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Housing Assets and Mental Well-being: A Financial Perspective from Longitudinal Chinese Data

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ABSTRACT

This paper presents a two-layer framework for mental well-being, consisting of the capital layer (human capital, financial capital, and social capital) and the value layer (personal value, family value, and social value). Using nationwide, longitudinal survey data from China (CHFS2011-CHFS2019), we test hypotheses derived from the framework and existing literature. Our results, obtained from a random-effects ordered probit model, suggest a nonlinear relationship between home ownership and mental well-being: the marginal utility of home ownership initially rises, but eventually decreases. Accordingly, China's housing market is expected to grow in the short term but level off in the long term. Our study finds very weak moderation effects of marriage and children on the ownership-wellbeing relationship. The evidence suggests a transition from a family-oriented value system to a self-oriented one in China.

1.Introduction

The concept of mental wellbeing is ubiquitously used but vaguely defined[1]. Terms such as "happiness" and "life satisfaction" are most popular ways of describing mental wellbeing[2-5]. However, measures like self-reported happiness and satisfaction tend to be subjective and incommensurable[6,7]. Despite these measurement issues, a vast literature is spawned based on questionnaires to identify various factors of mental wellbeing, such as occupational status[8], physical health[9], environmental quality[10], pet ownership[11] and more recently, COVID lockdowns[12]. Among others, home ownership is verified as a significant factor of mental wellbeing[13-15]. Dai & Zhou[16] find that homeless people (i.e., zero home ownership) are more likely to experience deteriorating mental health issues in the UK. Hamoudi & Dowd[17] examine how single home ownership contributes to psychological and cognitive wellbeing of older adults in the US. Searle et al.[18] investigate the heterogenous effect of multiple home ownership on wellbeing in the UK.

Nevertheless, there is no consensus on whether and how home ownership affects mental wellbeing. On the one hand, some studies suggest that homeowners are more likely to display a higher chance of being happy[19-22]. Specifically, Rohe[23] finds that owning a house has a positive effect on homeowners' self-esteem, sense of achievement and therefore mental wellbeing. Stillman & Liang[24] conclude that home ownership contributes to a higher mental wellbeing by providing a sense of security. Parker et al.[25] suggest that mental wellbeing can be increased by the investment returns associated with increases in house prices. On the other hand, some studies find a negative association between home ownership and mental wellbeing[26-28]. For instance, Rohe and Lindblad[29] argue that the attitudes of households to home ownership and their impacts on mental wellbeing changed in the presence of the failing housing prices. Zumbro[30] finds that any positive impact of home ownership on mental wellbeing can be offset by the negative effect of high housing costs.

Most of the abovementioned literature on the nexus between home ownership and mental wellbeing is mainly

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done in developed economies[23,24,28]. Research on developing economies is very scanty. However, countries like China, India, and Brazil are experiencing fast urbanization, which result in drastic changes in urban residents' wealth and health[31]. It is worth separately exploring how home ownership contributes to mental wellbeing in the context of developing countries. Our paper fills the gap in the literature using a longitudinal microdata in China.

As one of the fastest growing economies in the world, China provides an ideal and interesting case for studying the effects of home ownership on mental wellbeing, because property ownership was only introduced since 1990s. Before then, properties (houses and lands) were owned and allocated by the government. From early 1990s, the Chinese government launched a series of socioeconomic reforms aimed at promoting political and economic developments, which gradually replace the planned economy by a market economy. In this process, the idea of "personal life satisfaction" attracted Chinese policymakers' attention. Improving people's life satisfaction became one of the main objectives of the central government's long-term development strategy[32]. Hence, understanding the determinants of life satisfaction (or happiness) has attracted an increased attention in the Chinese literature[33-36]. Most of the studies focus on the households' demographics, health status, and environmental quality in China. Few studies examine the association between home ownership and mental wellbeing in the Chinese context. This omission is like ignoring the elephant in the room because the Chinese culture has a preferential tradition of home ownership. For thousands of years, it has been considered as a career path for the Chinese to "manage his home well before serving his country". Obviously, it is impossible to manage a home without owning one. Even nowadays, it is a well-known social phenomenon that the parent generation works extremely hard to help their children (especially sons) to own homes before they can get married. Under such a cultural background, home ownership is relevant to all generations in China.

Following the reforms in 1990s, private home ownership increased drastically. Chamon & Prasad[37] document that in the beginning of the 1990s, only 17 percent of Chinese households owned homes, whilst this figure in 2005 was 86 percent. The increased demand for houses, however, has driven the housing price up, especially in megacities like Beijing, Shanghai, and Shenzhen[38]. Most of the households suffered substantial pressures in the housing markets. Yet, the Chinese households keep buying houses. In cities, home ownership is deemed to increase a man's marriage competitiveness in China[39]. As an indicator of wealth status, some households own more than one property, but they are often unoccupied[40]. According to our data, 16.5 percent of the homeowners owned multiple homes in China.

Given the dilemma between the intense desire for home ownership and the rapidly rising housing prices, this paper sets out to answer the central research question using the most up to date longitudinal data: Does home ownership lead to happiness? There are already some answers to this question based on older, smaller-scale data. For example, Hu[5] and Cheng et al.[41] show that single home ownership has a significant impact on Chinese households' mental wellbeing. In addition to single home ownership, we contribute to the literature by analyzing the extent to which multiple home ownership affects the mental wellbeing of households. Our novelty is to extend the home purchase from an "extensive margin" (whether to own) to an "intensive margin" (how many/much to own: multiple ownership and partial ownership). It thus allows for nonlinearity in the effect of home ownership on mental wellbeing. Furthermore, we investigate whether the association between home ownership and mental wellbeing is stronger for married households[24] and for households with children[42]. In other words, we investigate if home ownership has moderating effects on family value to achieve mental wellbeing.

Our empirical analysis is based on the longitudinal China Household Finance Survey (CHFS) in 2011, 2013, 2015, 2017, and 2019. Controlling for socio-demographic factors, occupation-related characteristics of household heads, family income, and regional disparities, we find that multiple home ownership has a positive, initially rising, but eventually diminishing effect on mental wellbeing. The relationship does not exhibit statistically significant differences between the married and unmarried households, but families with children enjoy slightly bigger benefits of owning multiple homes.

