

Housing wealth and long-term care insurance demand: Survey evidence

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Abstract

This paper uses survey methods to assess the impact of access to housing wealth on long-term care (LTC) insurance demand. We compare two new mechanisms to finance LTC insurance with housing wealth: reverse mortgage loans and home reversion (partial sale and leaseback). Using data from an online survey of urban Chinese homeowners, we find that housing liquidity increases the stated demand for LTC insurance. On average, the survey participants spent 15.7% of their given total wealth to buy LTC insurance when they could use savings and a reverse mortgage, 12.8% when they could use savings and home reversion, and 5.2% when they could only use savings. Product demand was linked to economic factors, demographic variables, health, bequest motives, house price expectations, product understanding, and financial capability. Our results inform the design of new public or private sector programs that allow individuals to access their housing wealth while ‘aging in place’.

KEYWORDS

China, housing wealth, long-term care insurance, reverse mortgages

JEL CLASSIFICATION

D14, G11, G21

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1 | INTRODUCTION

Across both developed and developing countries, there is a growing demand for long-term care (LTC) services that exceeds available funding. Only a few countries have public LTC insurance programs, while some countries cover basic LTC services through public health insurance programs. Private LTC insurance markets are limited in most countries (OECD, 2020), and premiums can be high due to the high probability of needing LTC, adverse selection, and other factors. As a result, individuals often rely on family support and can face high out-of-pocket costs for LTC or unmet care needs.

At the same time, many older individuals own their homes, and their housing wealth often forms the largest part of their household wealth and retirement savings. Individuals often have a strong emotional attachment to their homes, and many prefer to “age in place”—to remain and receive care in their own homes as they age (Cocco & Lopes, 2020). The desire to “age in place” has been reinforced by the negative effects of the COVID-19 pandemic on older people in nursing homes (Achou et al., 2022). These trends suggest the potential for the development of new public or private sector programs that allow individuals to access their housing wealth to fund LTC while still living in their homes.

This paper uses survey methods to assess the stated demand for new LTC insurance arrangements that allow individuals to purchase LTC insurance using their housing wealth. We compare three approaches to fund LTC insurance: savings, reverse mortgage loans, and home reversion, and quantify the stated demand for different strategies involving these approaches. We also identify individual- and household-level factors driving preferences for these strategies. Our paper focuses on reverse mortgages and home reversion, the two most common types of home equity release arrangements internationally. With a reverse mortgage loan, a homeowner borrows against their home and is not required to make any interest and capital repayments until the home is sold upon the death or permanent departure of the homeowner(s). With home reversion, the homeowner sells part of their housing wealth, receives a payment upfront, and receives a proportional share of the sale proceeds when they die or permanently move out. The LTC insurance product we test is a single premium joint-life product that pays a regular monthly income (rather than reimburses expenses) when one or both spouses qualify for LTC.¹ The income can be used for various purposes, including (but not limited to) paying for formal care at home or in a nursing home or compensating family members or friends for informal care.

Our study uses data from an online survey that were completed by 1200 homeowners aged 45–64 residing in 49 of China's largest cities. We find that access to housing wealth increases the stated demand for LTC insurance. When participants could only use savings to finance their LTC insurance premiums, they used an average of 5.2% of their total wealth to purchase LTC insurance. When they could use savings and a reverse mortgage, the survey participants used 15.7% of their total wealth to purchase LTC insurance. With savings and home reversion, they used 12.8% of their total wealth. We also report how product demand is linked to household-level economic factors, demographic variables, health, bequest motives, house price expectations, product understanding, and financial capability.

Our paper is one of the first to provide empirical evidence on the stated demand for combinations of LTC insurance and home equity release products. Previous studies, such as

¹A growing literature studies the demand for life care annuities and LTC income insurance products (e.g., Brown & Warshawsky, 2013; de Bresser et al., 2022; Wu et al., 2022). However, these studies do not consider housing wealth as a source of funding for such products.

those by Davidoff (2009, 2010) and Hanewald et al. (2016), have used lifecycle models and simulations to understand how the availability of housing wealth through home equity release products like reverse mortgages and home reversion plans influences the demand for LTC insurance and annuities. Shao et al. (2019) extended this analysis by combining a reverse mortgage with LTC insurance in a rich multi-period lifecycle model, highlighting potential welfare benefits from such a combination. More recently, de Bresser et al. (2024) used a discrete choice experiment in the Netherlands to examine preferences for life care annuities, which combine life annuities and LTC insurance. They found that offering reverse mortgages as an alternative to monthly premiums increased demand for certain more expensive life care annuities. Our study expands this literature by quantifying the demand for different strategies for funding LTC insurance with savings, reverse mortgages, and home reversion through a survey-based approach. Our empirical approach captures actual preferences among homeowners as well as the individual- and household-level factors driving those preferences.

Our study also contributes to the growing body of empirical research exploring the demand for LTC insurance. Lambregts and Schut (2020) provided a systematic literature review of the reasons for the low uptake of LTC insurance and life annuities. They included 62 empirical studies that analyze LTC insurance uptake in different high-income countries. Lambregts and Schut (2020) report that most studies find a positive association between education, income, or wealth and LTC insurance uptake, while homeownership is associated with lower uptake (e.g., Boyer et al., 2020; Costa-Font & Rovira-Forns, 2008; Wu et al., 2022). When housing assets cannot be used as a financial resource to fund LTC insurance premiums, housing wealth may crowd out the demand for LTC insurance as it may be retained for precautionary purposes (Boyer et al., 2020; Costa-Font & Rovira-Forns, 2008). Our study is one of the first empirical studies to examine how access to housing assets via home equity release products impacts the demand for LTC insurance.

Our results can inform the design of new public or private sector programs that allow individuals to access their housing wealth while still living in their homes. Hanewald, Eaton, et al. (2020) discussed how home equity release could be used to finance LTC insurance in the US market. Similarly, Mayhew et al. (2017) and Mayhew et al. (2021) discussed and modeled different approaches to financing LTC insurance in the United Kingdom. In Australia, there is a government-offered reverse mortgage program (the Home Equity Access Scheme) that can already cover some LTC costs (Sun et al., 2024). By identifying an additional funding source for LTC, our findings can also facilitate the development of LTC services. The additional funding generated through access to housing wealth could attract more service providers to the market and may also increase the availability of informal caregivers who can be compensated using the LTC income payments.

The remainder of this paper is organized as follows. Section 2 provides background information on LTC insurance, housing wealth, and reverse mortgage programs in China; Section 3 describes the survey design and data; Section 4 reports descriptive statistics; Section 5 presents the regression analysis; Section 6 presents several robustness tests; Section 7 concludes.

2 | BACKGROUND

2.1 | LTC needs and insurance in China

China's large population is aging rapidly. As of 2024, China has approximately 209 million people aged 65 years or older, representing 15% of its total population. This number is expected

to nearly double by 2050, reaching an estimated 395 million, or 30% of the population (United Nations, 2022). As China's population ages, there is a growing need for LTC services. A recent study estimated that the number of older people (age ≥ 60 years) in China needing care for activities of daily living (ADLs) and instrumental activities of daily living (IADLs) will increase from 45.3 million in 2020 to 59.3 million by 2030 (Gong et al., 2022). This increase is primarily due to the growing size of the older population, as the prevalence of care dependency among older Chinese adults has declined in recent years and is projected to decrease from 17.9% in 2020 to 16.1% in 2030 (Gong et al., 2022).²

In China, LTC is traditionally provided by spouses and other family members. Older Chinese typically expect their partners and/or children, especially sons and daughters-in-law, to provide informal care (e.g., Zhu, 2015). However, the increasing demand for informal care is met by inadequate supply. There are fewer children available as caregivers as a result of demographic shifts and socioeconomic changes in recent decades. Lower fertility rates have resulted in "4-2-1" family structures (comprising four grandparents, two parents, and one child) that place an increased level of responsibility for LTC on single children with no siblings to share the responsibility. Moreover, the increased mobility of workers due to the changes in the labor market has weakened family connections, making it increasingly difficult for children to provide informal care for their elderly parents (e.g., Feng, 2017; Zhu, 2015).

Our research contributes to ongoing policy reforms in China aimed at establishing a well-functioning LTC system. The Chinese Central Government proposed a three-tiered LTC system prioritizing home-based care, supported by community-based and institutional services in the 12th 5-Year Plan (2011–2015). This strategy was further reinforced in the 13th 5-Year Plan (2016–2020) and several high-profile national policy directives (Feng et al., 2020). The government targets a 90-7-3 structure for LTC, where 90% of older adults would receive care at home, 7% through community-based services, and 3% in institutional care (Feng et al., 2020). However, actual policy implementation has incentivized the development of institutional care, with government support for residential care facilities through subsidies, tax breaks, and land leasing. From 2008 to 2018, the number of residential care beds more than tripled, yet occupancy rates fell from 80% to 55%, mainly due to high costs, poor quality, and limited accessibility (Feng et al., 2020). Many nursing homes charge a monthly fee of 20,000 RMB (ca. \$2850 USD³) or more (Jia, 2024).

