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Asset-Rich and Cash-Poor: Which Older Adults Value Reverse Mortgages?

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Introduction

In most developed nations, older persons tend to have home equity even if they have few liquid assets. Reverse mortgage programs enable older homeowners to unlock and consume a portion of their home equity without the need to leave their homes. With a reverse mortgage, the homeowner borrows from a lender using the property as collateral. Borrowers may elect to take the funds as a lump sum, a line of credit, or as structured monthly payments. The loan is then repaid with interest, usually on death, from the sale proceeds of the property. This is particularly important given older adults' strong attachment to their homes, as well as their desire to age-in-place if they can (Jacobs, 1986). In view of the fact that older homeowners can use the money to supplement retirement consumption, it is surprising that reverse mortgage markets have been slow to develop globally.

Prior studies have documented underdeveloped reverse mortgage markets in Australia, Italy, the Netherlands, Singapore, and the US (Phang, 2015; Fornero, Rossi, & Brancati, 2016; Davidoff, Gerhard, & Post, 2017; Dillingh, Prast, Rossi, & Brancati, 2017; Jefferson, Austen, Ong, Haffner, & Wood, 2017). Several reasons have been offered for the product's slow growth including high transaction costs (Mitchell & Piggott, 2004); precautionary savings needs (Nakajima & Telyukova, 2017); and volatile house prices (Chen & Yang, 2018). Consumer preferences also play a role since some older adults perceive housing equity as a financial buffer against adversity, and so they are reluctant to exploit this asset unless in crisis (Gibler & Rabianski, 1993; Morgan, Megbolugbe, & Rasmussen, 1996; Leviton, 2002).

The complexity of reverse mortgages also makes them less appealing to financially illiterate consumers. For example, Davidoff et al. (2017) found that older US homeowners have limited understanding of Home Equity Conversion Mortgages contract terms. Some knowledgeable homeowners expressed greater interest in using the product, implying that reverse mortgage take-up rates could be boosted via consumer education and by simplifying product explanations. In the Asian context, Merton and Lai (2016) argued that reverse mortgages could be marketed more effectively and efficiently to both retirees and their beneficiaries. A study of urban Chinese homeowners age 45-65 found that interest in reverse mortgages was positively associated with product understanding: 89% of the homeowners found reverse mortgages interesting after reading a numerical description of a hypothetical product (Hanewald, Bateman, Fang, & Wu 2020).

Singapore has one of the highest homeownership rates among developed economies, with homeownership at or above 90% since the 1990s (SDOS, 2019). Yet few older Singaporean households access their home equity, leaving them 'asset-rich but cash-poor' in retirement (McCarthy, Mitchell, & Piggott, 2002; Phang, 2018). This reality has prompted some analysts to explore the dynamics of the reverse mortgage market, though most prior work has approached the analysis exclusively from the supply side (Phang, 2015, 2018; Chia & Tsui, 2009; Doling & Ronald, 2012). For example, Phang (2015, 2018) highlighted that the products offered by private lenders were complex and had 'retiree-unfriendly' design features (e.g. eligibility age of 70, 50-year minimum remaining lease on the property, etc.). With such stringent conditions imposed by financial institutions, the pool of housing units available for reverse mortgages is drastically reduced. Here, by contrast, we explore the demand side for reverse mortgages.

The purpose of our study was to examine the demand for reverse mortgages among homeowners age 50+ in Singapore along two dimensions. First, we estimated the *potential* interest in reverse mortgages by studying the wealth composition of older homeowners. This contextualizes how important housing equity is to the average older Singaporean, and it underscores the 'asset-rich and cash-poor' conclusion. Second, we drew on a module we designed to gain insights into the *actual* interest levels in reverse mortgages. We also assessed the factors that independently influence consumers' preferences in reverse mortgages, focusing on the potential effects of poor product understanding and lack of product awareness.

Background

National housing policy in Singapore

Singapore is a land-scare country with a large public housing program known as the Housing Development Board (HDB). Unlike public housing meant for lower-income households in other countries, HDB housing provides options for a range of socio-economic classes. Over 80% of the total population lives in HDB housing (HDB, 2018), most of which consists of high-rise flats on state-owned land; these are planned, built, and allocated by the government. They are located in high-density housing estates which are self-contained satellite towns with schools, supermarkets, clinics, food centres, as well as recreational facilities. HDB homeowners are typically granted ownership rights for 99 years under a leasehold system that allows land to be recycled over time (HDB 2019*a*). Private housing in Singapore accounts for about 20% of the total

housing stock and, subject to certain conditions, HDB homeowners may invest in private properties (Phang, 2018). Over the past several decades, both public and private housing prices have experienced significant appreciation (Chia, Li, & Tang, 2017).