This paper proceeds as follows:Section 2 critically reviews the literature on the relationship between home ownership and mental wellbeing, based on which we develop our hypotheses to be tested. Section 3 illustrates our conceptual framework, testable hypotheses, and the empirical model. Section 4 presents our data and provides some descriptive statistics. Section 5 discusses our empirical results and Section 6 concludes.

2.Literature review

Mental wellbeing has received increasing attention in the literature on happiness economics[43,44]. However, few research has been done on how the housing market affects it, especially in the Chinese context. Some studies argue for a positive link between home ownership and mental wellbeing in the light of personal feelings, housing conditions, and wealth effects[20,30]. Another branch of studies provided opposite views that the positive effect of home ownership on mental wellbeing can be eroded by housing price uncertainties, heavy housing costs, and the inability of households to afford the upkeep costs[26,27]. In general, the literature remains inconclusive. The following subsections aim to summarize different mechanisms via which home ownership takes effect on subjective wellbeing.

2.1.Psychological mechanism: self-esteem, sense of achievement, and security

From the perspective of psychological preferences, home ownership can be perceived as a signal of life success and higher social status, which lead to a higher level of mental wellbeing by raising self-esteem and providing a sense of achievement and security for the owners[23,45-47]. This subjective mechanism is established theoretically and verified empirically in the literature.

Rohe et al.[23] present a theoretical foundation for the benefits of being a homeowner. They argue that the positive effect results from the enhancement of homeowners' self-esteem, because home ownership can be seen as holding superior social positions. As a result, homeowners tend to have a higher self-esteem, and therefore a higher sense of satisfaction in life. Furthermore, home ownership can also be recognized as a significant achievement in an adult's life. The self-confidence that comes from this achievement leads to higher life satisfaction for homeowners.

Using a national data covering 6,214 US households over the period 1948-1994, Rossi & Weber[19] find that home ownership is always accompanied by higher life satisfaction. They explain this positive correlation by considering the sense of achievement derived from home ownership. They find that the sense of achievement enhances the confidence of homeowners in their ability to achieve other goals. Hence, homeowners tend to be more certain about their future plans and less pessimistic than renters. Moreover, it is observed that, unlike renters, homeowners are more likely to engage in social activities to improve the quality of their neighborhoods. The strong sense of community inclusion also contributes to the greater mental wellbeing of homeowners.

Based on 2,547 households drawn from the 1986 wave of the Australian Family Project National Survey, Bracher et al.[48] argue that being a homeowner can reduce the risk of family instability and increase the sense of security. For example, homeowners are less likely to divorce. There are two reasons. First, the property can be seen as one of the rewards of marriage. This gives more inner stability to the home-owning family. Second, the cost of dividing a house can be a barrier to a couple separating, which lowers the likelihood of divorce. As a result, a higher sense of security is generated, which may, in turn, lead to a stronger mental wellbeing.

Using the Household, Income and Labour Dynamics of Australia survey covering 7,600 households over the period 2001-2009, Stillman & Liang[24] find that home ownership has a positive impact on individuals' mental wellbeing in several dimensions. They find that the positive effect of home ownership on life satisfaction is stronger for married couples, especially those with larger families. In addition, the effect of home ownership on life satisfaction is greater for new owners than old owners. For single householders, males obtain a higher level of mental wellbeing from home ownership than females.

2.2.Physical mechanism: housing conditions

The impact of home ownership on mental wellbeing can also be explained from the perspective of physical conditions of living. In 2017, a survey of 3,509 households from six large cities in England, conducted by Shelter & ComRes[49], the UK's housing and homelessness charity, find that about one in five people (21%) in these cities experienced mental-health issues due to housing problems during a five-year period. Specifically, the main type of housing problems mentioned is the poor condition of accommodation.

Using data from about 12,000 households in the German Socio-Economic Panel Study from 1992 to 2009, Zumbro[30] argue that housing conditions are an important factor in determining the relationship between home ownership and life satisfaction. Compared to renters, homeowners are more likely to maintain and decorate their homes. They have higher enthusiasm for keeping their dwellings in good condition. Thus, homeowners perceive a higher life satisfaction than renters because of their high-quality living conditions. Furthermore, homeowners find it unsatisfactory to live in dwellings which need renovation. This suggests that higher housing renovation costs reduce the positive effect of owning a home on life satisfaction.

Based on a panel of 15 European countries over the period 1994-2001, Diaz-Serrano[20] compare homeowners and renters to quantify the contribution of home ownership to mental wellbeing. The transition from being a renter to a homeowner significantly enhances the satisfaction of a household. Compared to renters, the positive perceptions of living in a house are twice higher for homeowners. The benefits of owning a home can even affect those who only change their tenure status, without improving their dwelling conditions. For example, for a homeowner who initially rents and later becomes the owner of her rented dwelling, home ownership can increase her housing satisfaction, despite the same housing condition. In addition, home ownership can ease the dissatisfaction derived from the poor conditions of the dwelling.

2.3.Economic mechanism: wealth effects

Home ownership is regarded as an important component of households' wealth[50,51]. Some studies suggest that home ownership affects the sense of households' mental wellbeing by influencing their wealth accumulation, either in positive or negative ways[29,30].

Rohe et al.[23] develop a theoretical model for the positive wealth impact of home ownership on mental wellbeing. It is argued that housing price appreciation increases homeowners' wealth accumulation, so homeowners can obtain higher levels of mental wellbeing from their wealth gains. In addition, the housing mortgage debts of homeowners typically decrease over time due to repayments. Hence, homeowners enjoy less housing affordability pressure, which also contributes to their higher mental wellbeing levels.

Using data covering over 6,000 households in 2005 in Spain, Vera-Toscano & Ateca-Amestoy[51] confirm Rohe et al.[23]'s model on the impacts of housing price appreciation. They find that home ownership can be seen as a significant investment, since homeowners can obtain financial benefits from upward housing price movements. This contributes to enhancing homeowners' mental wellbeing. Nevertheless, the sense of homeowners' mental wellbeing may be decreased by heavy housing loans and/or costs. Using data drawn from the 2007 wave of the OECD and the EU-SILC, Balestra & Sultan[47] find that homeowners' mental wellbeing depends on their attitude towards housing affordability stresses. If the households are optimistic about housing costs, they are happier than households who perceived upkeep costs as burden.

