume goes to existing homes). Furthermore, home loans from this source total only 30-40% of the house and lot value, another obstacle to building equity in the first place.

Research by Flavin and Yamashita [2002] in the US context demonstrates that high down payments and closing costs constrain the housing market; an international survey by Chiuri and Jappelli [2000] also finds that higher down payments are associated with lower owner-occupancy rates for housing. In practice, high-quality credit information is less valuable in the case of reverse mortgages, since the nonrecourse nature of the home loan means that homeowner credit histories are not as crucial as in the case of regular, forward mortgage. Nevertheless credit histories are being used as an indicator of timeliness in paying hazard insurance bills and a wide variety of other consumer behavior, so an underdeveloped credit market could pose a problem for the growth of the RM market as well.

Even if the supply of reverse mortgages were to be developed in Japan, there remains a question as to whether Japanese elders would demand them. That is, how many would borrow against their housing equity to fund old-age consumption? Some research would imply that there might be little demand, since among households age 65+, almost two-thirds indicate that they intend to leave a bequest, mainly via their house and land and averaging ¥66 M [Tachibanaki, 1994]. On the other hand, one could argue that these expectations will be changing as life

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[32] For more discussion on this point see Nishimura and Shimizu (2003).

expectancies rise and incomes of the elderly are pared down to bring the old-age pension system closer to solvency. Nevertheless tax regulations seem to promote property transfer by bequest rather than sale; thus Noguchi and Poterba [1994] argue that property tax rules plus inheritance tax and the Land Lease Law greatly choke the supply of land and houses in Japan, and may drive the traditional Japanese co-residence tradition where adult children move in with their parents and provide an effective consumption annuity in exchange for the promise of the bequest of the property at the parents' death.

Offsetting these negative concerns are two positive sets of evidence that may indicate the feasibility of Japanese reverse mortgage markets. First, Goetzmann and Spiegel [2000] have recently shown that housing is dominated as an investment asset in most nations, since other assets provide higher returns for lower risk. As a consequence, they recommend that governments everywhere must become far more cautious in encouraging housing investment among the "financially vulnerable," which would presumably include the house-rich, cash-poor elderly. Second, some encouraging evidence is provided by Kase [1994], who explored an actual reverse mortgage program implemented in Musashino City, a suburb of Tokyo, in 1981. This publicly-supported effort provided support services to the elderly in exchange for payment of a monthly bill, or a reimbursement amount taken from the homeowner's equity, where repayment was deferred until the sale of the person's property. The funds plus a 5% annual fixed interest rate could not exceed 80% of the value of the land (the government allocated no value to the building). Though this is clearly an early effort (only 42 people signed up for the reverse mortgage program), it illustrates that there may be some substantial demand on the part of the elderly, and some willingness on the part of governments to provide such products.

The growth and development of reverse mortgage markets in Japan also awaits better ways to forecast expected future home appreciation rates, taking into account adverse selection and/or moral hazard on the part of the borrowers; accurate forecasts of residents' future expected mortality and termination patterns; accurate forecasts of future expected riskless rates, mortgage rates, and annuity rates of return; and accurate forecasts of future tax/transfer policy, which influence the net costs and benefits of the RM options. This information set is clearly substantial though some progress can be made quickly, perhaps in the area of better mortality tables for annuitants as contrasted to population tables [McCarthy and Mitchell, forthcoming].

In the end, jump-starting the RM market in Japan would probably require a central government effort along several lines. Several US institutions are supportive of reverse mortgages including the Federal Housing Administration which has provided federally-backed reinsurance to support lenders that sell reverse mortgage products to the elderly. In addition, Fannie Mae and Freddie Mac have also supported these markets, with Fannie Mae purchasing virtually all the reverse mortgages on offer in the US. Establishing similar institutions in Japan might afford certain advantages, since in the US, these governmentally-backed groups are widely credited with bringing securitization to the housing market [Szymanoski, 1999]. Yet it is unclear whether establishing new institutions such as these in Japan would be politically and economically feasible at present. The Japanese government already faces serious budget constraints, and taking on potentially massive new reinsurance liabilities would be very risky.

Even more politically difficult might be the fact reverse mortgage borrowers would have to have property appraisals conducted and the results provided to possible lenders. In that process, many elderly who had up to then experienced only "latent" capital losses would become aware just how much their properties had lost in value as a result of the decade-long recession. In turn, banks and other mortgage holders would have to recognize that the book value of many of assets had declined precipitously, making their financial condition appear all the more precarious. In other words, making the RM market work in Japan would probably be supportive of other needed financial sector reforms, but these might not necessarily be politically palatable.