Since 1968, households may make pre-retirement withdrawals from their pension accounts to finance home purchases. Public and private home purchases can be financed through the Central Provident Fund (CPF), a mandatory defined-contribution scheme with national coverage. Plan participants contribute as much as 37% of their monthly wages to individual accounts, and part of these savings can be used as a down-payment for a house and to service subsequent mortgage payments subject to certain withdrawal thresholds (CPFB, 2019). The government also provides eligible public housing buyers with subsidies. Homeownership is believed to have generated positive externalities, public spiritedness, a sense of belonging, and 'good social behavior' (Low & Aw, 1997). It also allowed Singaporeans to share in the economic success of the country as property values appreciated. Nevertheless, as Singapore's population ages, a dilemma confronting policymakers is how to help older adults convert their housing assets into retirement income streams.

Reverse mortgage market evolution

Commercial reverse mortgages in Singapore were first offered by a local insurance co-operative (NTUC Income) in 1997. The program targeted private homeowners age 70-90 without property loans. By 2006, NTUC Income had issued around 350 reverse mortgage loans for private properties. In the same year, the government permitted HDB homeowners to take up reverse mortgages, following which NTUC Income extended reverse mortgages to this segment of homeowners. OCBC Bank – one of the big three commercial banks – also entered the market. Nevertheless, only 24 HDB homeowners took up reverse mortgages between 2006 and 2009, and thereafter the sale of reverse mortgages was discontinued due to lack of demand. In 2014, NTUC Income was servicing only 38 private properties and 10 HDB reverse mortgages (The Straits Times 2014).

One supply-side explanation offered for the failure of the Singaporean reverse mortgage market pertained to a contract feature which capped the maximum loan at 70% of the property's prevailing value throughout the tenure of the loan. If house prices were to decline, resulting in the loan breaching the cap, the lender would stop paying the borrower and take steps to recover the

loan. This tail risk became apparent to the public in 2009, when a couple sued NTUC Income alleging wrongful seizure and sale of their property (The Business Times, 2009). The couple had entered into a reverse mortgage contract in 1997 when their home was valued at over S$2 million. By 2004, however, the house value had fallen to S$1.1 million, and the borrowers were informed they needed to make cash repayments to bring down the loan to value ratio. By 2006, the borrowers' outstanding balance had grown to over S$1 million, whereapon NTUC Income repossessed and sold the property for just over $1 million. The couple was then asked to pay the alleged shortfall of S$55,000. While the case was eventually settled out of court, the negative publicity and the fact that the commercial product permitted recourse to the lender is believed to have contributed to the early demise of the reverse mortgage market in Singapore.

Methods

Data and sample

Our data are from the Singapore Life Panel (SLP)®, an ongoing high-frequency internet survey administered for a representative cohort of age-eligible Singaporean citizens and permanent residents age 50-70 when first recruited in 2015 by the Singapore Management University. The survey includes many globally-harmonized questions on respondents' consumption, health, employment, socioeconomic status, retirement expectations, and social networks. After the baseline interview where 15,212 persons were surveyed, monthly response rates have remained at around 70% (Vaithianathan, Hool, Hurd, & Rohwedder, 2018). Monthly interviews track individual and household circumstances longitudinally. Our analysis used data from the 2018 SLP®, including a special module on reverse mortgages that we developed. This module assessed older adults' interest and preferences pertaining to reverse mortgages, as well as their levels of product understanding and awareness; a detailed description of the survey is provided below.

Our full study sample comprised 6,814 subjects age 50+ who responded to the special module on reverse mortgages and who also had complete asset and wealth information. We identified homeowners as persons who responded "Yes, fully or partly own" to this question: "Do you [and/or your spouse] own or partly own the house, flat or apartment in which you live?" There were 6,258 (91.8%) homeowners and 556 (8.2%) non-homeowners, for a homeownership rate of 91.8%, in line with the aggregate homeownership rate for Singapore. Because homeownership is

a pre-requisite for reverse mortgages, we restricted our working sample to the subset of older homeowners (*N*= 6,258).

Wealth measures

To evaluate the potential demand for reverse mortgages, we computed each household's net housing wealth as a share of total net worth. Net housing wealth was operationalized as the current market value of all residential properties less outstanding mortgage debt (if any), reported by respondents. This included the value of the individual's primary and any secondary residences, and consistent with prior studies (e.g. Wind & Dewilde, 2018). Four separate wealth components were summed to obtain net non-housing wealth, as follows:

(i) Net financial wealth, including checking/saving balances, investments, and insurance holdings, less outstanding debt not related to housing;

(ii) Non-financial assets, including business assets, and motor vehicles;

(iii) CPF pension wealth; and

(iv) Non-CPF pension wealth (e.g. personal or employer-provided pension plans).

Household total net worth was the sum of net housing and net non-housing wealth.

Reverse mortgage survey

Our reverse mortgage questionnaire design drew on recent research by Hanewald, Bateman, Fang & Wu (2020) who surveyed urban Chinese on a similar topic. That study explored whether interest in commercial reverse mortgages differed between 1,100 older homeowners and 1,100 adult children, asking the latter whether they would recommend the product to their parents. Of note in that study was the use of a format where respondents were first presented with description of a hypothetical reverse mortgage. The aim was to address the unfamiliarity that most people have with reverse mortgages, and to avoid any (positive or negative) connection with any existing products already offered in the market, the product was simply named 'product ABC'. Next participants were shown a numerical example illustrating how product ABC worked Survey participants then rated their understanding of and interest in product ABC.