Zumbro[30] finds that the effect of housing on mental wellbeing is more significant for low-income households than the high-income counterparts. As an important wealth

component, home ownership can help low-income households cope with the risk of old-age poverty. Hence, low-income homeowners are more likely to have stronger effect on mental wellbeing. However, this conclusion is controversial and debated by other empirical studies.

Using data collected from the 2017 wave of the Community Advantage Program panel, which covers 638 US households over 20 years, Grinstein-Weiss et al.[28] argue that, due to limited financial resources, low-income homeowners have fewer choices in home purchasing and less accessibility to well-developed and affluent neighborhoods. As a result, low-income homeowners are more likely to be unsatisfied. Therefore, the overall life satisfaction of low-income homeowners can be lower.

A study by Rohe & Lindblad[29] emphasizes the negative aspects of home ownership on individuals' mental wellbeing in the US context. Compared to Rohe et al.[23], Rohe & Lindblad[29] take the housing crisis factor into consideration. They argue that the problems derived from a housing crisis with regard to home ownership reduce a homeowner's mental wellbeing. The US housing crisis between 2006 and 2011 caused a dramatic housing market recession: housing prices decreased by more than 30% nationally during this period[52]. About one quarter of US homeowners' homes were worth less than their housing mortgages during the housing crisis. About four million homeowners were forced by foreclosure to surrender their homes at a price less than that their mortgage value (National Delinquency Survey). Therefore, the attitude of households to home ownership and their impacts on mental wellbeing changed in the presence of the housing crisis. Yet, as soon as the market recovered, households' preference for owning a home rebounded relatively fast.

Now let us turn to the studies on China. Using a large national dataset covering 10,151 households, drawn from the 2006 wave of the Chinese General Social Survey, Hu[5] is the first to study the relationship between home ownership status and the mental wellbeing of the Chinese households. He concludes that the effects of owning a home on overall mental wellbeing are different in different regions in China. Considering the great housing price gaps between large cities and small cities in China, it is suggested that households in large cities may be constrained by a heavier housing-financial burden than those in small cities. As a result, the positive effects of home ownership on mental wellbeing are stronger for small-city households. This result suggests that housing financial stress can erode the positive effects of home ownership on mental wellbeing.

Using the 2011 wave of the China Household Financial Survey, Cheng et al.[41] study the link taking into account different types of home ownership and housing value. It is found that the mental wellbeing as a result of having a full-ownership home is higher than that of having a partial-ownership home or a minor-ownership home. This is explained by the liquidity of different types of ownership: trading a full-ownership home on the housing markets is quicker than trading other types of home ownership. In such cases, full-ownership homes can be easily liquidated, and hence are effective in protecting households against unexpected financial risks. Hence, full-ownership homeowners can gain higher financial security from home ownership, and in turn, higher mental wellbeing levels. The positive relationship between home ownership and mental wellbeing is consistent with the studies on Western countries[19,23].

Using the wave 2010 of the Chinese General Social Survey, Ren & Van[53] analyze the link in urban areas in China. First, they find that home ownership has a strong positive effect on the life satisfaction of urban Chinese households in general. Second, they conclude that this positive association of home ownership with life satisfaction varies with the level of income. The positive effect is significant for urban residents with high and medium income, but not for low-income urban residents. This suggests that the housing-affordability burden of low-income residents can offset any positive effects of home ownership on their life satisfaction. This finding is in line with Zumbro[30].

3.The model

The literature review establishes three mechanisms through which home ownership affects mental wellbeing: psychological, physical, and economic paths, building on which we develop a unified conceptual framework of mental wellbeing, three testable hypotheses, and an empirical model.

3.1.Conceptual framework

Figure 1 presents the conceptual framework which unifies the reviewed literature in one general system. It resembles the structural model of health demand in Grossman[54], where "fundamental commodities" (e.g., health) are determined by "derived commodities" (e.g., healthcare). Similarly, the value layer in the conceptual model consists of the "fundamental commodities" to obtain mental wellbeing (the "end"), while the capital layer contains the "derived commodities" (the "means") to generate value or perception of being valued.

In the value layer, we distinguish three types of value, starting from the individual per se to the inner circle (family) and then to the outer circle (society). This hierarchical order of the value system is in line with the Confucian maxim of "self-cultivating, family-managing, and state-regulating"[1]. First, personal value is measured by the euphoria received by the individual purely for his or her own sake, such as expenditures of tourism and entertainment. The budget for achieving personal value reflects the degree of financial freedom, which can be proxied by the Engel coefficient (the food/income ratio). Second, family value is one of the most important pursuits in the Chinese culture. It is usually reflected by two indicators; one is whether one is married, and the other is whether one has children. We will investigate how home ownership affects mental wellbeing via the two indicators. Third, social value reflects how much the society respects and evaluates a person, which can be measured by his or her social status (e.g., occupational achievements).

[1]The original phrase in Chinese is "修身齐家治国平天下" from The Great Learning ("Da Xue"), which is one of the four classical books in Confucian philosophy.