The LTC policy reforms in China aim to increase LTC funding through public LTC insurance schemes and the development of a private market for LTC insurance. Pilot programs for public LTC insurance were launched in 15 cities in 2016 and extended to 34 additional cities and areas in 2020. In June 2019 (the same year our survey was conducted), these pilot programs covered 88.5 million people (ca. 6% of China's total population), with 426,000 people receiving benefits (Wu et al., 2020). By July 2022, the programs had expanded to cover approximately 145 million people, representing ca. 10% of China's total population (State Council of the People's Republic of China, 2022). The coverage initially targeted urban employees and retirees but has since been expanded to include urban and rural residents. The pilot programs typically

²Gong et al. (2022) found that the decline in care dependency prevalence in China was mainly due to improvements in educational attainment, advancements in age-friendly residential environments, and increased accessibility of healthcare services. The dependency trends projected by Gong et al. (2022) align with those projected by Wang et al. (2022), who predict that between 2018 and 2038, life expectancy for 75-year-olds in China will increase by 1.5 years, while ADL-based healthy life expectancy will increase by 1.7 years.

³The exchange rate between RMB and USD on January 15, 2025, was 1 RMB = 0.14 USD.

cover 50% to 90% of LTC costs, depending on the type of service, with an average reimbursement rate of about 70% (Liu et al., 2023). Despite these efforts, a nationwide public LTC insurance system has not yet been established, leaving a significant portion of the population without access to public LTC insurance. There is also potential to grow the market for private LTC insurance in China. Only a few providers offer commercial LTC insurance products, and the total premium income is small (accounting for only around 1% of the total health insurance market premiums) (Dai & Chen, 2022).

2.2 | Housing wealth and reverse mortgages in China

Chinese households hold most of their wealth in housing. Homeownership rates increased rapidly after the privatization of China's housing market in the 1990s. Soaring house prices in the 2000s and 2010s further increased the value of real estate owned by households. More than 80% of households in urban China own homes (over 90% in rural China) (Huang et al., 2021), and the share of housing wealth of total wealth per capita has risen from 53% in 2002 to 73% in 2018 (Wan & Knight, 2023).

The Chinese government has shown an interest in developing the home equity release market. In 2014, a reverse mortgage program (known as the “House-for-Pension” scheme) was introduced in several large cities. Although uptake of the pilot scheme was low, the findings of a recent experimental study suggest a potential demand for simpler and more flexible reverse mortgage products among urban Chinese (Hanewald, Bateman, et al., 2020). Recent research by Han and Zhang (2024), based on an information disclosure experiment conducted in Zhengzhou City, Henan Province, further highlights that addressing cognitive biases, limited financial literacy, and strong bequest motives can significantly increase willingness to adopt reverse mortgages. One potential concern for developing China's home equity release market is property rights. However, our analysis of relevant legal articles covering property rights suggests that current property rights arrangements should not hinder the development of a home equity release market in China (see Supporting Information S1: Appendix A).

3 | DATA AND METHODOLOGY

3.1 | Sample

We developed a new online survey to quantify the stated demand for new LTC funding strategies and identify individual- and household-level factors driving preferences for these strategies. The survey was fielded in November 2019 by the online survey firm dataSpring to a sample of 1200 participants. dataSpring recruited the participants through email and an app from their database of over 1 million Chinese urban residents and from their network of panel suppliers to expand the reach of their database. Participants who completed the survey were paid a fixed amount and could earn a bonus payment based on the results of a quiz testing knowledge of the new LTC insurance products we introduced. The median completion time for the survey was 19 min.

The survey targeted urban homeowners aged 45–64 years who could be potential customers for the LTC insurance products we tested. We used quotas to target 50% males and 50% females, broad coverage of education levels, and representative geographical coverage across four Tier 1 cities (Shanghai, Beijing, Shenzhen, and Guangzhou) and 45 Tier 2 cities in China. We require

50% of the participants to reside in Tier 1 cities and the other 50% to reside in (smaller) Tier 2 cities. Tier 1 and 2 cities differ in population size, income level, business opportunity, and consumer behaviors. We also required the participants to have the urban “hukou” registration of the cities where they reside since this identifies participants with a long-term relationship with the city. We identified homeowners by asking participants whether they (or their spouses) own at least one property (with an owner certificate). We excluded participants with difficulties performing ADLs since such conditions would make them immediately eligible for LTC insurance benefits and would therefore disqualify them from purchasing any of the LTC insurance products.

3.2 | Survey structure and focus group testing

Figure 1 summarizes the structure of the final version of the survey. The survey was drafted in English and translated into Chinese. Screenshots of the English version of the survey are available in Supporting Information S1: Appendix B.⁴ We used focus groups in China to pre-test the survey design. The video-recorded focus group discussions helped us develop the presentation of the product information and the setup of the choice tasks. See Supporting Information S1: Appendix C.1 for more details on the focus group testing.

3.3 | Customization

We assigned participants into eight groups based on their self-reported household savings (×2), the value of their (most valuable) property (×2), and the tier of the city they live in (×2) (see Supporting Information S1: Appendix C.2). To address potential alienation with the survey questions, participants were assigned given home values and saving amounts close to their self-reported values, as described in Supporting Information S1: Appendix C.2.

3.4 | Information about LTC and choice tasks

We provided the participants with information about LTC risks and costs in easy-to-understand language (see Figure 2). We included estimates for the chance of requiring LTC for men aged 60 and women aged 55. These ages correspond to the pension eligibility ages for men and blue-collar women under China's Basic Old-Age Insurance program, which covers urban employees and public servants (Deng et al., 2023). Supporting Information S1: Appendix D describes how we calculated the LTC prevalence rates using individual-level data from two household panel surveys in China. We defined an older person as disabled if they need help permanently with three or more ADLs⁵: bathing, dressing, eating, using the toilet, continence, and transferring in and out of bed.

⁴The survey can be found at:

English: https://pro.wenjuan.com/s2/5d6e41097e634b90c7a7c319/?test_mode=1.

Chinese: https://pro.wenjuan.com/s2/5da15ed57e634b50a6b3e6d1/?test_mode=1.

⁵This definition is one of the triggers for benefit payments for many existing private critical illness insurance policies in China, such as the policies issued by Ping An Insurance and China Pacific Insurance.

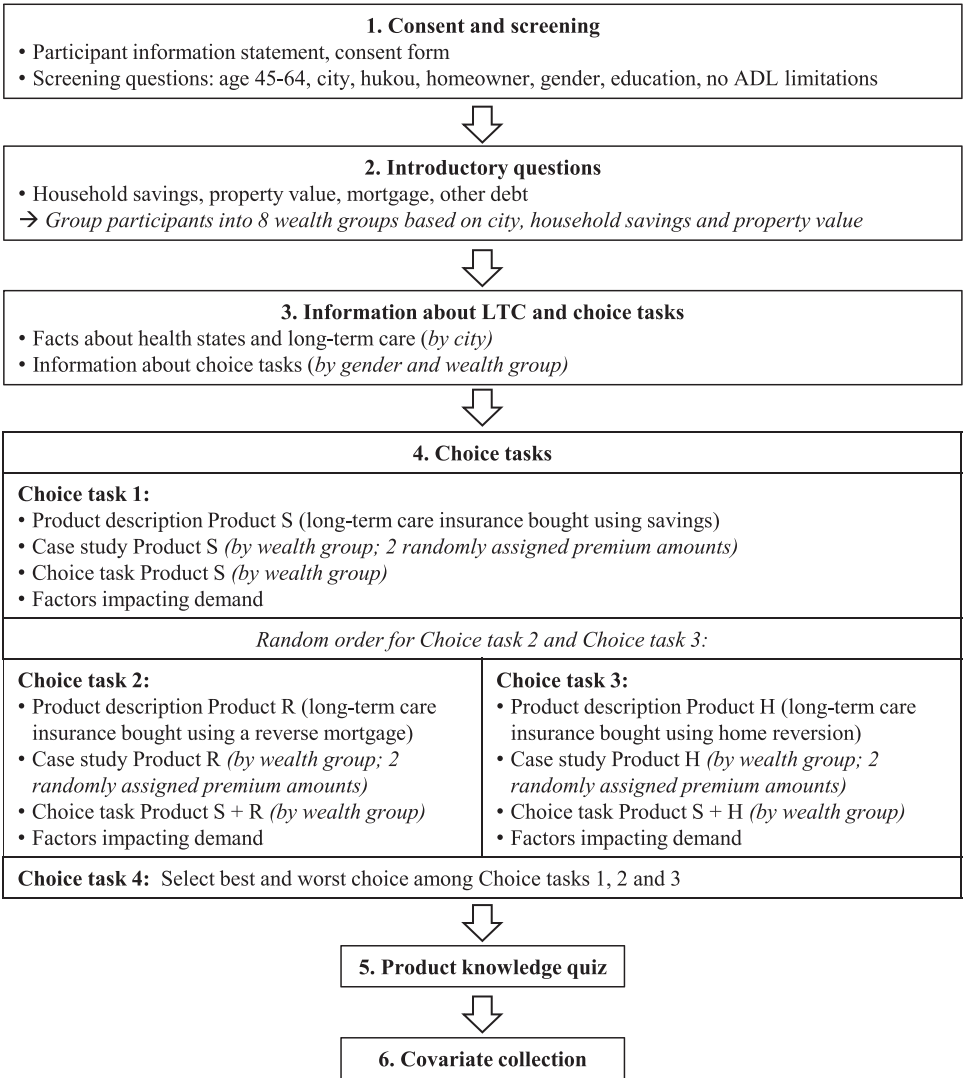


FIGURE 1 Overview of the survey design.