Experts see several valuable roles for government in this area. One is in eliminating regulatory and tax barriers limiting the products' development. For example, tax reform and clarification/unification of real estate laws would greatly enhance opportunities for profitability. Another factor that would greatly the operation of the market in Japan would be the building of a market database on housing quality, trades, and prices [Rasmussen et al., 1996; Nishimura and Shimizu, 2003]. In the US case, this was necessary for Lehman Brothers to securitize the entire RM book of business for the Financial Freedom Senior Funding Corporation in 1999 [Rodda et al., 2000]. Another role for government was demonstrated in the US case, where Fannie Mae offers the possibility that at least one investor provides liquidity for banks to take on the reverse mortgages. DiPasquale and Wheaton [1996] note that to launch a secondary market for regular (forward) mortgages in the US, the mortgages had to be "commoditized", or standardized with similar terms. For instance the mortgage had to be 30-year, fixed rate, and self amortizing, and

borrowers had to meet similar qualification standards (i.e. the monthly mortgage payment plus taxes and insurance initially had to be less than 28% of income to qualify for the loan). A parallel structure in Japan might be required to make RMs become feasible for the private lending market.

Conclusions and Implications

Evidence suggests that many older Japanese have quite high levels of home equity, notwithstanding the recent decline in real estate prices in that nation. At the same time, Japanese life expectancy rates are also among the highest in the world. These long life spans, when paired with very low fertility, mean that the Japanese retirement systems face almost certain future insolvency. This report suggests that methods of unlocking home equity in Japan could be developed to boost consumption among the elderly, reduce public pension liability, and mitigate the demand for long term care facilities. Creative ways to finance old-age consumption in Japan, by tapping home equity, might substantially improve retirement security in this rapidly aging country.

Previous literature on asset patterns by age has often overlooked housing wealth as a determinant of retiree wellbeing, particularly in the Japanese context. Here we have collected and analysed a range of international data on housing wealth patterns by age. Evidence from the Japanese National Family Income and Expenditure Survey (NFIES), and other sources, indicates some similarities regarding levels and patterns of home equity by age across countries. There are also many financing mechanisms that could help unlock housing wealth for retirement consumption, and here we focus on the potential implications of Reverse Mortgages (RMs) in a comparative context. Using Japanese and US mortality tables, as well as other economic assumptions, we compute the lump sum values, as well as the real annuity payments, that could be financed under alternative RM schemes in the US and Japan.

Our analysis suggests several conclusions. First, we show that Japan offers an environment conducive to the development, implementation, and encouragement of reverse mortgages. Japanese elderly today command relatively high levels of home equity by international standards. Consequently, this demographic group could expect substantial value from unlocking home equity with a reverse mortgage. In addition, the decline in Japanese fertility over the last 50 years implies that older households will have fewer children, implying

that the elderly may curtail their supply of bequests to the next (smaller) generation. This should make it easier for the elderly to unlock home equity for consumption purposes during their lifetimes.

A second conclusion is that the use of reverse mortgages could alleviate some of the financial strain that population aging imposes on the Japanese economy and budget. Old-age pensions already face insolvency, and the new Japanese long-term care program portends additional budgetary pressures. Retirement incomes are typically below labor earnings in Japan, and stringencies imposed by financing problems are further depressing the benefit replacement rate that can be financed by the PAYGO social security system. This too is likely to have a positive impact on the demand for RMs.

Despite long Japanese life expectancy and less than robust economic conditions, we also conclude that Japanese elderly could experience a large income increase from a reverse annuity if it were paid out in a lump sum, or in the form of an annual income stream until death. Replacement rates might be boosted substantially with the development of a RM market that permitted older Japanese to finance consumption using their home equity.

Policymakers wanting to establish a market for reverse mortgages in Japan would have to mitigate several factors that appear to impede the development of such products. For one, tax and regulatory obstacles would need to be removed to support these financial arrangements. Exempting reverse mortgages from capital gains and transactions taxes would certainly make these financial products more appealing. Another area requiring attention has to do with the tax treatment of income from reverse mortgages: for instance, making annuity income flows from RMs tax exempt would likely enhance their appeal to the elderly. Tax policy is also crucial to lenders, who would be more likely to find the market viable if regulations permitted them to deduct interest payments accumulating on RMs but not payable until the sale of the house. The precise pattern of tax rules surrounding RMs would have to be considered in the context of the broader prevailing tax regime.

To help the elderly unlock their home equity, it would also be critical for Japan to develop a clear and transparent legal framework for reverse mortgage contracts. The borrower and the lender must understand clearly the obligations each takes on when making the deal, and each must have legal recourse in the event of fraud or misbehavior. For instance, US lenders are forced to content with real estate and insurance laws that differ across the 50 US states, making it

impossible to have a standard, nationally enforceable, RM contract. This complexity undermines the potential for scale economies and standardization on the part of the lenders, and it also makes it difficult to educate potential borrowers about the nature of the products. Undue complexity also gives rise to potential conflicts of interest between lenders and borrowers, once an individual loan has reached the crossover point.