We followed this a similar format in our questionnaire design (see the Supplementary Material for question wordings). First we qualitatively described a hypothetical reverse mortgage product named 'product ABC' offered by a large local bank in Singapore. Similar to previous

products offered in the market, the payouts could be in the form of an upfront lump-sum payment, monthly payments for life, or some other arrangement (e.g. for a fixed period of months). We also stated that no taxes would be related to the equity extraction due to the product. Second we showed how product ABC worked using the example of a married couple who owned a property worth S$400,000 in Singapore. The property price of S$400,000 assumed in the example reflects the average home value of public housing in Singapore, and it is fairly close to the median net housing wealth observed among our respondents. We also included relevant information on the interest rate used for valuation, payout structure, and different debt repayment scenarios should the homeowners pass away.

Responses to three main questions were collated:

(1) "Hypothetically, would you be interested in such products if they were available in Singapore? (Yes/No)"

(2) "Have you ever heard of such a product? (Yes/No)"

(3) "How do you rate your understanding of product ABC? (5=completely clear, 4=mostly clear, 3=generally clear, 2=mostly confusing, 1=completely confusing)"

Question (1) sought to measure the older homeowners' interest in reverse mortgages. Responses to this question were binary and used as the outcome variable in our regression models. Questions (2) and (3) measured product awareness and understanding, respectively, and were used as explanatory variables in our regressions. On the basis of previous studies revealing consumer difficulties in understanding financial products generating retirement income, it was anticipated that product awareness and understanding would be low, possibly dampening interest in reverse mortgages. Follow-up questions were also asked based on responses to (1). If respondents answered "Yes," we asked them to indicate how they would use the funds. If respondents answered "No," we asked them to indicate why.

Statistical analysis and covariates

We implemented two probit regression models to evaluate factors that could independently influence consumer interest in reverse mortgages. Aside from product awareness and product understanding, Model 1 included a standard set of socio-demographic factors and factors pertinent to financial decision-making: sex, marital status, age groups, education, currently working, income, net non-housing wealth, financial literacy, manage household finance, financially

prepared in retirement, financial risk tolerance, and financial planning horizon. Respondent age groups were 50-54, 55-59, 60-64, 65-69, and 70+, while categories for education were: less than secondary, secondary, and post-secondary. Self-rated product understanding (range 1-5) and financial literacy score (range 0-3) were coded as continuous variables. The latter is based on the "Big Three" financial literacy questions testing key concepts on numeracy, inflation, and risk diversification used to measure financial knowledge in over 20 countries (Lusardi & Mitchell, 2008, 2011). Annual income and net non-housing wealth were represented in logs. Separate indicator variables were constructed for all remaining variables.

Model 2 added controls for property type (value of the primary residence in logs; have mortgage; rented out residence; have secondary property), health (fair/poor self-rated health; ever have a chronic condition; likely to live past age 75), and family networks (number of living children; bequest to children/family). We sought to determine whether a fuller specification improve model fit, and whether the relationship between interest in reverse mortgages and product awareness/understanding changed in the presence of additional confounding factors. The binary variable for "likely to live past age 75" is set to 1 for persons age 75+ (less than 1.5%). For persons below age 75, we used responses to the question "What is the percent chance that you will live to be 75 or more?" where the binary variable is coded 1 if the respondent stated a percentage greater than 50, 0 otherwise. All statistical analyses were carried out using STATA version 16.0 (StataCorp, College Station, TX, USA).

Results

Sample characteristics of older homeowners

Table 1 reports descriptive statistics of the sampled older homeowners, whose average age was 61.9 and just over half (51%) were female. About 83% were married and 39% had post-secondary education (> 10 years of schooling). The mean financial literacy index score was 2.1 with a standard deviation of 0.9, implying that older Singaporeans averaged two of three correct answers to the "Big Three" questions fielded. Some 85% reported that they managed their household's finances, 15% had high financial risk tolerance, and 42% had a long-term financial horizon. About 44% said they were financially prepared for retirement. Three-fifths of the older adults were currently working, and about 20% were fully retired. Annual income averaged S$58,487 (US$40,940; exchange rate S$1=USD$0.70) and mean net non-housing wealth was

S$529,000 (US$370,300). Although 63% stated that they ever had a chronic condition, only about one-third (37%) rated their health as fair or poor. Subjects had two living children on average, and 96% stated they intended to leave a bequest to their family members.