We also presented information about residential nursing home costs. The participants saw different prices according to the tier of the city they reside in. Timers were placed on each “information” screen to ensure participants spent sufficient time reading the detailed material.

3.5 | Choice Tasks 1–3

We designed three choice tasks to investigate the potential demand for three different hypothetical LTC insurance products. All participants started with Choice Task 1, which required them to state their demand for LTC insurance using savings. The participants then completed either Choice Task 2, which allowed them to use savings and a reverse mortgage

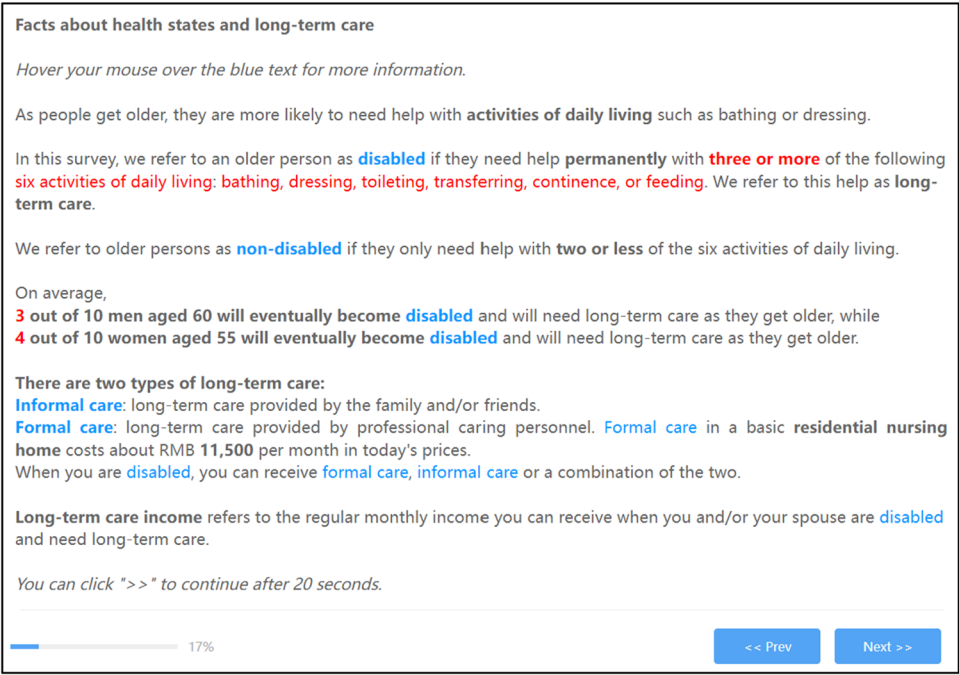


FIGURE 2 Screenshot showing “Facts about health states and LTC” (translated). LTC, long-term care.

loan to purchase LTC insurance, or Choice Task 3, which allowed them to use savings and home reversion to purchase LTC insurance. We included a “choice task treatment” where we randomized the sequence of Choice Tasks 2 and 3 to mitigate potential ordering effects.

We labeled the insurance products “LTC Income Product S,” “LTC Income Product R,” and “LTC Income Product H” to avoid any biased associations with existing financial products. We did not refer to the products as insurance but instead used the terms “products” or “contracts.” The letter S denoted savings, R represented reverse mortgage, and H indicated home reversion.

Each choice task consisted of a description of the given LTC insurance product, a case study illustrating how the product could be used, and a choice task to elicit the stated demand. We now describe these components.

3.6 | LTC insurance product descriptions

The product descriptions comprised a short summary followed by a detailed description in a question-and-answer style presented in table format. Screenshots of all product descriptions are provided in Supporting Information S1: Appendix B, and we summarize the three alternative LTC insurance product descriptions in Supporting Information S1: Appendix C.3. All three products provide a monthly income to the policy holder and their partner if at least one of the couple is disabled and qualifies for LTC. The monthly income can be used for any purpose,

including but not limited to paying for formal care or compensating family members/friends for informal care. The three products differ in the way the one-off premium (paid at the beginning of the contract) is financed: with savings (Product S), by borrowing against the home (Product R), or by selling part of the housing wealth (Product H).

We asked the participants to read the product descriptions carefully and explained that their understanding of the products would affect the bonus amount they could earn from the survey (e.g., Hanewald, Bateman, et al., 2020 used similar incentives).

3.7 | Case study

After each product description, the participants were shown a case study. The case study illustrated how each product works, using as an example a hypothetical couple in the same wealth group as the participants. Figure 3 shows a screenshot of the case study for LTC Income Product R. The case studies for Products S and H have a similar structure and can be found in Supporting Information S1: Appendix B. In the numerical example, we randomly assigned the participants to one of two different amounts of LTC insurance purchased (i.e., case study premium treatment) to address its possible influence on their stated demand for LTC insurance. After reading the case study, we asked participants to rate their understanding of that particular LTC insurance product.

Case study for Long-term Care Income Product R

Hover your mouse over the blue text for more information.

Please read the following case study which illustrates how Long-term Care Income Product R works.

Mr. Wang is aged 60 and Mrs. Wang is aged 55 in 2019. They have an adult daughter. They live in their own apartment in Beijing which is worth RMB 5,000,000 and have RMB 250,000 in their savings account. They decide to buy Long-term Care Income Product R to cover their future long-term care needs.

- They choose to **borrow RMB 300,000 against their apartment** to buy long-term care income with Long-term Care Income Product R. The amount becomes a debt which accumulates interest at the fixed interest rate of 5.8% p.a
- If one or both are disabled, they will receive a **monthly income** according to the following table:

Both non-disabled/deceased	1 non-disabled/deceased , 1 disabled	Both disabled
RMB 0/month	RMB 5,271/month	RMB 10,542 /month

- They do **not have to repay anything** while **at least one of them still lives at home**.
- The couple **fully own their apartment**, including all growth in its value, if any.

This contract will **terminate** when **both** Mr. and Mrs. Wang **pass away**.

Assume that Mr. Wang remains **non-disabled** and **passes away in 2044**. In the same year, Mrs. Wang becomes **disabled** and **permanently moves into a residential nursing home**. The **outstanding debt amount in 2044** accumulated from the initial loan is RMB 1,228,000. Below are **three possible scenarios in 2044**:

- Scenario A:** The product provider **sells the home at the highest possible market price** of RMB 10,000,000. The sale proceeds are used to **repay the debt**. Mrs. Wang **receives the remaining RMB 8,772,000**. She will receive a **long-term care income** of RMB 5,271/month **until she passes away**.
- Scenario B:** The product provider **sells the home at the highest possible market price** of only RMB 1,000,000. All sale proceeds are **used to repay the debt**. Mrs. Wang will **receive nothing from the sale**, but she is **not required to make an extra payment**. The difference is a **loss to the product provider**. Mrs. Wang will receive a **long-term care income** of RMB 5,271/month **until she passes away**.
- Scenario C:** Their daughter decides to **repay the debt herself and keep their property**. Mrs. Wang will receive a **long-term care income** of RMB 5,271/month **until she passes away**.

FIGURE 3 Partial screenshot of the case study for LTC Income Product R (translated). LTC, long-term care.

3.8 | Choice tasks

After reading the product description and case study, the participants proceeded to the choice tasks. Here, they were asked to ignore their own financial circumstances and imagine that they were aged 60 for males (55 for females), married to a spouse aged 55 (60 for females), about to retire, that they owned their own home of a given value, have a given amount in a savings account, and no other assets. The home values and savings amounts were close to the participants' self-reported values, as described in Section 3.3.