Japanese housing markets would also need to be modernized in several ways if RMs are to function effectively in this nation. Enhanced information flows would be needed regarding sale prices and characteristics of both new and existing residential property.[33] This would permit the securitization of housing loans and lines of credit, both of which we have argued make home equity accessible to older persons. Establishing reinsurance mechanisms would also encourage lenders to offer these products while offering them some protection against crossover risk. In the US case, the federal government has played a key role in the development of standardized price and housing quality data via the two housing loan authorities, Fannie Mae and Freddie Mac. To develop the basic information required for securitization in Japan's housing market, it would likely be necessary to have the federal government jump-start the process with a similar set of institutions. Transactions costs and servicing costs would also have to be kept down by competition and enhanced market fluidity, ideally to below rates currently charged in the US (e.g. 6% of the initial loan value in the case of a lump sum loan.)

Policies supportive of RM markets would also include changes in other financial sectors complementary to the RM market. For example, strengthening the life insurance sector would make more appealing the sale of lifelong annuity streams, a key piece of the annuity-oriented version of the RM structure. Having a strong long-term bond market is also critical to the development of RM loans, since lenders would need to borrow long-term in order to pay out the lump sums and annual income flows needed by the elderly who wish to unlock their home equity. The recent move by the US federal government to offer inflation-protected bonds is a key element in a long-term commitment to help preserve consumption streams of the elderly.

Implementing a program of RMs would be a fruitful means of helping the elderly finance their consumption in Japan, a particularly valuable development against the backdrop of financial stringencies facing the government. Of course additional modelling would be helpful,

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[33] Nishimura and Shimuzu (2003) discuss information shortfalls in the Japanese property market.

in order to develop a clearer idea of potential costs and benefits in the Japanese context. For example, our model along with others in the RM literature assumes a deterministic interest rate process; additional research is required incorporating sources of volatility and correlation across assets and liabilities. Our model also assumes no transaction costs, or conversely, that homeowners have substantial net equity after accounting for these costs; additional research would be useful on the likely level of such costs in Japan. Additional analysis would also be required to determine the value of lender insurance required in the Japanese context. Demand for such insurance will be greater when residential housing values are declining, and interest rates are low, which is apparently true for Japan in the near term. Further research would also be useful in exploring alternative ways to structure RM payments so as to make the products more appealing to borrowers, and how these might vary with key parameters of interest.

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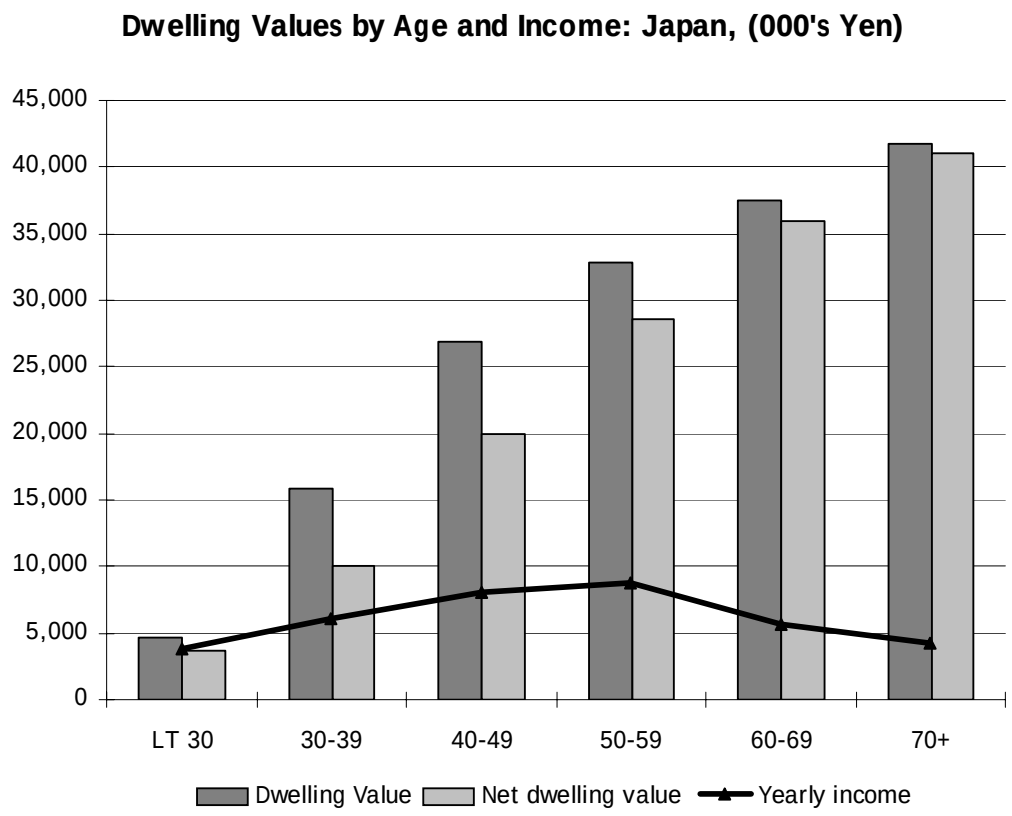
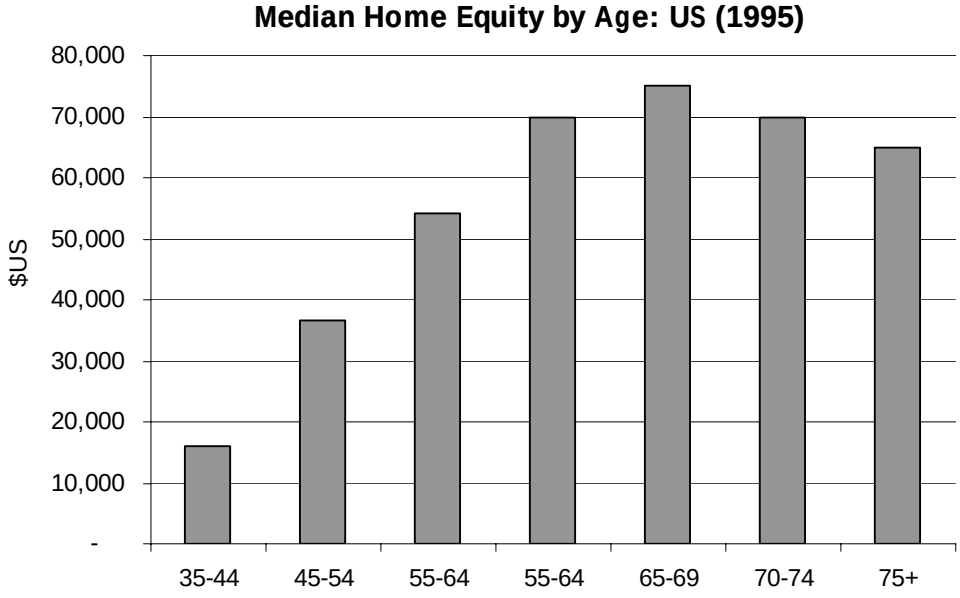
Figure 1