[Table 1 here]

The net mean value of primary residences held was approximately S$699,000 (with a median of $450,000). Since respondents were past their 50's, their homes were mostly paid off: the mean mortgage value was S$29,000, and only 18% still held a mortgage on their primary residences. Some 8.6% of the sample reported owning one or more secondary properties, and in this subset, the net value of the secondary property (or properties) averaged about $1.26 million. In the Singaporean context, the higher net value of the secondary property as compared to the primary residence is unsurprising. Many people purchase HDB flats as their first home, and if they can afford it, will later purchase condominiums sold by private developers as a secondary property for investment and rental.

Share of housing wealth among older households

The importance of housing equity as a share of total net worth among the older homeowners is shown in Table 2. For an average (or mean) household, housing wealth (inclusive of primary and secondary residences) accounted for about 60% of net worth in 2018. Based on our estimates, even if the value of secondary residence(s) was excluded, housing wealth still accounted for a substantial share (52%) of total net worth for a typical homeowner. This is partly because less than 10% of our sample reported owning secondary properties. In comparison to housing wealth, the other components constituted a much smaller proportion of total net worth. On average, an older homeowner held only 15% of wealth in financial assets, 3% in non-financial assets, 21% in CPF pension savings, and 2% in non-CPF pension savings in 2018. Wealth composition was broadly similar for the mean and the median household.

[Table 2 here]

This distributional analysis confirms that older Singaporean homeowners are indeed 'asset-rich and cash-poor'. Although total net worth for our homeowners age 50+ averaged S$1,307,000, some three-fifths of this wealth was locked up in housing, most of it in owner-occupied homes. The bottom panel of Table 2 provides further insights by ranking respondents based on total net wealth, where we see that even older adults with lower accumulated net worth still held substantial

housing assets. For example, persons at the 30th percentile held $350,000 in housing wealth despite having just $10,000 in net financial assets. Those at the 50th percentile of the wealth distribution had about $450,000 in net housing wealth, about nine times what they had in net financial assets ($50,000). Individuals at the 70th percentile had about $600,000 in net housing wealth, almost four times their net financial assets.

Product interest, awareness, and understanding

Table 3 summarizes participants' responses to the three key questions posed in our reverse mortgage module. Interestingly, only one-quarter (26%) of the older homeowners indicated that they were interested in reverse mortgages. The remaining three-quarters of the sample were uninterested, even if only hypothetically. As a follow-up question, those interested in reverse mortgages were asked how they would use the borrowed funds, by having them allocate 100 points across seven different (randomized) options (listed in Table 3). A large majority (76%) of the interested respondents stated that the payments from reverse mortgage would be used to support themselves if they lived longer than average in retirement. Only one in 10 reported that they would use the funds to cover expenses in retirement (presumably for medical expenses or aged care), while 8.7% intended to deploy the funds to support their spouse/partner in old age. A small minority indicated that the funds would be channeled to supporting children and/or grandchildren (2.8%) or siblings (0.2%).

[Table 3 here]

Two additional aspects of interest are product awareness and self-rated product understanding. Fewer than one-quarter (22%) of older homeowners surveyed had ever heard of reverse mortgages (Table 3). This is somewhat surprising, considering that Singapore boosts an educated populace; for example, four of five respondents in our sample had at least 10 years of schooling. Over two-thirds (69%) stated that they had at least a generally clear understanding of product ABC (13% were completely clear, 13% mostly clear, and 43% generally clear), while 32% were mostly or completely confused. In other words, a majority of the sample deemed the contract terms of product ABC as relatively clear. Despite this, however, only one-quarter of the older homeowners indicated interest in reverse mortgages.

Figure 1 provides insight into why some older Singaporean homeowners are uninterested in commercial reverse mortgages. Among respondents who answered "No" to 'whether

interested,' a sizeable proportion (19.6%) stated that they want to have as little debt as possible. Many older persons (19.5%) also wished to leave their properties to children and family members; additionally, 13.8% stated that they did not need the extra income from housing monetization; and 13.4% felt that reverse mortgages were too complex. Finally, 7.4% of those uninterested in reverse mortgages emphasized their emotional attachment to their homes. and 10.0% said they did not trust the provider (being an unnamed large local bank in Singapore in our example).

[Figure 1 here]

Regression results

Table 4 presents estimated marginal effects from multivariate probit regressions of the probability that a respondent indicated 'interest in' reverse mortgage product ABC. In Model 1, significant associations were identified between the outcome variable and product awareness, product understanding, currently working, financial literacy, financially prepared in retirement, income, as well as respondent age group. Importantly, product awareness and understanding both significantly increased consumers' interest in reverse mortgages. Older homeowners who had heard of reverse mortgages were about 3.2% ($p<.05$) more likely to favor such products, as were those with higher self-rated understanding of product ABC's contract terms described in the survey (11.4%; $p<.01$). Respondents age 60+ were significantly less interested in reverse mortgages, compared to those age 55-59 ($p<.01$). As expected, individuals who felt they were financially prepared for retirement, or having higher income, were less likely to be interested in such products compared to their counterparts ($p<.01$). Though currently working and financial literacy were positively linked with the outcome, the effects were relatively weak ($p<.10$).