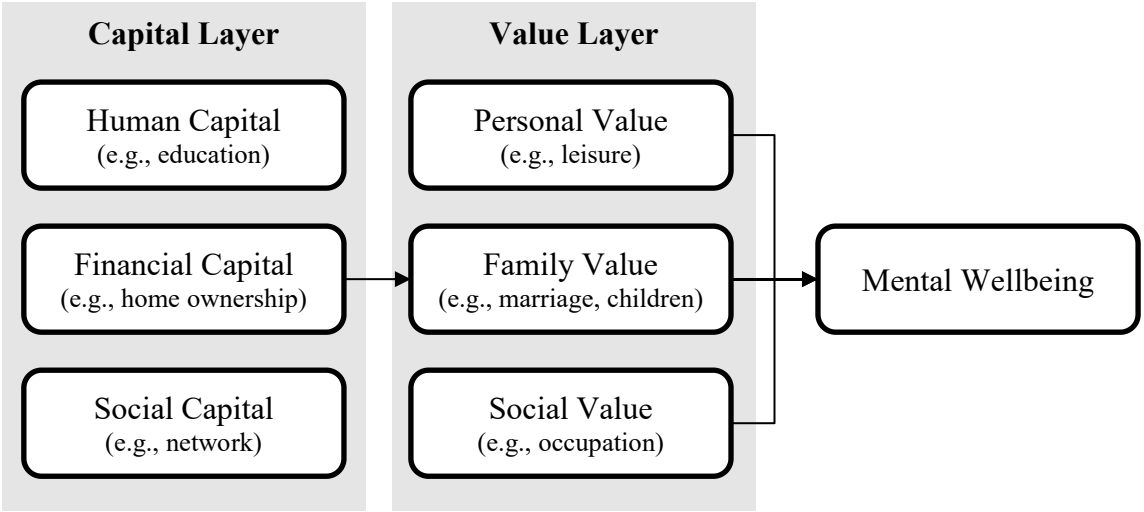

Fig 1. The conceptual framework of mental wellbeing

The capital layer defines the input basis of value generation and there are also three types of capital. First, human capital determines an individual's intelligent ability to create value, such as education, personality (risk attitude), and life experience (age). Second, financial capital, either inherited or accumulated, affects an individual's financial affordability to obtain value, such as assets, debts, and most importantly home ownership in this paper. Third, social capital influences an individual's network scalability to extend value, which mainly depends on the population size and political power of his or her social identity such as gender, ethnicity, and residency. In the Chinese society, this network effect has a special term called "guanxi" widely discussed in finance literature.

The value-layer and capital-layer factors are listed below:

- Value-layer factors:
  - Personal Value: food-income ratio (Engel coefficient), leisure-income ratio
  - Family Value: marital status (m_{it}), children dummy (n_{it})
  - Social Value: working status, entrepreneur, public servant, managerial level
- Capital-layer factors:
  - Human Capital: education level, age/experience, risk attitude
  - Financial Capital: home ownership, car ownership, assets, debts, insurances
  - Social Capital: gender, ethnicity, urban resident, migrant

3.2. Testable hypotheses

Building on the conceptual framework, we further develop the following three testable hypotheses on multiple home ownership.

First, we have seen that home ownership is positively associated with mental wellbeing, especially for high-income homeowners in developed economies[23,50]. A positive relationship between owning a home and mental wellbeing is also found in China[53,41]. The relationship can naturally be extended to multiple home ownership, but the second home is expected to generate greater benefit than the first home because the first ownership is for living while second home serves other purposes (e.g., investment, supporting children). For the same reason, the law of diminishing marginal utility may not apply to multiple home ownership because additional homes are not additional consumable goods, but rather, they are part of one's wealth and life-time budget constraint. However, maintenance costs may kick in, so the net benefit of owning more houses vanish eventually (H1B).

H1: Home ownership has a positive effect on households' mental wellbeing.

H1A: Second home ownership has a greater positive effect than single home ownership.

H1B: The positive effect of multiple home ownership diminishes slowly but eventually.

Many previous studies explore the moderation effect of household's characteristics on the effect[5,30,53]. Among these, Stillman & Liang[24] find that home ownership provides higher relationship satisfaction and overall life satisfaction to married households compared to single households. Therefore, it is expected that multiple home ownership has a stronger impact on married households' mental wellbeing compared to no or single ownership. However, the divorce rate in China has been steadily increasing in recent years. According to official data, the divorce rate in China was 2.87 per 1,000 people in 2020, up from 2.09 in 2015. Changing societal attitudes and increased economic independence may dampen the moderation effect. The following hypothesis is tested:

H2: The association between multiple home ownership on mental wellbeing is stronger for married households.

Lee & Xiao[42] show that exchanges between two generations of housing and financial transfers are common in China. It is partly due to the cultural value of family and partly due to the exchange for eldercare. Multiple home ownership is parents' preparation to support their children when they grow up. Nevertheless, recent development of pension schemes and eldercare markets may dampen the moderation effect. We therefore test the following hypothesis:

H3: The association between multiple home ownership on mental wellbeing is stronger for households with children.

3.3.Empirical models

These testable hypotheses are to be empirically verified or falsified by data. To do so, we formulate an empirical model to identify the effect of home ownership on subjective wellbeing. Following Hu[5] and Cheng et al.[41], we set up a random effects ordered probit model to operationalize the conceptual framework:

$$\Pr(y_{it}=k) = \Pr(\kappa_{k-1} \le \alpha + \beta' x_{it} + \mu m_{it} + \eta n_{it} + \gamma' z_{it} + v_i \le \kappa_k) \quad (1)$$

Note that this equation is a reduced form of the conceptual framework, so it does not identify the structural paths via which capitals affect values and values affect wellbeing. Instead, the coefficients only provide an empirical verification of the hypotheses. The ordinal variable y_{it} presents five ordered levels of mental wellbeing in the survey data, i.e., extremely unhappy (=1), unhappy (=2), just fine (=3), happy (=4), and extremely happy (=5) for household i at time t. To model the ordered scale of y_{it}, the linear component of equation (1) contains a set of cutpoints κ_k (k=1,2,3,4) to maximize the likelihood of matching the observed levels. To capture the panel data structure of the longitudinal surveys, a term v_i is added to model the random effect of individual i.

The key independent variable in testing hypotheses (H1), (H1A), and (H1B) is house ownership which is separately denoted by x_{it}. It can be a single variable (number of properties owned) or a set of dummy variables (one property, two properties, etc.). The ownership can also be distinguished as full ownership and partial ownership. Cheng et al.[41] ague that home ownership can significantly increase the level of Chinese homeowners' life satisfaction, regardless of the ownership type. We therefore expect to observe positive marginal effects associated with both variables. Marital status (m_{it}) and children dummy (n_{it}) are separated from other independent variables to emphasize their roles in family value[24,41,44,53]. Other factors are grouped into the control variable vector z_{it}.

To test hypotheses (H2) and (H3), equation (1) needs to be augmented by two sets of interactive terms between m_{it},n_{it} and x_{it} to capture the moderation effects of marriage/children on the effect of home ownership on mental wellbeing. In equation (2), we use the Stata syntax ## to indicate the interactive terms.

$$\Pr(y_{it}=k) = \Pr(\kappa_{k-1} \le \alpha + \beta' x_{it} \#\# (m_{it}, n_{it}) + \gamma' z_{it} + v_i \le \kappa_k). \quad (2)$$

We estimate all models using a random effects model. This choice of model over the alternative (fixed effects model) is due to the fact that the sample used in our study is randomly extracted from a large population[55]. To ensure the robustness of our results, we check them by changing the measure of the dependent variables from ordered metrics to dummy variables.

4.Data

We use the longitudinal dataset of China Household Finance Survey (CHFS) collected biannually from 2011. CHFS is a large-scale, nationally representative survey of household finances in China. It aims to collect comprehensive and detailed information about the financial status and behavior of Chinese households, including their income, spending, assets, debts, and savings, as well as their attitudes towards and experiences with various financial products and services[56].