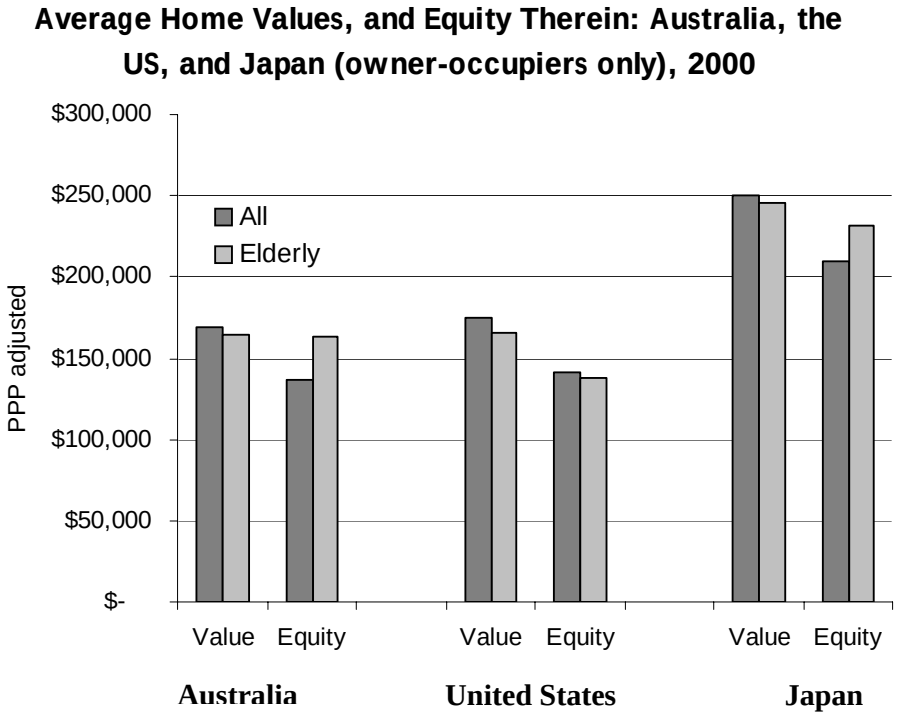
Source: *NSFIES 1999, Table 21, www.stat.go.jp/data/zensho/1999/z*

Figure 2



Sources*: US Census Bureau, Asset Ownership of Households, 1995, www.census.gov/hhes/www/wealth/1995/wlth95-1.html*

Figure 3



Sources: *ABS (1999), Australian Housing Survey; Rand Corporation (1998), Health and Retirement Survey, Wave 5; Economagic (online resource); World Bank (2002), World Development Indicators, Table 5.6*