[Table 4 here]

The second column of Table 4 provides estimates obtained from an extended model, which had a slightly better fit as indicated by the small reduction of the Bayesian information criterion (BIC) statistic. Overall, the significant effects of product awareness, product understanding, financial literacy, financially prepared in retirement, income, and respondent age group remain relatively similar to Model 1 though the effects of currently working became nonsignificant. We found that certain aspects of property and familial characteristics independently influenced consumers' interest in reverse mortgages. Specifically, homeowners who had not fully paid off their mortgage loans were 4.6% ($p<.01$) more likely to find reverse mortgages attractive. Older

adults with more living children were significantly less likely to demand such products (2.4%; $p<.01$), and those with higher-value homes were also less inclined to take up reverse mortgages ($p<.10$).

Discussion

Reverse mortgages are useful financial instruments that can release housing equity to help finance retirement. Cash-poor but house-rich older homeowners may find such products valuable in helping them liquidate their housing assets while continuing to age-in-place. The "puzzle" is why there has been modest uptake of such products in several developed countries including Singapore, where reverse mortgages were available and aggregate homeownership rates are high. This article examined the potential and actual demand for reverse mortgages in a nationally representative sample of older homeowners in Singapore, and it also investigated whether the lack of product awareness and poor product understanding negatively influenced consumers' preferences.

Unlike in the US, where housing assets generally rank after Social Security wealth for older households (Jacobs, 1986; Morgan et al., 1996), housing assets are by far the most important component of personal wealth for the average older Singaporean household. Nevertheless, we found little potential enthusiasm regarding reverse mortgages among older Singaporean homeowners: only one in four indicated interest in reverse mortgages, and the funds that could be released via housing monetization would be used for old-age support. The remaining three-quarters of the sample were not interested, even hypothetically. Our results are striking given that older people hold a majority of their assets – 60% on average – in housing equity, and they underscore Phang's (2018) view that ageing homeowners in Singapore will "need to monetize their housing wealth for retirement financing."

We also show that greater product awareness and product understanding boost older homeowners' interest levels in reverse mortgages. Older homeowners who had previously heard of reverse mortgages were significantly more interested such products, as were people who felt they better understood the product's contract terms. These results are robust to controlling for property, familial, and health characteristics, and they underscore the fact that consumer willingness to take out reverse mortgages will require enhanced consumer awareness and simpler product contract terms. Our results are also in line with those from studies conducted outside

Singapore which report that lack of knowledge relates to low interest in reverse mortgages (Merton and Lai 2016; Davidoff et al. 2017; Hanewald et al. 2020). In Singapore's context, lack of product awareness is particularly problematic. More than three-quarters of older homeowners we surveyed said they had not previously heard of reverse mortgages. This was surprising, considering that such products had been introduced in Singapore in 1997 and were marketed for at least a decade thereafter.

About two-thirds of our sample reported at least a generally clear understanding of product ABC after the product description and numerical example were presented to them. Since product knowledge is positively and significantly associated with consumer interest, one strategy could be for regulators to work with insurers to market more transparent products with simpler contract terms. For instance, consumer concerns regarding home foreclosure would likely need to be addressed through a "non-recourse" clause, to protect retirees from owing more than what their property is worth. Nevertheless, such a clause may make these products more expensive.

Our analysis was also informative regarding other determinants of demand for reverse mortgages. Older respondents had significantly lower interest in reverse mortgages, as did those with lower income. Notably, older homeowners who were more financially savvy were significantly more interest in reverse mortgages, while those who felt better prepared for retirement were less interested. This is broadly consistent with findings from previous studies suggesting that financial literacy enhances household financial decision-making (Lusardi & Mitchell, 2008, 2011). Some related studies (e.g. Fornero et al., 2016; Davidoff et al., 2017) have conversely reported that higher financial literacy is associated with lower interest in reverse mortgages, and they rationalized this result as the financially literate being otherwise better prepared for retirement. In this present study, however, we used a separate measure for financial preparedness, so the effects of financial literacy and preparedness for retirement could be separately identified.

Singaporean homeowners with fewer children were significantly more interested in reverse mortgages (nonsignificance of the bequest measure possibly because 96% of sample stated they wished to leave a bequest). In a similar vein, Hanewald et al. (2020) reported that Chinese omeowners age 45-69 who did not wish to leave a bequest were significantly more interested in reverse mortgages, indicating that intergenerational aspects are critical in shaping product interest in such markets. Another common factor influencing reverse mortgage demand in both China and Singapore relates to home mortgages. Our results buttress Hanewald et al. (2020)'s finding that

having a mortgage is positively associated with an interest in home equity release products, controlling on other factors. While 89% of the older Chinese homeowners expressed interest in reverse mortgages, only 26% did in our sample. Factors that may account for this difference include an older respondent profile in our sample (mean age of 61.9 vs. 52.6 in the Chinese study), as well as the availability of government support schemes for indigent older persons in Singapore (e.g. ComCare Long-Term Assistance Scheme, Silver Support Scheme).