Choice Task 1 collected the stated demand for LTC insurance purchased with savings only (LTC Income Product S). Participants were informed that they could use the money in their savings account to purchase LTC income with LTC Income Product S. They were then asked: *Would you like to buy LTC income with LTC Income Product S? And if you do: How much of your savings do you want to use to buy LTC income?* The participants used a configurator to select their choice. The configurator ranged from 0 to the given amount of savings.

Choice Task 2 collected the stated demand for LTC insurance where participants could use both LTC Income Product S (savings) and LTC Income Product R (home equity released using a reverse mortgage) to purchase LTC income, as illustrated in Figure 4. In completing the choice task, participants were prompted to use two configurators to indicate their stated choice: one configurator for LTC Income Product S (range: 0 to the given savings amount) and one for LTC Income Product R (range: 0%–40% of the given amount of housing wealth, see Supporting Information S1: Appendix D.6).

Choice Task 3 collected the stated demand for LTC insurance where participants could use LTC Income Product S (savings) and LTC Income Product H (home equity released using home reversion). Participants were again prompted to use two configurators to indicate their stated choice: one configurator for LTC Income Product S (range: 0 to the given savings amount) and one for LTC Income Product H (range: 0 to the maximum available amount of housing wealth; see Supporting Information S1: Appendix D.7 for more details).

The configurators in each choice task were initially set to 0. The participants were informed that they had to move the slider at least once before continuing and were reminded that they could place the slider at zero if they did not want to buy a product or they did not want to use a given source of financing (Choice Tasks 2 and 3). For each choice task, we showed an output table below the configurator(s) illustrating the financial consequences of the participant's choices. The output table reported the regular income from the LTC Income Products in different disability states, the required payments for LTC from one or both of the LTC income products included in the choice task and the remaining wealth in savings and housing (see Figure 4, bottom). The table also reported the percentage of the cost of formal care or informal care that participants would be able to cover with the selected amount of LTC income. The participants could review their choice and observe how their choice would impact their income and wealth in different scenarios. The numbers in bold changed when the participants moved the cursor on the configurator(s). Below the output table (not shown in Figure 4), participants were asked to select from a list of possible reasons the main reason why they did not purchase more of the respective LTC income product.

3.9 | Choice Task 4

In Choice Task 4, participants were asked to review a table summarizing their choices in Choice Tasks 1–3 and to select their most and least preferred of the three product choices.

Task 2 of 4: Long-term Care Income Product R

Hover your mouse over the blue text for more information.

In this choice task, assume, you have **RMB 250,000** in your savings account and your home is worth **RMB 5,000,000**. You can use the money in your savings account to purchase **long-term care income** with **Long-term Care Income Product S**. You can also borrow against your home to purchase long-term care income with **Long-term Care Income Product R**.

Use the two sliders below to indicate your choices. You can buy long-term care income with your savings (**Long-term Care Income Product S**) and/or borrow against your home (**Long-term Care Income Product R**). The outcomes of your choice are summarised in the table below.

The decisions you have to make are:

Would you like to buy long-term care income? And if you do

MRa. How much of your savings do you want to use to buy long-term care income with Long-term Care Income Product S?

You can position the slider anywhere on the line, but you need to move it at least once before you can continue. If you **DON'T** want to buy **Long Term Care Product S** place the slider at **RMB 0**.

Long-term Care Income Product S:

RMB 0

RMB 100,000

RMB 250,000

MRb. How much do you want to borrow against your home to buy long-term care income with Long-term Care Income Product R?

You can position the slider anywhere on the line, but you need to move it at least once before you can continue. If you **DON'T** want to buy **Long Term Care Product R** place the slider at **RMB 0**.

Long-term Care Income Product R:

RMB 0

RMB 300,000

RMB 2,000,000

	Outcome
Regular income when you and your spouse are non-disabled	RMB 0 per month
Regular income when one spouse is disabled, and the other spouse is non-disabled or deceased	RMB 7,028 per month This would cover 61.11% of the cost of formal care in a residential nursing home for one person or compensate your family/friends who take care of you.
Regular income when both spouses are disabled	RMB 14,056 per month This would cover 61.11% of the cost of formal care in a residential nursing home for you and your spouse or compensate your family/friends who take care of you.
Total payment for long-term care income	RMB 400,000
Payment for long-term care income from your savings account	RMB 100,000
Payment for long-term care income from Long-term Care Income Product R	RMB 300,000 loan with annual interest rate 5.80% p.a.
Remaining money in your savings account	RMB 150,000
Your remaining housing wealth	RMB 5,000,000
Your remaining total wealth	RMB 5,150,000
Additional features:	You receive the monthly income for as long as you/your spouse are disabled

FIGURE 4 Partial screenshot of Choice Task 2 (translated).

3.10 | Product quiz

After completing the four choice tasks, participants were presented with an incentivized product knowledge quiz comprising eight statements that tested their understanding of LTC

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Income Products S, R, and H. Participants were required to indicate which statement applied to each of the three LTC income products.

3.11 | Covariate collection

The final part of the survey asked questions on demographics, including information about children and grandchildren, health and subjective life expectancy, household income and wealth, financial literacy and numeracy, retirement plans, financial risk attitudes and personality traits, bequest plans, and expectations of house price growth and LTC arrangements. Where possible, we used standard questions to ensure comparability with other surveys, including the China Health and Retirement Longitudinal Study (CHARLS) and the Chinese Longitudinal Healthy Longevity Survey (CLHLS). We drew on Lusardi and Mitchell (2011) for the financial literacy questions, while the numeracy questions were from Lipkus et al. (2001). Personality traits were elicited using the Big Five personality questions (Agnew et al., 2018; Borghans et al., 2008). Questions eliciting bequest preferences, subjective views on retirement plans, and house price expectations were adopted from related studies on LTC income products and reverse mortgages (Davidoff et al., 2017; Hanewald, Bateman, et al., 2020; Wu et al., 2022). We included an instructional manipulation check (IMC), which allowed us to identify inattention by repeating a question in the survey and asking the participants whether they had seen this question before (Oppenheimer et al., 2009), and measured the time taken to complete the survey. To gauge the quality of the survey design, we asked participants to rate the clarity of the survey questions.

4 | DESCRIPTIVE STATISTICS

4.1 | Sample characteristics

In terms of demographic and socioeconomic variables, our analysis sample is reasonably representative of the segment of the Chinese population we are targeting. Please refer to Supporting Information S1: Appendix C.4 for a comparison between our sample and a corresponding sample from the nationally representative CHARLS. Our sample is younger, more educated, and wealthier than the relevant CHARLS sample. These differences are likely due to the interview method (our survey was conducted through an online commercial web panel, whereas the CHARLS uses face-to-face interviews). Previous studies using online surveys have noted similar sample differences (e.g., Hanewald, Bateman, et al., 2020; Wu et al., 2022). While the survey sample matches the target population for the hypothetical LTC income products we test, we will be careful not to draw conclusions for the general population based on our sample. We will also present a robustness analysis that applies weights to correct the sample distribution in Section 6.1.

4.2 | Product familiarity and understanding

Most participants had heard about reverse mortgages and LTC insurance before taking the survey. Overall, 58% indicated that they had heard about a “House for Pension” scheme

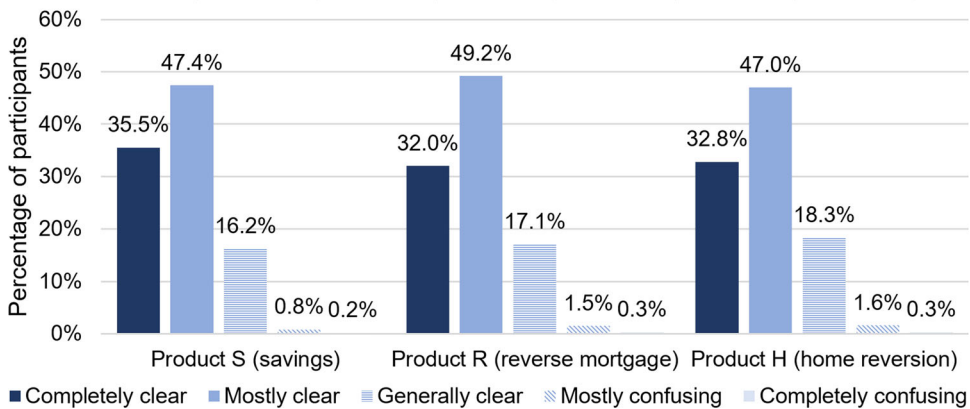


FIGURE 5 Subjective product understanding.

(i.e., the reverse mortgage product offered in China, see Section 2.2),⁶ while 73% indicated that they were familiar with LTC insurance.