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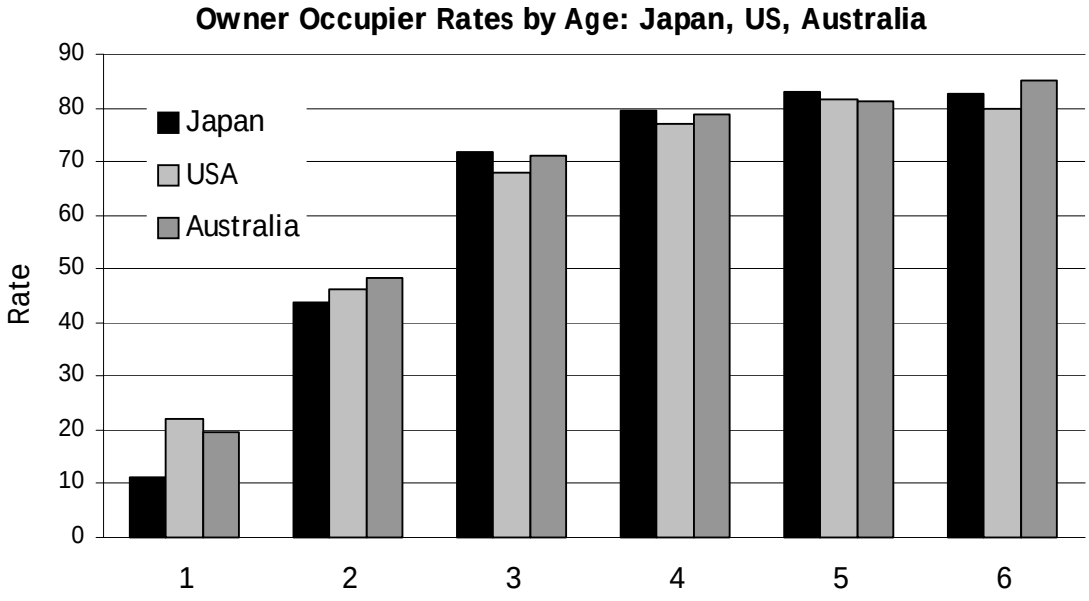
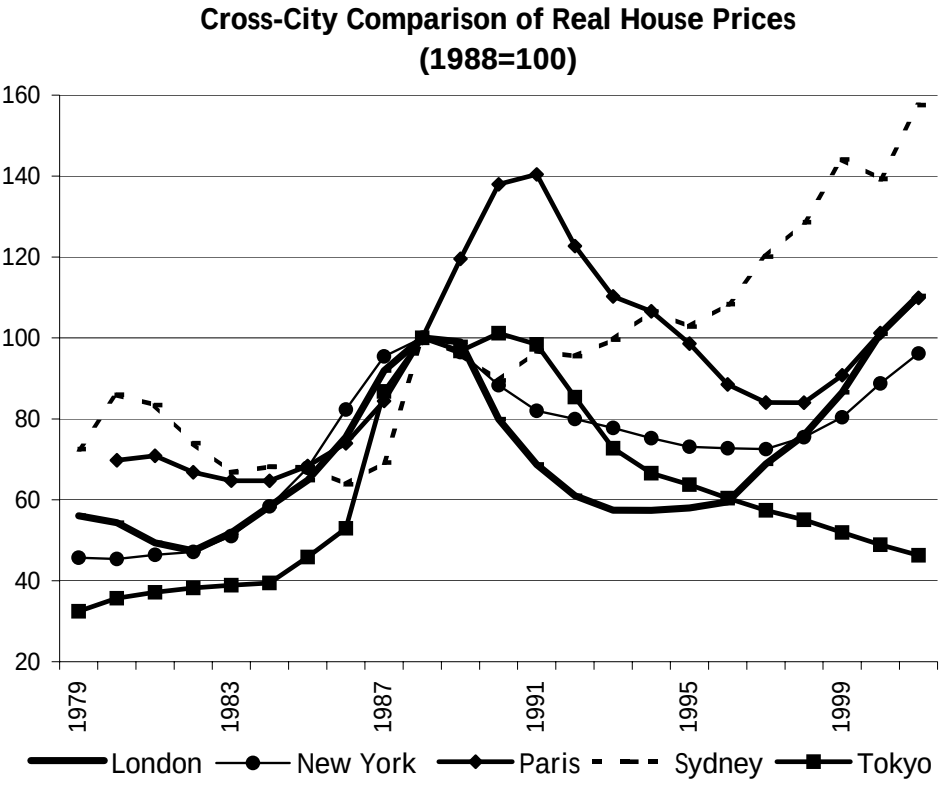
Figure 4



* Cohort	1	2	3	4	5	6
Japan 1999	< 30 yrs	30-39 yrs	40-49 yrs	50-59 yrs	60-69 yrs	70 yrs +
USA 2001	< 25 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65 yrs +
Australia 1998-99	< 25 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65 yrs +