Our analysis must acknowledge a few limitations. First, the analysis is restricted to homeowners age 50+. Younger cohorts of homeowners who are more highly educated and with greater exposure to financial instruments may evaluate reverse mortgages differently from their parents. Second, our study did not consider other possible ways to monetize housing assets, including subletting (renting out a portion of the property to earn rental), downsizing (selling the existing home and buying a smaller house), and a government-supported equity sale scheme where HDB owners can sell the tail-end lease of their 99-year lease flat to the HDB in exchange for cash deposited in their pension accounts. Nonetheless, the HDB equity sale scheme (around since 2009) has also not been popular among older homeowners: fewer than 1% of our sample reported participating in the scheme. Finally, our data are self-reported regarding product interest, awareness, and understanding in reverse mortgages. To verify consistency across responses, nonetheless, we performed several cross-checks. For example, we verified that the majority (59%) of those stating that "the product is too complex" also found the description of product ABC to be mostly, or completely, confusing.

Realizing the potential of reverse mortgages to finance retirement consumption among older households requires the development of an active market for these instruments. Reverse mortgages are also discussed with increasing frequency by the media and financial advisers, so ageing Singaporeans are increasingly likely to acquire adequate information about the product. Acceptance of reverse mortgages among older homeowners should not be readily assumed, however. Key reasons cited for the disinterest in reverse mortgages in our study included debt aversion, bequest motives, and product complexity. Younger cohorts of older homeowners with nuclear families and greater exposure to financial instruments may be perhaps more receptive to the notion of housing monetization than previous cohorts.

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Figure 1. Reasons given for why uninterested in reverse mortgage (*N*=4,544)
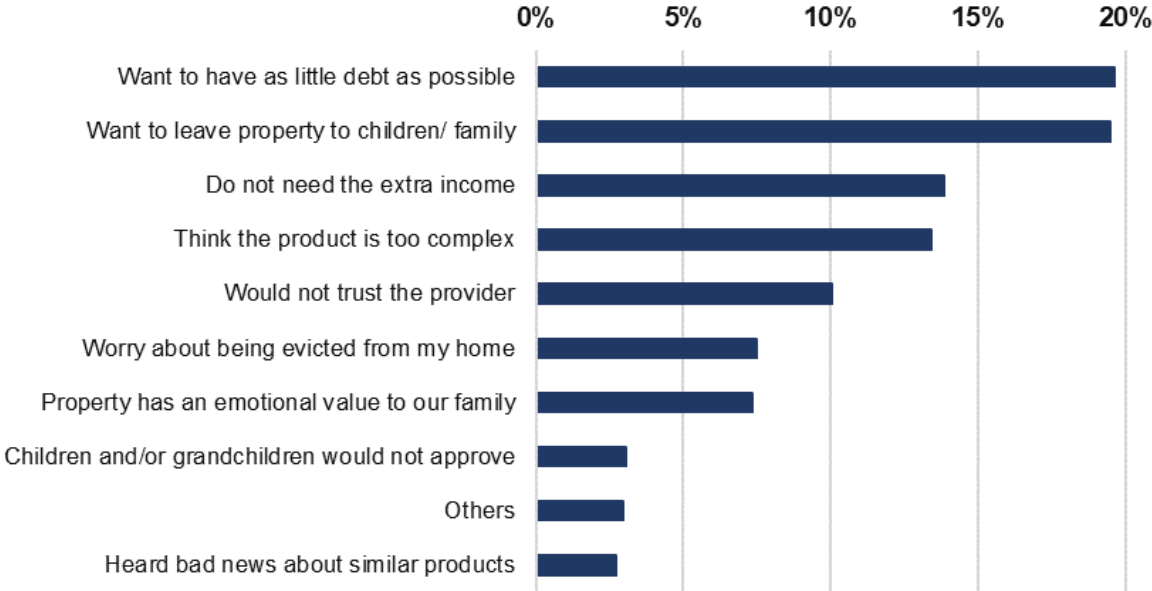
Notes: Analysis of the subset of 4,544 older Singaporean homeowners who responded "No" to the question "Would you be interested in such [reverse mortgage] products if they were available in Singapore?"

Table 1. Descriptive statistics on older Singaporean homeowners

Variable	Mean	SD
Homeownership characteristics:		
Value of primary residence (S$'000)	699	843
Mortgage on primary residence (S$'000)	29	120
Have mortgage on primary residence	18%	
Ever rented out primary residence	8.9%	
Have secondary property	8.6%	
Net value of secondary property (S$'000), of those owning	1,264	1,492
Other demographic characteristics:		
Female	51%	
Married	83%	
Current age	61.9	5.8
Age bands		
50-54	8%	
55-59	32%	
60-64	28%	
65-69	19%	
70+	13%	
Education		
Less than secondary	19%	
Secondary	42%	
Post-secondary	39%	
Currently working	60%	
Fully retired	20%	
Financial literacy score (0-3)	2.1	0.9
Manage household finances	85%	
High financial risk tolerance	15%	
Longer-term financial horizon	42%	
Financially prepared in retirement	44%	
Annual Income (S$)	58,487	97,266
Net non-housing wealth (S$'000s)	529	847
Fair/poor health	37%	
Ever have chronic condition	63%	
Likely to live past age 75	32%	
Number of living children	1.9	1.0
Bequest to children/family	96%	

Notes: Percentages shown for categorical variables; means and standard deviations shown for continuous variables.