Table 1. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Happiness	148,521	3.758	0.857	1	5
No. of properties	148,521	1.044	0.986	0	285
Full ownership	148,521	0.247	0.431	0	1
Married	148,521	0.855	0.352	0	1
No. of children	148,521	0.752	1.082	0	11
Food-income ratio	148,231	0.581	0.243	0	1
Leisure-income ratio	148,231	0.072	0.145	0	1
No job	148,521	0.351	0.477	0	1
Employer	148,521	0.104	0.305	0	1
Public servant	148,521	0.050	0.217	0	1
Managerial level	148,521	0.030	0.171	0	1
Education (primary)	148,521	0.239	0.426	0	1
Education (secondary)	148,521	0.478	0.500	0	1
Education (occupational)	148,521	0.124	0.329	0	1
Education (higher education)	148,521	0.082	0.274	0	1
Age	148,438	53.96	14.32	0	117
Risk seeker	148,521	0.073	0.260	0	1
Car ownership	148,521	0.581	0.493	0	1
ln(assets)	148,521	8.428	3.145	0	18.12
In debt	148,521	0.085	0.279	0	1
Insured (health)	148,521	0.927	0.261	0	1
Insured (pension)	148,521	0.839	0.368	0	1
Female	148,521	0.236	0.425	0	1
Ethnic minority	148,521	0.052	0.222	0	1
Urban resident	148,521	0.372	0.483	0	1
Migrant	148,521	0.056	0.229	0	1

CHFS uses a stratified multi-stage sampling design to ensure that its sample is representative of the Chinese population. In the first stage, provinces and autonomous regions in China are stratified into urban and rural areas and selected for inclusion in the sample. In the second stage, counties or districts within the selected regions are chosen as the sampling units. In the third stage, neighborhoods or villages within the selected counties or districts are selected as the primary sampling units. Finally, households within the selected neighborhoods or villages are selected as the final sampling units. This multi-stage sampling strategy allows the CHFS to accurately reflect the demographic and socioeconomic characteristics of households in different regions, urban and rural areas, and income groups in China, while also reducing sampling error. The sample size of the CHFS is large, usually around 10,000 households, which increases the reliability and validity of the survey results. More importantly, the CHFS tracks the same respondents over multiple time periods. This provides valuable information on changes in financial behavior and circumstances over time,

enabling researchers to study the dynamics of household finances and to assess the impact of various factors such as income, spending, and wealth. Panel data is more reliable than cross-sectional data as it accounts for both observed and unobserved factors that may affect financial behavior.

We use all datasets available before the COVID-19 pandemic, i.e., 2011, 2013, 2015, 2017, and 2019. Geographically, the dataset covers 29 province-level regions, including 25 provinces (Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Heilongjiang, Henan, Hubei, Hunan, Inner Mongolia, Jiangsu, Jiangxi, Jilin, Liaoning, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Sichuan, Yunnan, and Zhejiang) and 4 municipalities (Beijing, Chongqing, Shanghai, and Tianjin). Data are not collected for Tibet and Xinjiang. The descriptive statistics of the variables after dropping missing observations are reported in Table 1.

The dependent variable of this study is the measure of mental wellbeing. Terms such as "happiness", "wellbeing" and "life satisfaction", are used interchangeably in the studies of mental wellbeing. The CHFS dataset contains the following question: "In general, do you feel happy in your life?" The answer ranges from 1 (very unhappy), 2 (unhappy), 3 (neutral), 4 (happy), to 5 (very happy). For a robustness check, we create a binary measure of happiness by assigning a value of 1 if the response is greater than 4, and 0 otherwise. The other key variable is home ownership, measured by the number of properties owned by a household. Figure 2 plots a scatter plot between home ownership and happiness level (province-year pairs). There is a noticeable trend that as home ownership increases over time, the level of happiness also increases.

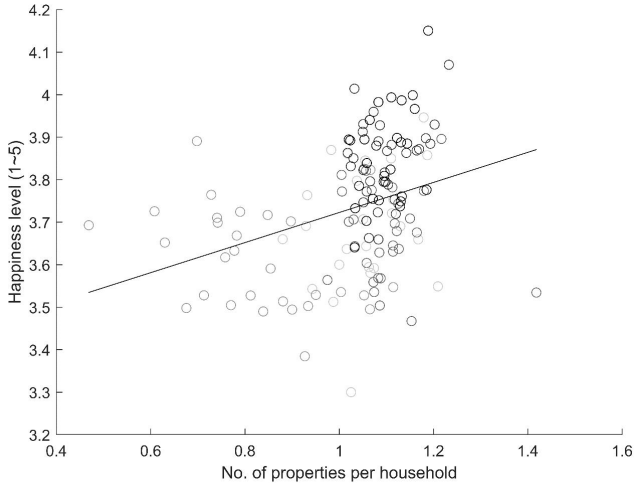

Fig 2. Scatter plot between happiness level and number of properties

Notes: Each circle represents the average levels of a province-year pair. Darker circles are more recent years. The regression line is positive and significant.

5.Results

In theory, ready-to-use maximum likelihood procedures (xtoprobit in Stata) can be implemented to estimate equation (1). However, the unbalanced panel data are too large (75,582 individuals, maximum 5 periods) to run the estimation in practice. To reduce the computational burden, we divide the data into 29 subsets based on province and independently estimate equation (1) for each province. We then obtain overall estimates by using provincial population as weights for a weighted average. The following subsections present and discuss the estimation results of equation (1), based on which the hypotheses are tested.

5.1.Home ownership and mental wellbeing

To test H1, we use four different measures to quantify the effect of home ownership on mental wellbeing: (i) the number of houses owned x_{it}, (ii) logarithm of houses $\ln x_{it}$, (iii) three-category dummy variables for single home ownership and multiple home ownership, and (iv) five-category dummy variables for single, double, triple, and 4+ home ownership. The first measure imposes a linear relationship, the second assumes a restrictive nonlinear relationship, while the last two allow for flexible nonlinear relationship. In addition to the "extensive measure" of home ownership x_{it}, we also have an "intensive measure" $\tilde{x}_{it}$ which is equal to 1 if the property is full ownership and 0 if partial ownership. The estimation results related to home ownership measures and cutting points are presented in Table 2.