Figure 5 provides descriptive statistics on subjective product understanding by product type. 83%, 81%, and 80% of the participants rated their product understanding as completely clear or mostly clear for LTC Income Products S, R, and H, respectively. The data from the product quiz confirms that participants generally understood the products well, with 51% recording more than 75% correct answers. These descriptive statistics suggest that the comprehensive product descriptions and numerical examples we developed based on previous research and focus group testing allowed participants to understand the three financial products well.

4.3 | Demand for LTC insurance

In Section 3.5, we explained that the survey comprised three product choice tasks in which participants indicated their stated demand for LTC insurance under alternative financing methods: using savings (Product S) in Choice Task 1; using savings and a reverse mortgage (Products S and R) in Choice Task 2; and using savings and home reversion (Products S and H) in Choice Task 3. In a “task sequence treatment,” the sequence of Choice Tasks 2 and 3 was randomized, as described in Section 3.6. To compare the demand across tasks, we plot the average percentage of total wealth used to buy LTC insurance in Figure 6. Total wealth is calculated as the sum of the given saving amount and home value (see Section 3.3).

Figure 6 shows that the demand for LTC insurance was highest in Choice Task 2, where savings and a reverse mortgage (Products S and R) could be used to buy LTC insurance. On average, the participants chose to use 4.8% of their total wealth (32.8% of their savings) to

⁶The level of awareness of the “House for Pension” is similar to levels found by Hanewald, Bateman, et al. (2020) and Hanewald, Eaton, et al. (2020) in two online surveys conducted in 2017, where 57.7% of urban Chinese aged 20%–49% and 60.1% of urban Chinese homeowners aged 45–65 had heard of such a product. The level of awareness of LTC insurance may be higher because of the prevalence of pilot programs for public LTC insurance in China (see Section 2.1).

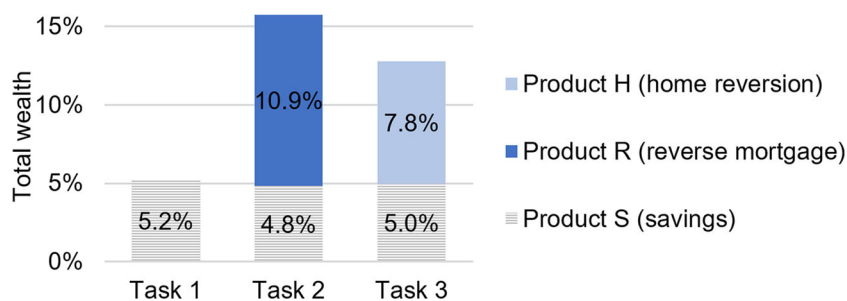


FIGURE 6 Average demand for LTC insurance. Participants could use the following to fund LTC insurance: savings (Product S) in Task 1, savings and a reverse mortgage in Task 2 (Products S and R), and savings and home reversion (Products S and H) in Task 3. Total wealth is calculated as the sum of the given saving amount and home value (see Section 3.3). LTC, long-term care.

TABLE 1 Differences in the amount of LTC insurance and source of funds by choice task.

Test	Mean	Mean	D Mean	Test stat	df	p
Demand for LTC insurance						
Task 1 vs. 2	5.2% (Task 1)	15.7% (Task 2)	10.5%	31.7	1645.3	<2.2e−16***
Task 1 vs. 3	5.2% (Task 1)	12.8% (Task 3)	7.5%	27.1	1857.1	<2.2e−16***
Savings allocated to LTC insurance						
Task 1 vs. 2	36.0% (Task 1)	32.8% (Task 2)	−3.2%	−3.6	2391.7	1.8e−4***
Task 1 vs. 3	36.0% (Task 1)	33.7% (Task 3)	−3%	−2.6	2395.3	5.0e−3**

Note: We used Welch’s *t* test for comparisons between choice tasks, allowing for unequal sample variances. “Test stat” denotes the test statistic of Welch’s *t* test. “df” denotes degrees of freedom. “D Mean” refers to the difference in mean. Task 1 involved savings (Product S), Task 2 involved savings and a reverse mortgage (Products S and R), and Task 3 involved savings and home reversion (Products S and H). +, *, **, and *** denote statistical significance at the 10%, 5%, 1%, and 0.1% level, respectively.

purchase LTC insurance with Product S and to use 10.9% of their total wealth (12.8% of their home value) to purchase LTC insurance with Product R.

The demand for LTC insurance was second highest in Choice Task 3, where participants could use their savings and home reversion to purchase LTC insurance. On average, participants allocated 5.0% of their total wealth (33.7% of their savings) to Product S and 7.8% of their total wealth (9.1% of their home value) to the home reversion Product H.

Table 1 compares the change in wealth allocated to LTC insurance purchases when housing wealth becomes available as a source of financing. We first compare the difference in demand for LTC insurance between Task 1 (savings only) and Task 2 (savings and a reverse mortgage) and Task 1 (savings) and Task 3 (savings and home reversion). We then compare the allocation of savings wealth to LTC insurance between Tasks 1 and 2 and between Tasks 1 and 3. For all comparisons, we found that when housing wealth (accessed by either home reversion or a reverse mortgage) was available to purchase LTC insurance, the demand for LTC insurance increased significantly. Furthermore, the amount of savings allocated to LTC insurance was significantly lower when housing wealth was available for purchasing LTC insurance.

We also analyzed the absolute amounts of savings and housing wealth that participants allocated to LTC insurance across the different financing options. Histograms in Supporting

Information S1: Appendix C.5 depict the distribution of these amounts. The histograms show that most participants opted for relatively low amounts of LTC insurance bought with savings (Product S) in all three tasks, with 59%, 63%, and 62% of participants choosing amounts ranging from zero to 100,000 RMB (ca. 14,250 USD) in Tasks 1, 2, and 3, respectively. In contrast, a larger proportion of participants chose higher amounts of LTC insurance with a reverse mortgage (Product R) or home reversion (Product H), with 65% and 56% exceeding 100,000 RMB in Tasks 2 and 3, respectively. These findings provide insights into the potential demand for these products. However, we note that individuals were grouped into different wealth groups, with given savings ranging from 75,000 to 750,000 RMB and given home values ranging from 800,000 to 5,000,000 RMB, as detailed in Supporting Information S1: Appendix C.2.

4.4 | Preferred choice

In Choice Task 4, participants reviewed a table summarizing their choices in the three previous LTC insurance choice tasks and identified their “best” and “worst” choices. Overall, 42% of participants selected their Task 1 choice (using only savings to purchase LTC insurance) as their best choice, 38% nominated their Task 2 choice (involving savings and a reverse mortgage), and 20% selected their Task 3 choice (involving savings and home reversion).

The popularity of Task 1 is somewhat surprising since it offered fewer options—only savings—compared to Tasks 2 and 3, which also involved a reverse mortgage or home reversion. It is possible that participants preferred Task 1 because it was simpler, involving only one product compared to two products in Tasks 2 and 3. Furthermore, some participants expressed concerns about the product features of Products R and H. For example, when asked why they did not purchase more of Product R, 10% indicated that they did not want to have a (higher) loan, and 4% were worried that they might be evicted from their property (see Supporting Information S1: Appendix C.6). We will test the robustness of the LTC insurance demand results presented in the previous subsection, considering the preferred choices, in Section 6.2.

4.5 | Barriers to product demand

Following each choice task, we asked participants to select from a list of up to seven possible reasons the main reason why they did not purchase more of Product S (in Task 1), Product R (in Task 2), and Product H (in Task 3). The data (in Supporting Information S1: Appendix C.6) show that the main reason for each product was “I think I can manage LTC risk” (selected by 35%–44% of participants), followed by “My children/grandchildren will care for me when I am old” (selected by 19%–24%). Only 13%–16% of participants selected “the product is too complex,” and 12%–14% thought the product was not a good deal.

5 | REGRESSION RESULTS

5.1 | Model specification and econometric methods

We used regression analysis to identify the factors driving individuals' preferences for financing LTC insurance using housing wealth. Specifically, we regressed the demand for LTC insurance

across the three separate choice tasks (each representing a distinct financing method) on covariates that prior research has linked to interest in LTC insurance and reverse mortgages (e.g., Brown et al., 2012; Hanewald, Bateman, et al., 2020; Wu et al., 2022), as well as indicator variables for the two survey treatments and measures of attention and survey understanding:

- The covariates included economic and demographic factors, health variables, financial capability (including both subjective and objective understanding of the LTC income products), preferences, and measures of personality and expectations, as described in Section 3.8.
- The indicator variables for the two survey treatments included “Version R,” which equaled one if the participant saw Product R (reverse mortgage) before Product H (home reversion), capturing the impact of task order on decision-making, and “High premium in the case study,” which equaled one if the participant was shown the example with higher premiums. Further details on these treatments can be found in Section 3.5.
- The two variables measuring whether the participants paid attention when completing the survey included the IMC and the time taken to complete the survey, as described in Section 3.8.