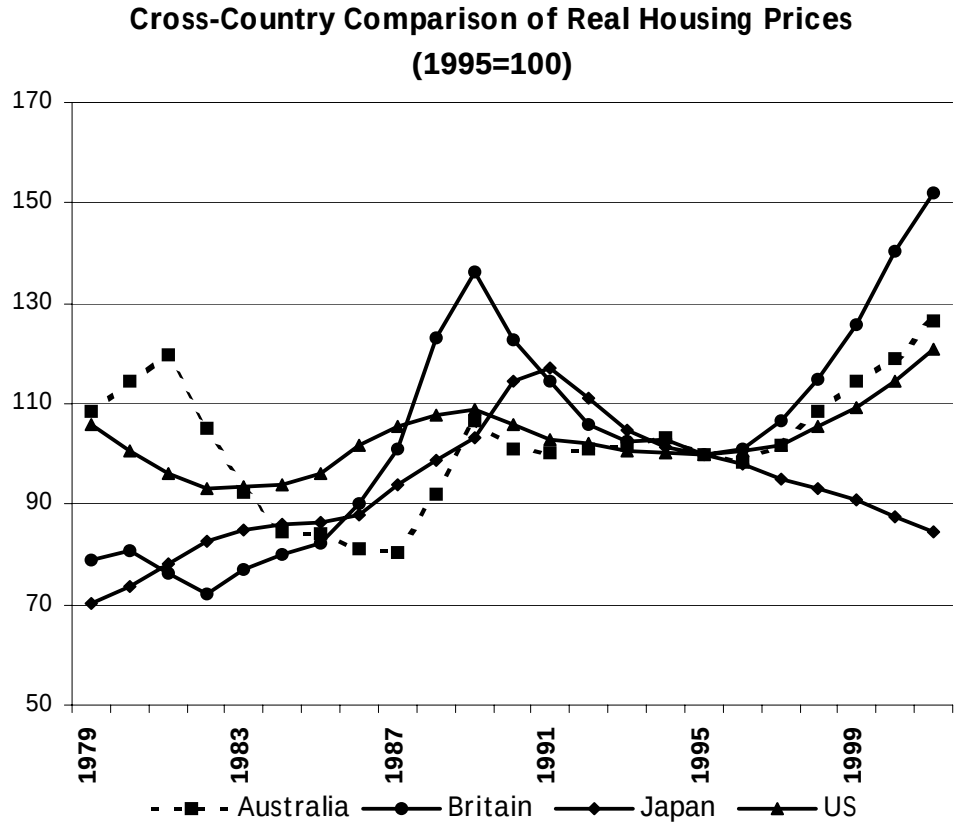
Sources: *US Census Bureau, Housing Vacancy Survey, Q2, 2002, Statistics Bureau & Statistics Center, HOUSING OF JAPAN, Management & Coordination Agency (May, 2000), Household Expenditure Survey Australia 1998-1999*

Figure 5



Sources: *Authors' computations using data provided by the* Economist *magazine*

Figure 6



Sources: *Authors' computations using data provided by the* Economist *magazine*

Figure 7

Housing Status Change at Death of Spouse				
	Women		Men	
Yrs Since Death of Spouse	Fraction Owning	Average Dwelling Value (USD)	Fraction Owning	Average Dwelling Value (USD)
-4	0.78	37,775	0.85	40,728
-3	0.77	38,061	0.85	39,668
-2	0.79	37,531	0.84	42,827
-1	0.76	40,281	0.80	40,592
0	0.76	37,952	0.79	41,763
1	0.72	36,511	0.77	43,257
2	0.71	34,549	0.71	38,407
3	0.68	34,098	0.76	39,184
4	0.64	32,733	0.75	38,059

Source: *Sheiner & Weil, NBER WP 4115, July 1992*

Figure 8

Change in Ownership Status Among the Elderly				
	Women		Men	
Age in 1988	Owner-Occupier Rate in 1983	Change in Ownership 1983-1988	Owner-Occupier Rate in 1983	Change in Ownership 1983-1988
60-64	0.80	-0.02	0.82	-0.01
65-69	0.78	-0.01	0.82	0.00
70-74	0.74	-0.05	0.81	0.00
75-79	0.67	-0.02	0.79	-0.01
80-84	0.63	-0.07	0.79	-0.08
85-89	0.53	-0.05	0.73	-0.09

Source: *Sheiner & Weil, NBER WP 4115, July 1992*

Figure 9

Moving Rates of Owner Households Age 65 and Over		
	Japan (1998)	US (1997)
Owner households who moved	0.72%	2.9%
- to another owner-occupied home	0.45%	1.67%
- to a rented home	0.26%	1.22%
Renter households who moved	3.75%	8.16%
Source: *Ishikawa and Yajima (2001)*		

Figure 10

Reverse Mortgage Lump Sum or Monthly Payment (for tenure in home), by Age and Home Value: US HECM and Homekeeper Loans

	Lump Sums		*Monthly*	
$100,000	HECM	HomeKeeper	HECM	HomeKeeper
65	$52,774	$14,128	$303	$111
70	57,224	26,660	345	193
75	62,064	34,764	402	301
80	67,125	43,262	482	385
85	72,250	52,481	610	511
90	77,296	58,397	858	586

	Lump Sums		*Monthly*	
$300,000	HECM	HomeKeeper	HECM	HomeKeeper
65	$155,617	$51,238	$893	$402
70	167,438	89,478	1,010	647
75	180,176	112,428	1,166	973
80	193,309	137,728	1,389	1,226
85	206,332	164,803	1,743	1,605
90	218,749	182,373	2,427	1,829

Source: www.rmaarp.com, viewed January 15, 2003 for zip 19004. Interest rate and closing costs assumed by calculator, based on 1-year Treasury bill returns for the week of January 13, 2003, plus servicing costs.