The result of measure (i) shows that there is a significantly positive relationship between home ownership and mental wellbeing[57]. Therefore, the hypothesis (H1) is supported. The results of measure (ii) indicate that the positive relationship is concave, implying a diminishing marginal utility for multiple home ownership. To further examine the nonlinearity, estimation results (iii) and (iv) reveal that the second home ($x_{it} = 2$) creates a greater impact than the first home ($x_{it} = 1$), confirming the hypothesis (H1A). Based on the results of (iv), it can be shown in Figure 3 that the marginal effect of additional home ownership reaches the maximum at $x_{it} = 3$ and decline from there. The marginal benefit of owning additional homes starts to drop insignificant from the fourth property. This finding confirms the hypothesis (H1B)—despite slow, the diminishing marginal utility eventually kicks in.

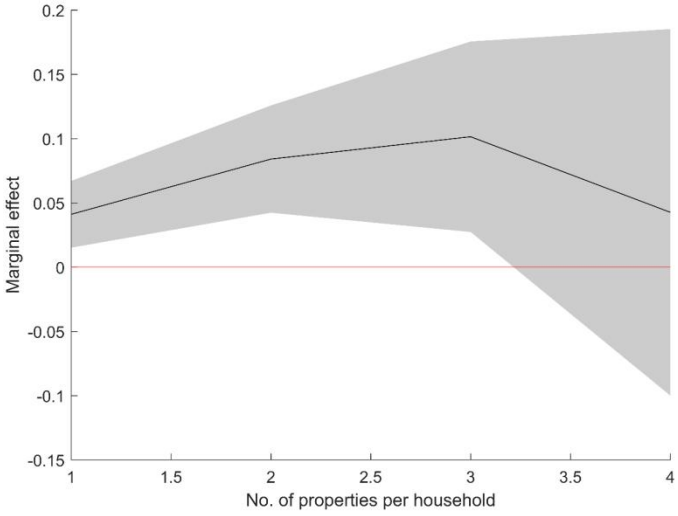

Fig 3. Marginal effect of multiple home ownership

Notes: The shade indicates the 95% confidence interval

Another dimension of home ownership is the extent to which the property is owned. In China, full ownership of a house ($\tilde{x}_{it} = 1$) refers to a person or entity having complete control and ownership rights over the property, including the right to use, transfer, mortgage, or dispose of it. Partial

ownership ($\tilde{x}_{it} = 0$), on the other hand, refers to a situation where an individual or entity only has partial control and ownership rights over a property, which may be limited by time, usage rights, or other conditions. In China, partial ownership is commonly seen in the form of shared ownership or leasehold ownership. The positive effect of full ownership is marginally significant in all four regressions, suggesting that people care less about the degree of ownership than the number of ownerships.

Table 2. Panel oprobit estimation results of home ownership measures

(i)		(ii)		(iii)		(iv)	
x_{it}	0.0597***	$\ln x_{it}$	0.124***	x_{it}=1	0.0408***	x_{it}=1	0.0411***
				$x_{it}\geq 2$	0.1378***	x_{it}=2	0.1253***
						x_{it}=3	0.2268***
						$x_{it}\geq 4$	0.2695***
$\tilde{x}_{it}$=1	0.0172*	$\tilde{x}_{it}$=1	0.0116	$\tilde{x}_{it}$=1	0.0197*	$\tilde{x}_{it}$=1	0.0191*
$\hat{\kappa}_1$	-1.6144***	$\hat{\kappa}_1$	-1.6032***	$\hat{\kappa}_1$	-1.6259***	$\hat{\kappa}_1$	-1.6291***
$\hat{\kappa}_2$	-0.6952***	$\hat{\kappa}_2$	-0.6838***	$\hat{\kappa}_2$	-0.7067***	$\hat{\kappa}_2$	-0.7097***
$\hat{\kappa}_3$	0.791***	$\hat{\kappa}_3$	0.8026***	$\hat{\kappa}_3$	0.7798***	$\hat{\kappa}_3$	0.777***
$\hat{\kappa}_4$	2.3432***	$\hat{\kappa}_4$	2.3549***	$\hat{\kappa}_4$	2.3322***	$\hat{\kappa}_4$	2.33***
$\hat{\sigma}_v^2$	0.447***	$\hat{\sigma}_v^2$	0.4472***	$\hat{\sigma}_v^2$	0.4465***	$\hat{\sigma}_v^2$	0.4466***
No. of obs.	148,149		148,149		148,149		148,149

Notes: *** = 1%, ** = 5%, * = 10%. x_{it} is the number of houses owned, and $\tilde{x}_{it}$ indicates full ownership. In regressions (iii) and (iv), the base group is x_{it}=0, i.e., no home ownership.

The estimated cutpoints of the four regressions are very close. When the latent variable $\hat{y}_{it} = \hat{\alpha} + \hat{\beta}'x_{it} + \hat{\mu}m_{it} + \hat{\eta}n_{it} + \hat{\gamma}'z_{it}$ falls in different intervals of the estimated cutpoints, i.e., $(-\infty, \hat{\kappa}_1], [\hat{\kappa}_1, \hat{\kappa}_2], [\hat{\kappa}_2, \hat{\kappa}_3], [\hat{\kappa}_3, \hat{\kappa}_4], [\hat{\kappa}_4, \infty)$, the outcome y_{it} is equal to the category of happiness 1,2,3,4,5 respectively. Note that the marginal effect shown in Figure 3 is the effect of an additional home ownership on the value of latent variable $\hat{y}_{it}$.

To understand the nonlinear relationship, it is important to note that properties can serve as an economic goods to use (the first home), an asset to invest (especially the second home), and a status good to signal the marriage market. Specifically, it is found that the skewed sex ratio in China motivates males to use home ownership to compete for partners[58]. Therefore, the marginal effect does not diminish until the fourth property because the first three properties serve different purposes and are considered as distinct goods.

5.2.Control variables and robustness

Apart from the key variables of interest (home ownership), the empirical model equation (1) provides a rich set of information on the determinants of happiness. The estimates are robust under different measures of home ownership (i-iv) and different measures of happiness (v) as shown in Table 3. The control variables are grouped in terms of the value layer and capital layer in line with the conceptual framework developed in subsection 3.1.