The variable definitions are listed in Supporting Information S1: Appendix C.7. Most covariates were coded as binary variables for ease of interpretation. We converted numerical and ordinal variables to binary indicators of whether the participants’ responses were higher than the sample median to keep variable definitions consistent.

We measured individuals’ LTC insurance demand as the percentage of total wealth (calculated as the sum of the given saving amount and home value, see Section 3.3) they used to purchase LTC insurance. Since the dependent variable ranged between 0 and 1, we used beta regressions with a logit link function to estimate the association between the dependent variable and the independent variables (e.g., Ferrari & Cribari-Neto, 2004). We estimated separate regression models for the stated demand for LTC insurance in the three separate choice tasks, each focusing on a distinct method of financing LTC insurance.

The regression model for each choice task t is specified as:

$$\log\left(\frac{y_t}{1 - y_t}\right) = \beta_{0t} + \sum_{i=1}^p \beta_{it}x_{it} + \epsilon_t, \quad (1)$$

where y_t denotes the demand for LTC insurance in task t , x_{it} represents the i^{th} independent variable, β_{it} are the estimated coefficients for each task, β_{0t} is the intercept, and ϵ_t is the error term. The models were estimated using maximum likelihood estimation via the `betareg` function in R. We report the average marginal effects, which indicate the percentage point (ppt) change in demand resulting from a one-unit change in each predictor, averaged over the sample’s observed values.

5.2 | Main regression results

Table 2 presents the regression results, where we analyzed the factors explaining LTC insurance demand under the alternative funding approaches. In the following, we discuss the covariates that are significantly associated with LTC insurance demand across the three financing approaches. We also compare our results to those of related studies on demand for

LTC insurance conducted in Australia (Wu et al., 2022), Canada (Boyer et al., 2020), France (Courbage & Roudaut, 2008), Hong Kong (He & Chou, 2020), Spain (Costa-Font & Rovira-Forns, 2008; Jiménez-Martín et al., 2016), and the US (Brown & Finkelstein, 2008; Brown et al., 2012; Chatterjee & Fan, 2017; Gottlieb & Mitchell, 2020; McGarry et al., 2014; Van Houtven et al., 2015). We note that none of these studies assessed the demand for products that combine LTC insurance and home equity release (as in the present study).

Economic factors: Table 2 shows that the demand for LTC insurance was significantly lower among participants with higher household incomes across all three funding approaches. However, the magnitude of this effect is relatively small: Controlling for other covariates, having a household income above the sample median was associated with a decrease in demand of 0.7 ppts in Task 1, 1.4 ppts in Task 2, and 1.5 ppts in Task 3. These negative effects contrast with previous studies that found positive associations between income and LTC insurance demand but focused mainly on reimbursement-based LTC insurance (Brown et al., 2012; Chatterjee & Fan, 2017; Costa-Font & Rovira-Forns, 2008; Jiménez-Martín et al., 2016). The LTC insurance product offered in our survey, which pays a regular monthly income when one or both spouses qualify for LTC, may be less appealing to higher-income households that likely have sufficient resources to cover LTC costs. Additionally, our survey did not consider means-tested public LTC benefits, such as those under Medicaid, which could incentivize higher-income earners to purchase private LTC insurance. Such benefits are not widely available in China (see Section 2.1).

Table 2 also shows that participants with higher self-reported net nonhousing wealth had a higher demand for LTC insurance financed from savings only (in Task 1), consistent with findings by Chatterjee and Fan (2017) and He and Chou (2020). The size of this effect is 2.3 ppts. However, when housing assets could be accessed to fund LTC insurance in Tasks 2 and 3, demand was not constrained by the amount of nonhousing assets. Also, for the savings-only funded product, participants with a lower self-reported value for their primary property had a significantly higher demand for LTC insurance, with an effect size of 1.7 ppts. This finding aligns with Davidoff's (2009) argument that housing wealth is a substitute for LTC insurance when housing wealth is illiquid.

Demographic factors: There was no statistically significant link between LTC insurance demand and age, retirement status, or gender, consistent with the results of McGarry et al. (2014) and Jiménez-Martín et al. (2016).⁷ Married participants, including those in long-term relationships, had a higher demand for LTC insurance when housing wealth was available to purchase LTC insurance in Tasks 2 and 3, with effect sizes of 5.2 ppt and 6.7 ppt, respectively. Similarly, Gottlieb and Mitchell (2020) also found a higher demand for LTC insurance by married individuals, while several other studies found no link between marital status and LTC insurance demand (Jiménez-Martín et al., 2016; McGarry et al., 2014; Wu et al., 2022). Our findings may be attributable to our survey design, which asked individuals to assume they were married in the choice tasks and involved joint-life products. Consequently, married participants likely found it easier to relate to the choice tasks than single individuals. Participants with a daughter showed a lower demand for LTC insurance when housing wealth was available (−1.3 ppts in Tasks 2 and 3), possibly due to an expectation of relying on their

⁷These non-results may be due to the fact that we have included a broad range of other covariates, such as health measures, preferences, personality traits, expectations, and product and financial capability measures. It is possible that these factors are mediating the relationship between LTC insurance demand and demographic variables such as age, retirement status, or gender.

TABLE 2 Explaining the demand for LTC insurance.

	Task 1			Task 2			Task 3		
	Product S (savings)			Products S + R (savings + reverse mortgage)			Products S + H (savings + home reversion)		
	ME	SE	Sig.	ME	SE	Sig.	ME	SE	Sig.
<i>Economic factors</i>									
Net nonhousing wealth	0.023	(0.002)	***	0.008	(0.007)		0.007	(0.005)	
Household income	−0.007	(0.002)	**	−0.014	(0.007)	*	−0.015	(0.005)	**
Social health insurance	0.002	(0.010)		−0.004	(0.027)		−0.025	(0.021)	
Property value	−0.017	(0.002)	***	−0.005	(0.007)		−0.010	(0.005)	+
Mortgage	0.002	(0.003)		−0.006	(0.008)		−0.009	(0.006)	
<i>Demographic factors</i>									
Age	0.001	(0.001)		0.001	(0.004)		0.002	(0.003)	
Retired	−0.001	(0.004)		0.008	(0.010)		0.003	(0.008)	
Female	−0.001	(0.002)		−0.011	(0.007)	+	−0.007	(0.005)	
Married	0.014	(0.008)	+	0.052	(0.023)	*	0.067	(0.020)	***
1+ child	0.005	(0.013)		0.033	(0.036)		−0.014	(0.028)	
Daughter	−0.003	(0.002)		−0.013	(0.006)	*	−0.013	(0.005)	**
Child same HH	0.002	(0.002)		0.002	(0.006)		0.007	(0.005)	
College above	0.003	(0.002)		−0.002	(0.007)		0.006	(0.005)	
Tier 1 city	−0.003	(0.002)		−0.016	(0.007)	*	−0.013	(0.005)	*
<i>Health</i>									
Health	−0.001	(0.002)		−0.002	(0.007)		−0.003	(0.006)	
Life expectancy	−0.002	(0.002)		−0.014	(0.006)	*	−0.011	(0.005)	*
Smoker	0.002	(0.002)		−0.014	(0.007)	*	−0.006	(0.006)	
Chances need formal care at home	0.006	(0.003)	*	0.014	(0.007)	+	0.003	(0.006)	
Chances need formal care at residential nursing home	−0.003	(0.003)		0.014	(0.007)	+	0.011	(0.006)	+
<i>Preferences, personality, and expectations</i>									
Willingness to take financial risks	0.000	(0.003)		−0.007	(0.007)		−0.008	(0.006)	
Intended bequest	−0.009	(0.002)	***	−0.034	(0.007)	***	−0.029	(0.006)	***
Patience	−0.005	(0.003)	+	−0.006	(0.007)		−0.002	(0.006)	
Conscientiousness	−0.003	(0.002)		−0.003	(0.007)		−0.004	(0.005)	
House price expectations	0.002	(0.002)		0.019	(0.007)	**	0.015	(0.005)	**
Trust in banks	−0.000	(0.001)		−0.002	(0.003)		0.001	(0.002)	
Trust in insurers	0.004	(0.001)	***	0.014	(0.002)	***	0.011	(0.002)	***

(Continues)

TABLE 2 (Continued)