Figure 11

Reverse Mortgages: Uncertainty of Interest Rate

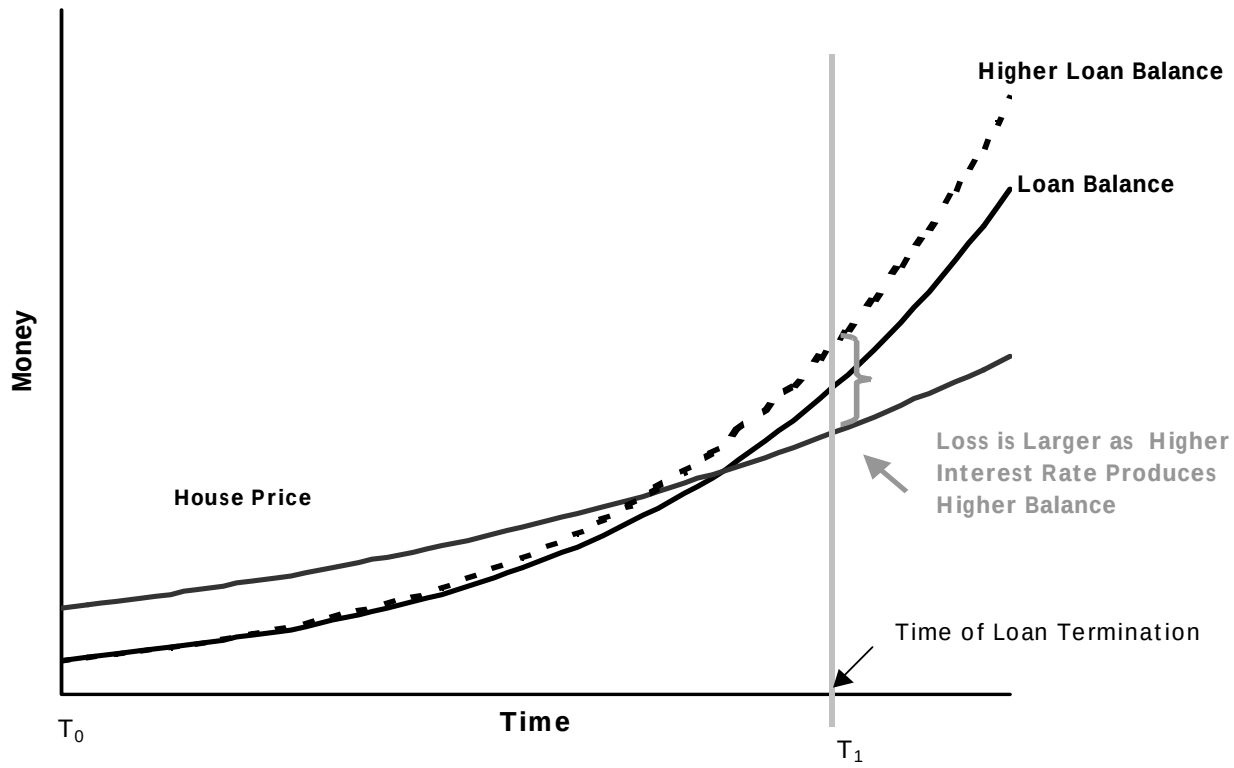


Figure 12

Illustrative Reverse Mortgage Payout Comparisons for US and Japan

		Value of Home Equity			
		US		Japan	
Payment Option	Age	$100K	$300K	$100K	$300K
I. Lump Sum	65	53,635	160,905	39,871	119,613
	75	66,623	199,869	54,579	163,737
	85	79,281	237,843	70,078	210,234
II. Real Annuity	65	3,713	11,139	1,807	5,421
	75	6,489	19,467	3,711	11,133
	85	12,584	37,752	8,087	24,261

Note: Authors' computations assume initial home equity set (respectively) of $100,000 and $300,000 for loan taken out by female at given age, surviving according to (respectively) Japanese or US population tables.