Personal Value. It is found that a higher Engel coefficient (food-income ratio) is negatively correlated to happiness because it suggests less financial freedom for households to enjoy and develop after paying for subsistence. As a sign of financial stress and material deprivation, households with a high Engel coefficient are more likely to struggle to afford necessities such as housing and healthcare, which can lead to increased stress and anxiety[59]. In contrast, there is a positive effect of leisure-income ratio on happiness. Leisure expenditure on tourism, hobbies, sports, and entertainment provide opportunities for social interaction, relaxation, and self-expression, which can contribute to better mental health[60]. Leisure expenditure can also serve as a source of meaning and purpose, helping individuals to achieve personal goals and feel a sense of accomplishment.

Family Value. It is shown that marriage has a positive impact on mental wellbeing. Marriage can provide a sense of security, social support, and companionship, which can contribute to a person's overall happiness and wellbeing. Our finding is consistent with the literature that married people tend to report higher levels of life satisfaction, lower levels of stress and depression, and better overall mental health compared to their unmarried counterparts[61]. However, the impact of children on happiness is found to be negative. While children can bring joy and fulfillment to many people's lives, they can also be a source of stress and responsibility. Studies have found that parents often experience more stress and reduced levels of life satisfaction compared to non-parents, especially for mothers[62].

Social Value. It is found that employment status (including whether to work and where to work) can have a significant impact on mental wellbeing due to the social value it provides. First, the negative coefficient of no job (-0.0525***) suggests that unemployment can lead to financial strain and insecurity, which can increase stress and anxiety. It can also lead to a loss of social status and identity, causing feelings of shame and low self-esteem. In addition, unemployment can result in decreased social support, isolation, and a lack of structure and purpose in daily life, all of which can contribute to poor mental health. Second, being an employer can have both positive and negative impacts on mental wellbeing, so the overall effect is insignificant. On the positive side, employment can provide financial stability, a sense of purpose, and opportunities for personal and professional growth. It can also provide a sense of social status and identity and allow individuals to contribute to society in a meaningful way[63].

However, studies have also shown that being an employer can lead to increased levels of stress and anxiety, particularly among those who are self-employed or who own small businesses[64]. Factors such as long work hours, job insecurity, and financial stress can contribute to poor mental health in this population. Third, reputable working sector (public servant) and job level (managerial) have positive impacts on mental wellbeing. Public sector jobs are often associated with a wage premium, job security, good working conditions, and opportunities for professional development[65,66]. Public sector employees may also benefit from a strong sense of purpose and the opportunity to make a positive impact on their communities. Additionally, the benefits and leave policies offered by the public sector are often more generous than those in the private sector, providing additional support for mental wellbeing.

Table 3. Panel oprobit estimation results of control variables

		(i)	(ii)	(iii)	(iv)	(v)
Personal Value	Food-income ratio	-0.0573***	-0.0588***	-0.0559***	-0.0553***	-0.0869***
	Leisure-income ratio	0.0903***	0.0926***	0.0875***	0.0857***	0.1286***
Family Value	Married	0.2297***	0.2283***	0.2298***	0.2298***	0.2626***
	Have children	-0.1007***	-0.1004***	-0.1016***	-0.1017***	-0.0932***
Social Value	No job	-0.0525***	-0.0519***	-0.0527***	-0.0526***	-0.045***
	Employer	0.0012	0.0015	0.0017	0.0015	-0.0183
	Public servant	0.0704***	0.0707***	0.0686***	0.0682***	0.094***
	Managerial level	0.1722***	0.1727***	0.1718***	0.1718***	0.2014***
Human Capital	Education (primary)	0.0402***	0.0398***	0.0405***	0.0402***	-0.0132
	Education (secondary)	0.0492***	0.0493***	0.0487***	0.0482***	-0.0028
	Education (occupational)	0.1027***	0.1042***	0.101***	0.1003***	0.0909***
	Education (higher education)	0.1074***	0.1096***	0.1059***	0.105***	0.1106***
	Age	0.0114***	0.0114***	0.0114***	0.0114***	0.0121***
	Risk seeker	0.0021	0.0029	0.0014	0.0008	0.0037
Financial Capital	Home ownership	Yes	Yes	Yes	Yes	0.0676***
	Car ownership	-0.0364***	-0.04***	-0.0315***	-0.0327***	-0.0153
	ln(assets)	0.0413***	0.0414***	0.0411***	0.041***	0.0423***
	Have debt	0.021	0.0196	0.0199	0.0205	0.0145
	Insured (health)	0.0116	0.0105	0.0112	0.0114	0.0278*
	Insured (pension)	0.0536***	0.0532***	0.0531***	0.0532***	0.0576***
Social Capital	Female	0.035***	0.0355***	0.0352***	0.035***	0.0553***
	Ethnic minority	0.0812*	0.0809*	0.0818*	0.0816*	0.0795***
	Urban resident	-0.0241***	-0.0235**	-0.0247***	-0.0245***	0.0003
	Migrant	0.0672***	0.0684***	0.0654***	0.0657***	0.0825***
	Year fixed effects	Yes	Yes	Yes	Yes	Yes
	Household fixed effects	Yes	Yes	Yes	Yes	Yes

Notes: *** = 1%, ** = 5%, * = 10%. Column (i) uses a linear measure of home ownership (x_{it}), (ii) uses $\ln x_{it}$, (iii) uses three-category dummies (x_{it}=0,1,2+), and (iv) uses five-category dummies (x_{it}=0,1,2,3,4+). Column (v) uses a binary measure of happiness ($y_{it}\geq 4$) rather than a 5-level ordered measure as in (i)-(iv).

Human Capital. Our results are consistent with the literature. Higher levels of education are found to be associated with increased opportunities for personal and professional growth, which can lead to greater life satisfaction and improved mental wellbeing[67]. Education can also provide a sense of identity and personal fulfillment, as well as a greater sense of control over one's life[68]. Education can also increase access to better-paying jobs and better health care, which can provide indirect support for mental wellbeing. Age indicates different phases in a life cycle. The positive coefficient of age implies that, compared to older generations, younger adults in China face fierce competition in both job market and marriage market, which can be a source of stress and anxiety. Risk preferences have an insignificant effect because there are two opposite impacts. On the one hand, risk-averse individuals tend to prioritize stability and security in their lives and may experience reduced stress and improved mental wellbeing. On the other hand, taking calculated risks can also have a positive impact one mental wellbeing as it can provide a sense of control and personal agency as well as opportunities for personal wealth and professional growth.