Table 2: Distribution of wealth components for older Singaporean homeowners in 2018

	Total net worth	Net housing wealth	Net financial wealth	Non-financial assets	Pension wealth	
					CPF	Non-CPF
Mean ($)	1,307,842	778,766	201,049	39,328	268,284	20,415
As % of net worth		*60%*	*15%*	*3%*	*21%*	*2%*
Median 10% ($)	735,025	453,299	69,238	9,243	197,759	5,486
As % of net worth		*62%*	*9%*	*1%*	*27%*	*1%*
Percentile ($)						
10	$334,000	200,000	0	0	14,500	0
30	534,175	350,000	10,000	0	92,000	0
50	769,062	450,000	50,000	0	174,486	0
70	1,238,500	600,000	155,000	5,000	327,889	0
90	2,806,000	1,600,000	545,000	70,000	641,199	52,000

Note: Median 10% refers to subjects falling between the 45th and 55th percentile of the wealth distribution.

Table 3. Reverse mortgage interest, awareness, and understanding

	N	%
Product interest:		
Would you be interested in such products if they were available in Singapore?		
Yes	1,614	26%
No	4,544	73%
Missing	100	1.6%
For those who answered 'yes' to above,		
What would be the primary use of the funds?		
To support myself if I live longer than average in retirement.	1,228	76%
To have the flexibility to cover any expenses in retirement.	167	10%
To support my children and/or grandchildren.	45	2.8%
To support my parents.	5	0.3%
To support my spouse/partner in old age.	140	8.7%
To support my siblings.	3	0.2%
Others	6	0.4%
Missing	20	1.2%
Total	1,614	100%
Product awareness:		
Have you ever heard of such a product?		
Yes	1,379	22%
No	4,879	78%
Product understanding:		
How do you rate your understanding of product ABC?		
Completely clear	799	13%
Mostly clear	786	13%
Generally clear	2,674	43%
Mostly confusing	1,303	21%
Completely confusing	678	11%
Missing	18	0.3%

Table 4: Factors associated with 'whether interested in' reverse mortgages

Variables	Model (1) Marginal effects		95% CI	Model (2) Marginal effects		95% CI
Product awareness	0.032	**	(0.005, 0.059)	0.032	**	(0.006, 0.059)
Product understanding	0.114	***	(0.104, 0.124)	0.114	***	(0.104, 0.125)
Female	-0.009		(-0.029, 0.108)	-0.006		(-0.026, 0.014)
Married	-0.001		(-0.031, 0.030)	0.024		(-0.010, 0.058)
Age groups (reference: 50-54)						
55-59	-0.033		(-0.072, 0.006)	-0.028		(-0.068, 0.011)
60-64	-0.066	***	(-0.108, -0.025)	-0.060	***	(-0.102, -0.018)
65-69	-0.071	***	(-0.117, -0.024)	-0.058	**	(-0.106, -0.011)
70+	-0.077	***	(-0.130, -0.025)	-0.059	**	(-0.113, -0.005)
Education (reference: Less than secondary)						
Secondary	0.018		(-0.014, 0.05)	0.014		(-0.018, 0.046)
Post-secondary	0.006		(-0.029, 0.041)	0.005		(-0.03, 0.041)
Currently working	0.026	*	(-0.004, 0.055)	0.021		(-0.009, 0.05)
Fully retired	-0.010		(-0.048, 0.028)	-0.009		(-0.047, 0.029)
Financial literacy score	0.013	*	(-0.001, 0.027)	0.013	*	(-0.001, 0.027)
Manage household finances	-0.008		(-0.038, 0.022)	-0.009		(-0.038, 0.021)
High financial risk tolerance	0.023		(-0.007, 0.054)	0.022		(-0.008, 0.052)
Financially prepared in retirement	-0.049	***	(-0.072, -0.026)	-0.043	***	(-0.067, -0.02)
Longer-term financial horizon	-0.020		(-0.044, 0.004)	-0.018		(-0.043, 0.006)
Ln annual income	0.009	***	(0.004, 0.013)	0.009	***	(0.005, 0.013)
Ln net non-housing wealth	-0.004		(-0.009, 0.001)	-0.003		(-0.008, 0.003)
Additional controls:						
Ln value of primary residence				-0.015	*	(-0.03, 0.001)
Have mortgage				0.046	***	(0.017, 0.076)
Ever rented out primary residence				0.014		(-0.027, 0.055)
Have secondary property				-0.030		(-0.076, 0.015)
Fair/poor health				0.004		(-0.021, 0.288)
Ever have chronic condition				0.016		(-0.007, 0.039)
Likely to live past age 75				0.013		(-0.011, 0.037)
Number of living children				-0.024	***	(-0.039, -0.01)
Bequest to children/family				0.039		(-0.022, 0.101)
Model fit:						
BIC	6,151			6,150		