	Task 1			Task 2			Task 3		
	Product S (savings)			Products S + R (savings + reverse mortgage)			Products S + H (savings + home reversion)		
	ME	SE	Sig.	ME	SE	Sig.	ME	SE	Sig.
<i>Product and financial capability</i>									
Financial literacy and numeracy	0.001	(0.002)		−0.008	(0.007)		0.001	(0.006)	
Awareness of financial products	−0.004	(0.002)	+	−0.011	(0.007)		−0.008	(0.006)	
Awareness LTCI	0.004	(0.003)		0.019	(0.007)	**	0.020	(0.006)	***
Awareness RM	0.001	(0.002)		−0.006	(0.007)		−0.003	(0.005)	
Thought of LTC expenses	0.011	(0.002)	***	0.035	(0.006)	***	0.029	(0.005)	***
Subjective understanding of relevant products	0.018	(0.003)	***	0.047	(0.007)	***	0.036	(0.006)	***
Objective product knowledge	0.002	(0.002)		−0.015	(0.006)	*	−0.012	(0.005)	*
<i>Survey understanding and attention</i>									
Survey clarity	0.001	(0.004)		0.002	(0.010)		0.003	(0.008)	
Passed IMC	0.006	(0.003)	+	0.016	(0.009)	+	−0.000	(0.007)	
Survey time	−0.003	(0.002)		0.000	(0.006)		0.004	(0.005)	
<i>Treatments</i>									
Version R	−0.005	(0.002)	*	−0.013	(0.006)	*	−0.012	(0.005)	*
High premium in case study	0.002	(0.002)		0.004	(0.006)		0.005	(0.005)	
<i>Model information</i>									
N	1200			1200			1200		
R ²	0.159			0.152			0.175		

Note: This table presents the results of beta regressions of the percentage of total wealth allocated to LTC insurance on independent variables. Variables are defined in Supporting Information S1: Appendix C.7. +, *, **, and *** denote statistical significance at the 10%, 5%, 1%, and 0.1% level, respectively.

Abbreviations: IMC, instructional manipulation check; LTC, long-term care; ME, marginal effect; SE, standard error.

daughters for LTC. Notably, there was no link between LTC insurance demand and the number of children participants had, aligning with the findings of McGarry et al. (2014), Van Houtven et al. (2015), and Wu et al. (2022). Similarly, no link was found between LTC insurance demand and having a child living in the same household, likely due to the stronger effect of having a daughter.

Health: We found no significant link between subjective health and LTC insurance demand, in line with the results of Chatterjee and Fan (2017) and Gottlieb and Mitchell (2020). When

housing wealth was available for purchasing LTC insurance via a reverse mortgage or home reversion in Tasks 2 and 3, participants with a shorter subjective life expectancy indicated a higher demand for LTC insurance. The effect size was 1.4 ppt in Task 2 and 1.1 ppt in Task 3. This finding contrasts with existing studies that found no relationship between subjective life expectancy and the demand for LTC insurance (Wu et al., 2022). It is likely that participants with a shorter subjective life expectancy were more concerned about LTC risks and thus opted to purchase more LTC insurance.

Preferences, personality, and expectations: LTC insurance demand was lower for those who were more certain about leaving an inheritance, with a decrease of 0.9 ppt in Task 1, 3.4 ppt in Task 2, and 2.9 ppt in Task 3. In contrast, studies in Western countries found that individuals with stronger bequest motives have higher LTC insurance demand, most likely to protect remaining wealth against high nursing home costs (Boyer et al., 2020; Brown et al., 2012). Several other variables measuring preferences and personality (willingness to take financial risks, patience, conscientiousness) were mostly insignificant. However, participants with higher house price growth expectations had a higher demand for LTC insurance when housing wealth could be used in Tasks 2 and 3, with effect sizes of 1.9 ppt and 1.5 ppt, respectively. Furthermore, trust in insurers was a significant positive factor in all three choice tasks, contributing increases of 0.4 ppt, 1.4 ppt, and 1.1 ppt, respectively.⁸

Product and financial capability: Participants who had heard of LTC insurance before taking the survey had a higher demand for LTC insurance partially funded by housing wealth in Choice Tasks 2 and 3, with increases of 1.9 ppt and 2.0 ppt, respectively. Participants who had thought about how to pay for LTC expenses before participating in the survey allocated a significantly higher proportion of their total wealth to LTC insurance under all three funding approaches, with effect sizes of 1.1 ppt in Task 1, 3.5 ppt in Task 2, and 2.9 ppt in Task 3. These findings are consistent with the results of Courbage and Roudaut (2008), Brown et al. (2012), and Jiménez-Martín et al. (2016).

Furthermore, participants with a higher self-rated product understanding of the relevant products in Tasks 1, 2, and 3 had a higher demand for LTC insurance across the three tasks, with effect sizes of 1.8 ppt in Task 1, 4.7 ppt in Task 2, and 3.6 ppt in Task 3. This positive correlation between subjective understanding and product demand is consistent with findings from previous studies, such as those by Davidoff et al. (2017) and Hanewald, Bateman, et al. (2020). However, objective product knowledge—measured by the product quiz and a combined score of financial literacy and numeracy—was associated with lower LTC insurance demand in Tasks 2 and 3, with effect sizes of 1.5 ppt and 1.2 ppt, respectively.

Treatments: Our survey included two random treatments: the sequence of Choice Tasks 2 and 3, and the LTC insurance premium used in the case study example, as explained in Section 3.5. To account for potential order effects, we included a variable, “Version R,” which indicates whether participants first encountered Choice Task 2 (LTC insurance partially funded by a reverse mortgage) or Choice Task 3 (LTC insurance partially funded by home reversion). The results show that participants who first encountered Choice Task 2 allocated less wealth to LTC insurance in all tasks, with a decrease of 0.5 ppt in Task 1, 1.3 ppt in Task 2, and 1.2 ppt in Task 3. These findings suggest that the order in which participants encountered the financing options may have had a moderate impact on their wealth allocation decisions, with participants

⁸Trust in banks was not significant. We note that participants were told that all three products in the survey are offered by a “state-owned bank” not an insurer.

who encountered reverse mortgages first allocating slightly less wealth to LTC insurance in all tasks.⁹ There was no significant impact of the case study premium treatment on demand.

Summary: In Section 4.3, we reported that the demand for LTC insurance was higher when housing wealth was available to supplement savings to finance LTC insurance. This section reported plausible results for the effect of the independent variables on LTC insurance demand for the different funding strategies.

5.3 | Heterogeneity analysis

We conducted subgroup analyses to further investigate the main results discussed in the previous subsection, dividing the sample into subgroups and repeating the regression analysis for each. The corresponding results are reported in Supporting Information S1: Appendix E.

First, we examined whether different factors impact the preferences of men and women for financing LTC insurance using housing wealth. The results, reported in Supporting Information S1: Table E.1, indicate that several of the main findings applied to both men and women. For instance, both men and women who were more certain about leaving an inheritance had a lower LTC insurance demand across all three tasks. Similarly, men and women with a higher self-rated product understanding of the relevant products in Tasks 1, 2, and 3 had a consistently higher demand for LTC insurance. Some of the main results were only significant in one subgroup. For example, the demand for LTC insurance was significantly lower only among men with higher household incomes across all three funding approaches. Overall, the subgroup analysis for men and women identified similar factors, with the effects of these factors showing the same direction as in the main analysis.

Next, we split the sample into two groups based on whether the participants reported a household income above or below the sample median. The regression results for these two subgroups are reported in Supporting Information S1: Table E.2. Many of the main results reported in Table 2 were confirmed for both income subgroups. In addition, this subgroup analysis identified a number of ‘new’ factors that were not identified in the analyses discussed above. For example, demand for LTC insurance was associated with being retired and with the combined financial literacy and numeracy score, with different effects depending on net household income. Furthermore, females with a lower net household income had a lower demand for LTC insurance in Tasks 2 and 3.

Finally, we divided the sample based on whether the participants reported a property value above or below the sample median. This analysis (see Supporting Information S1: Table E.3) identified “having a mortgage” as an additional factor influencing LTC insurance demand, with differing effects for those with a “high” property value (positive links between having a mortgage and LTC insurance demand across all three tasks) and those with a “low” property value (negative effects in Tasks 2 and 3). Several key variables identified in the main analysis—bequest motives, trust in insurers, awareness of financial products, having thought about LTC expenses, and subjective product understanding—were confirmed in this property value-based subgroup analysis.

⁹However, these results should be interpreted with caution, as Choice Task 1 did not involve housing wealth. Additionally, we note that these effects do not alter the main findings, as participants allocated 5.2% of their total wealth to purchase LTC insurance in Task 1, 15.7% in Task 2, and 12.8% in Task 3 (see Figure 6).

6 | ROBUSTNESS TESTS

6.1 | Weighted sample

This subsection presents a robustness analysis that applies weights to correct the sample distribution. As noted in Section 4.1, our survey sample is younger, more educated, and wealthier than a corresponding sample from the nationally representative CHARLS. In Supporting Information S1: Appendix F.1, we report the results of a robustness test where we applied raking, also known as iterative proportional fitting, to calculate sample weights to align the marginal distributions of key variables with those of the CHARLS sample. Supporting Information S1: Appendix F.1. details the method used to compute the weights and reports descriptive statistics of the weighted sample, showing that it is indeed more similar to the CHARLS sample. The calculated weights suggest that about 33% of observations (394 out of 1200) are effectively removed with zero weights, while a small number of observations are assigned large weights of around 5.