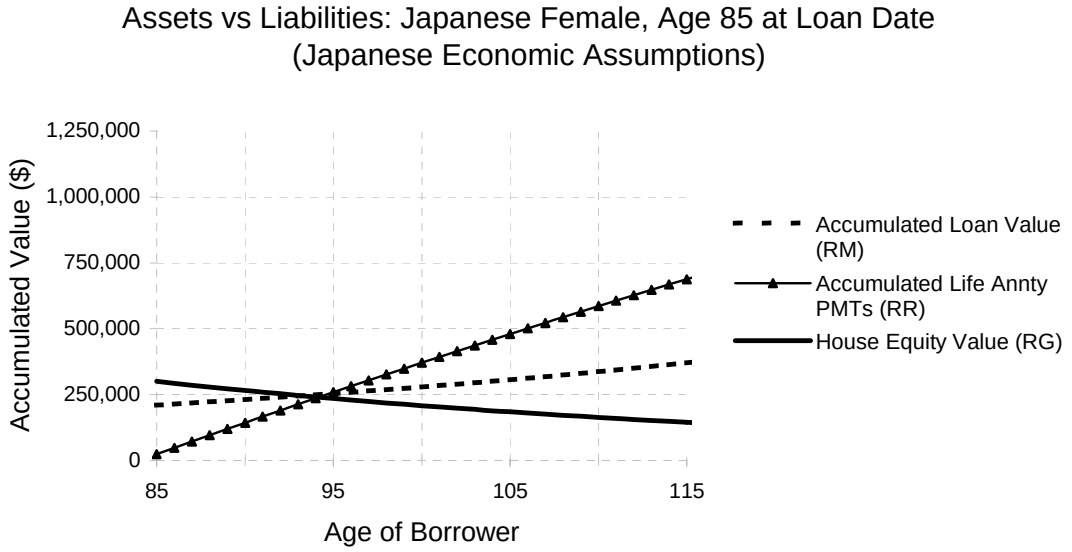
A. US economic assumptions:
Risk-free real rate (r) = 2.0%;
Real home equity growth rate (r+g) = 1.0%;
Real mortgage rate (r+m) = 4.5%;
Real AIR for annuity (r+a) = 3.0%

B. Japan economic assumptions:
Risk-free real rate (r) = -0.6%;
Real home equity growth rate (r+g) = -2.4%;
Real mortgage rate (r+m) = 1.9%;
Real AIR for annuity (r+a) = 0.4%

Figure 13

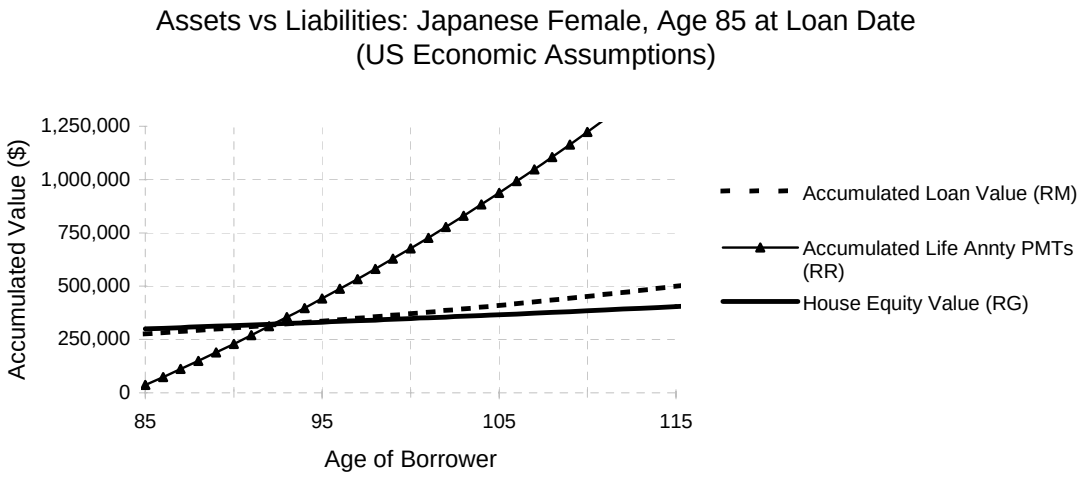
Lifetime Profile of Assets vs Liabilities in a Reverse Mortgage Setting: Two Alternative Scenarios, Assuming Borrower with $300,000 in home equity

Scenario A: 85-year old Japanese Female at Loan Date and Japanese Economic Assumptions



Notes: The following economic assumptions were employed:
Inflation rate = -0.6% annually ('01 estimate; www.cia.gov/cia/publications/factbook/fields/2092.html)
r = -1.2 - (-0.6) = -0.6% (last 12 mos as of Oct '02: www.boj.or.jp/en/siryo/sk/ske4.pdf)
r + a = -0.6 + 1 = 0.4%
r + g = -3-(-0.6) = -2.4% (www.boj.or.jp/en/siryo/sk/ske4.pdf)
r + m = 2.5 + (-0.6) =1.9%

Scenario B: 85-year old Japanese Female at Loan Date and US Economic Assumptions



Notes: The following economic assumptions were employed:
Inflation rate = 1.5% (last 12 most as of Dec '02; www.econedlink.org/lessons/index.cfm?lesson=EM222)
r = 3.5 - 1.5 = 2% (1-yr Treasury rate Dec '02; www.federalreserve.gov/releases/h15/data/a/tcm1y.txt)
r + a = 2 + 1 = 3%
r + g = 1%
r + m = 2 + 2.5 = 4.5%