Notes: ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$. BIC = Bayesian information criterion. N=6,158 older homeowners who responded to the question "Hypothetically, would you be interested in such [reverse mortgage] products if they were available in Singapore?" (dependent variable coded 1 if yes, 0 else). Marginal effects from a probit regression reported; 95% confidence intervals are shown in parentheses. Other controls not reported include indicators for race/ethnicity and for missing values. Robust standard errors clustered at household level.

Supplementary Material

This appendix provides the exact question wording of the reverse mortgage module fielded in the Singapore Life Panel® in 2018. A two-part format is employed following Hanewald et al. (2020). In the first part, we provide a qualitative description of a hypothetical reverse mortgage named 'product ABC'. In the second part, we show a numerical example illustrating product ABC works. The property value and parameters used in the numerical example are reflective of the economic landscape in Singapore. We used bold font to emphasize key product features.

Part 1: Basic description of a hypothetical reverse mortgage product

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We are now going to describe a new financial product to you. Please read the description carefully.

Product ABC allows retired homeowners to use their home as collateral for receiving cash payments while **allowing them to still own and live in the property**. Product ABC is offered by a large local Singapore bank. Product ABC has the following characteristics:

At the beginning of the contract:
• You can **choose how much** and **how** you will be paid. You can choose between a lump sum, lifetime fixed regular payments, or flexible payments, depending on your needs.
• The maximum value of these payments depends on the value of your property at the beginning of the contract, your age, the age of your spouse, and other factors.
• The value of the property is assessed by an **independent, authorized** appraiser.

While you and your spouse are alive:
• You will receive the payments you have chosen in cash or as bank transfers.
• You **do not have to repay the payments** while you (and your spouse) are alive.
• Instead the payments become a **debt** which **accumulates interest**. The interest rate is **fixed** at the beginning of the contract and will **not change** over the period of the contract. The interest rate is 1-2 percentage points higher than standard mortgage rates.
• You and your spouse have a **guaranteed right to live in your property** as long as both of you are alive.
• As long as you live in the home, you and your spouse **may rent out** a portion of the property and keep the rental income.
• If for any reason the property is lost in a natural disaster, the bank will settle the contract with an insurance company and compensate you in a fair way.

If both you and your spouse move out permanently, or have passed away:
• The product provider will sell your property at the **highest possible market price**.
• The sale proceeds will be used to repay the debt.
• If the sale proceeds are above the value of the debt, your heirs will **receive any amount remaining** after the debt has been repaid.

• If the sale proceeds are **insufficient** to cover the value of the debt, your heirs **will not be liable** to pay any additional money. The product provider is responsible for the difference and bears the risk.

The following options are also part of product ABC:
• You and your spouse can **terminate** the contract early by **prepaying the debt plus interest**.
• Your heirs can **repay the debt plus interest and keep the property** after you and your spouse have passed away or moved out.

*Please assume that you would owe **no taxes** on any of the above payments.*

Part 2: Numerical example of product ABC

The following example illustrates how product ABC works:

Mr. and Mrs. Tan are 67 and 65 years old in 2018. They live in their own property in Singapore which is worth S$400,000. They decide to use product ABC to increase their retirement income.

At the beginning of the contract:
• The Tans choose to receive a lifetime stream of fixed regular payments of $1,200 per month.
• The Tans choose to include an option for their daughter to repay the debt if she wishes to keep the property after they move out or have passed away.

While one or both partners are alive and living in the property:
• They will receive regular payments from product ABC in cash or as bank transfers.
• The payments received become a debt that accumulates interest at a variable interest rate, which is currently 5% per annum.
• The Tans do not need to repay the debt plus interest while either of them is alive and lives in the property.
• The couple has a claim on future growth in the value of the property, if there is any.

Mr. Tan passes away at age 77, but Mrs. Tan lives until age 82. When Mrs. Tan passes away in 2035, the outstanding debt plus interest now totals S$385,000. Then, three scenarios are possible in 2035:
• <u>Scenario A</u>: The product provider sells the apartment at a price of S$600,000. The money from the property sale is used to repay the debt plus interest. Mr. and Mrs. Tan's daughter inherits the remaining S$215,000.
• <u>Scenario B</u>: The product provider sells the apartment at a price of only S$250,000, which goes entirely to the product provider as this is below the $385,000 plus interest. The daughter inherits nothing, but neither is she liable for the difference of S$135,000. The difference is a loss to the product provider.
• <u>Scenario C</u>: The daughter decides to repay the debt of S$385,000 herself and keep the apartment.