Despite this adjustment, the average demand for LTC insurance in the weighted sample, as shown in Supporting Information S1: Figure F.2, is remarkably similar to the main results in Figure 6. The average amounts of total wealth allocated to Product S in Task 1, Product H in Task 2, and Product R in Task 3 are essentially unchanged. The only notable changes are slight reductions in wealth allocated to Product S in Task 2 (4.5% vs. 4.8% in Figure 6) and Task 3 (4.5% vs. 5.0% in Figure 6), leading to small decreases in LTC insurance demand in these two tasks.

We also repeated the regression analyses using the weighted sample. The corresponding results, available in Appendix F.1, generally confirmed the factors identified in the main findings in Table 2, with additional covariates showing significance. For example, older participants had a higher demand for LTC insurance in Tasks 1 and 3, while those with a child living in the same household had a higher demand in Tasks 2 and 3. Moreover, conscientiousness was linked to higher demand in all three tasks, while awareness of more financial products was a negative factor across all three tasks.

Overall, the findings presented in this subsection suggest that the main results are robust to sample bias.

6.2 | Pilot versus non-pilot cities

This subsection presents a robustness analysis where we split the sample based on whether the survey participants lived in a city that had trialed public LTC insurance. As described in Section 2.1, pilot programs for public LTC insurance were launched in 15 Chinese cities in 2016 and extended to 34 additional cities and areas in 2020. Our survey, conducted in November 2019, included participants from 49 cities. Of these, nine cities had pilot programs for public LTC insurance. This allows us to split the sample into a “pilot” subgroup with 466 survey participants and a “non-pilot” subgroup with 734 survey participants.

Supporting Information S1: Appendix F.2 shows that the average demand for LTC insurance was slightly lower in pilot cities than in non-pilot cities. Specifically, in Task 1, participants from pilot cities allocated 5.1% of their total wealth to Product S compared to 5.3% in non-pilot cities. Similarly, in Tasks 2 and 3, participants in pilot cities allocated 15.3% and 12.4% of their total wealth to LTC insurance, respectively, compared to 16.0% and 13.0% in pilot cities.

These results could suggest that public LTC insurance is, to some extent, crowding out demand for private LTC insurance in pilot cities. These findings are particularly noteworthy given that median household savings and median home values were higher in the pilot cities, which included several large and wealthy cities, such as Shanghai and Guangzhou (see Supporting Information S1: Appendix F.2).

6.3 | Accounting for preferred choices

This subsection tests the robustness of the LTC insurance demand results, considering the preferred choices in Choice Task 4. The descriptive statistics in Section 4.3 suggested that LTC insurance demand increased significantly when housing wealth (via a reverse mortgage or home reversion) was available as a financing option. However, Section 4.4 reported that 42% of participants selected their Task 1 choice, which relied solely on savings, as their best choice. To address this, we present in Supporting Information S1: Appendix F.3 the results of a robustness test, where we recalculated Figure 6 (average demand for LTC insurance) and Table 1 (testing the differences in the amount of LTC insurance), accounting for preferred choices as follows: For each participant, who preferred Task 1 over Tasks 2 or 3, we replaced their Task 2 or 3 product choice with their Task 1 choice for Product S, setting the demand for Products R and H to zero.

The results in Supporting Information S1: Appendix F.3 suggest that, even when accounting for preferred choices, the demand for LTC insurance still increased significantly when housing wealth could be used to purchase LTC insurance. However, the average amounts of housing wealth used were lower than in the main results: in Task 2, participants allocated 5.0% of their total wealth to Product S and 6.7% to Product R (vs. 4.8% and 10.9% in the main results). In Task 3, participants allocated 5.1% of their total wealth to Product S and 4.8% to Product H (vs. 5.0% and 7.8% in the main results).

7 | CONCLUSION

We developed and conducted an online survey to assess the stated demand for innovative LTC insurance arrangements that allow individuals to access their housing wealth to purchase LTC insurance. We focused on a joint-life product that pays a regular monthly income when one or both spouses qualify for LTC services.

In our sample of 1,200 Chinese homeowners aged 45–64, we found that the stated demand for LTC insurance increased when individuals could use housing wealth in addition to savings to purchase LTC insurance. When they could only use savings, the participants used on average 5.2% of their given wealth to purchase LTC insurance. The average demand for LTC insurance increased to 15.7% of total wealth when a reverse mortgage was available and 12.8% of total wealth when home reversion was available. Furthermore, we used regression analysis to identify factors driving the demand for the different LTC insurance products introduced in our study. Our findings confirm that household-level economic factors, demographic variables, health, bequest motives, trust in insurers, house price expectations, and financial capability impact LTC insurance demand. Importantly, we find—in line with previous studies (Davidoff et al., 2017; Hanewald, Bateman, et al., 2020)—that subjective product understanding is significantly associated with the stated demand for LTC insurance.

We extend the literature on housing liquidity and LTC insurance demand by providing empirical evidence for the stated demand for combinations of LTC insurance and home equity release products. Previous studies have mostly used lifecycle models and simulations to investigate whether and how the demand for LTC insurance increases when home equity can be used to finance the insurance premium (e.g., Achou, 2021; Davidoff, 2010; Hanewald et al., 2016; Shao et al., 2019). We find a larger effect of home equity release on LTC insurance demand than Achou (2021), who estimates that housing liquidity has a limited impact on LTC insurance demand in an estimated quantitative lifecycle model of single retirees in the US context. His model suggests that, even if housing wealth was fully liquid, LTC insurance rates would hardly rise above 10% from a 5% baseline in his sample. The larger effect identified in our survey-based study may arise from several factors, including: (i) we measured stated demand for an LTC income product, while Achou (2021) modeled observed demand for expense reimbursement LTC insurance, and (ii) differences in LTC risks and out-of-pocket costs between China and the United States.¹⁰ Comparing different combinations of LTC insurance and home equity release, we find that LTC insurance demand is slightly higher with reverse mortgages than with home reversion. This empirical result is consistent with the model-based results by Hanewald et al. (2016), who compared (standalone) reverse mortgages and home reversion plans in a lifecycle model and found higher utility gains from having access to reverse mortgages, which provide higher lump-sum payouts and downside protection against house price risk.

We developed product designs, product descriptions, and case studies that were well understood and generated positive demand from survey participants. For example, we included options for the homeowners' heirs to repay the reverse mortgage debt or buy back the home reversion share to keep the property upon contract termination. These designs and our survey results can contribute valuable insights for the development of new public or private sector programs in China and other markets. They could help to address some of the challenges that hindered the success of the complex reverse mortgage product previously piloted in China (Hanewald, Bateman, et al., 2020).

We acknowledge that our survey sample of urban Chinese homeowners was more educated and wealthier than a comparison sample from the nationally representative CHARLS survey. However, a robustness test showed that our main findings—that access to housing liquidity increases the stated demand for LTC insurance—remained valid after adjusting for sample bias with a weighting technique. We also observed a small but significant effect of task order on participants' decisions, with those encountering reverse mortgages first allocating slightly less wealth to LTC insurance across all tasks. However, this order effect did not alter the main conclusions. Future research could further explore the implications of task sequencing and collect a broader sample, including individuals living in rural areas.

Overall, our study documented a positive stated demand for new financial arrangements that allow older homeowners to use their housing wealth to fund LTC insurance. We found a higher stated demand for LTC insurance combined with a reverse mortgage rather than with home reversion. Our findings suggest that new types of reverse mortgage loans that pay a regular monthly income when borrowers qualify for LTC could be beneficial for China's aging population. While the arrangement was described as a 'financial product' offered by a "state-

¹⁰Achou (2021) incorporated means-tested LTC benefits from Medicaid into his lifecycle model. Our survey did not account for public LTC insurance, as it was only available in 15 pilot cities in China when the survey was conducted in 2019 (see Section 2.1).

owned bank,” it could also be offered as a government program similar to the Home Equity Access Scheme in Australia. This “public reverse mortgage” program allows older Australian homeowners to receive a voluntary, nontaxable fortnightly loan from the government, which can be used to finance LTC or other expenses (Sun et al., 2024).

To ensure the success and broad acceptance of new approaches to finance LTC insurance involving housing wealth, specific policy actions are needed. The Chinese government could consider establishing clear guidelines and protections for consumers to prevent potential financial abuse and ensure fair access to these financial products or programs. Additionally, piloting these programs in select cities with varying demographic profiles could help gather data and adjust the program before a wider rollout. Partnering with financial institutions and aging specialists to develop training programs for advisors would also help seniors and their families understand their options and the implications of their choices. These steps could help integrate new LTC financing options into China's broader plans for addressing the needs of its aging population.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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