Financial Capital. As discussed in 5.1, home ownership has a positive but slowly diminishing impact on mental wellbeing (H1, H1A, H1B). In urban areas, home ownership may have a negative effect on non-housing spending, known as the "tightening-belts-to-buy-a-home effect"[69], which may help explain the declining marginal utility (H1B) via the personal value channel indirectly. Our results show that car ownership has a negative effect on mental wellbeing, as the costs (financial stress and traffic congestion) outweigh the benefits

(increased mobility and social status). The indebtedness, whether it be a home mortgage or car mortgage, does not significantly impact mental wellbeing as the benefits and costs of borrowing cancel each other out. Our results show that insurance plays a crucial role in reducing uncertainty and anxiety, but the positive impact of healthcare insurance as a contingent payment is not significant. In contrast, pension schemes as a regular payment have a more significant impact[70].

Social Capital. A well-connected social network provides the source of social value, which in turn contributes to mental wellbeing. There are many social dimensions in which social capital can be analyzed. First, in the gender dimension, many studies have found that women are more likely to experience depression, anxiety, and stress due to gender discrimination and domestic abuse[71], while men are more likely to experience substance abuse and behavioral problems[72]. According to our results, women in China enjoy a higher mental wellbeing partly because of the skewed gender ratio (105 males to 100 females in 2022) and partly because of the "women-hold-up-half-the-sky" culture[73]. Second, ethnic minorities in China account for 8.4% of the population. The Chinese government has implemented policies to support ethnic minorities aiming to promote equality, improve living standards, and protect the rights of ethnic minorities such as affirmative action (preferential treatment in education and employment) and cultural preservation. The estimated mental wellbeing of the minorities is not significantly higher, probably because they mainly live in deprived regions. Third, like many empirical findings, our results show that urban residents tend to have lower mental wellbeing. Urban living can bring many benefits, such as access to better healthcare, education, and employment opportunities, but urbanization can also lead to increased stress, anxiety, and depression due to factors such as high population density, noise pollution, and limited green spaces. It can also result in social isolation and loneliness, especially for those who live alone or are new to the city[74]. Finally, migrants (mainly intranational) enjoy greater happiness level because spatial mobility allows people to choose the best residential location suitable for their preferences and needs[75].

5.3.Moderation effects of family value

To test the moderation effects of family value (marriage and children) on the relationship between home ownership and mental wellbeing, we estimate equation (2) using the four measurements of home ownership. Table 4 reports the estimated moderation effects.

Table 4. Panel oprobit estimation results of moderation effects

(i)		(ii)		(iii)		(iv)	
$x_{it}\#m_{it}$	0.007	$\ln x_{it}\#m_{it}$	0.0279	$=1\#m_{it}$	0.0003	$=1\#m_{it}$	0.0005
				$\geq 2\#m_{it}$	0.0071	$=2\#m_{it}$	0.0036
						$=3\#m_{it}$	-0.4854
						$\geq 4\#m_{it}$	-1.7246
$x_{it}\#n_{it}$	0.0251**	$\ln x_{it}\#n_{it}$	0.0423*	$=1\#n_{it}$	0.0020	$=1\#n_{it}$	0.0021
				$\geq 2\#n_{it}$	0.0402	$=2\#n_{it}$	0.0407
						$=3\#n_{it}$	0.0074
						$\geq 4\#n_{it}$	-0.0661
No. of obs.	148,149		148,149		148,149		148,149

Notes: *** = 1%, ** = 5%, * = 10%. x_{it} is the number of houses owned, m_{it} is equal to 1 if married and 0 otherwise, and n_{it} is equal to 1 if having children and 0 otherwise. In regressions (iii) and (iv), the base group is x_{it}=0, i.e., no home ownership. The control variables are the same as equation (1).

It is shown that marriage does not have any significant moderation effect on the ownership-happiness relationship. This finding is at odds with earlier studies[24]. There are two possible explanations of this result. On the one hand, with the rise of individualism and a greater emphasis on personal happiness, many people in urban China are choosing to end unhappy marriages rather than staying together for the sake of tradition, family, or economic considerations[76]. The moderation effect of home ownership (single or multiple) diminishes in the changing societal attitudes. On the other hand, the Chinese government has relaxed restrictions on divorce in recent years, making it less costly to end their marriages. In 2016, the government revised its laws, reducing the mandatory waiting period for divorce from two years to one year. The division of property during a divorce is also made clearer by the Marriage Law. As a result, home ownership is no longer an essential factor to hold a family together, the hypothesis (H2) is not supported by the data in 2010s.

Turning to children's moderation effect, the estimates show ambiguous results. If the linear measure x_{it} is used, then the moderation effect is positive and significant (0.0251**). It suggests that having children enhances the positive effect of home ownership on mental wellbeing in line with previous evidence on developed economies[50] and developing economies[53]. Nevertheless, if nonlinear measures are considered, the moderation effect becomes weaker ($\ln x_{it}$) or even insignificant (dummies). Admittedly, having a child is a major life event that changes their priorities and financial situation. The desire for a stable and secure living environment for their family can be a significant factor in motivating people to own a home. However, the impact of having a child on the motivation to own a home can vary depending on a number of factors, including a family's financial situation, cultural norms and values, and individual preferences. For some families, the cost of owning a home may outweigh the benefits, and they may prefer to rent or live in alternative housing arrangements. Our data does not

provide significant evidence for the moderation effect of children on the relationship between home ownership and wellbeing. Hypothesis (H3) is not supported.

The findings based on equation (2) point to one common trend—family value of Chinese households is less intertwined with home ownership. We believe that it is a progress because in pursuit of happiness, family value is less dependent of material appeal (home ownership). It indicates a greater degree of freedom in marriage and child rearing.

6.Conclusion

Based on a longitudinal, nation-wide survey in China from 2011 to 2019 (CHFS), this paper creates a model of mental wellbeing, with a specific focus on home ownership. Theoretically, we establish a two-layer framework is established, where the capital layer (human capital, financial capital, and social capital) has an indirect impact on mental wellbeing through the value layer (personal value, family value, and social value). Empirically, the three hypotheses are tested by a panel ordered probit regression, resulting in the following findings.

First, our findings show that home ownership has a positive impact on households' mental wellbeing (H1), with a stronger effect for the second and third homes compared to the first home (H1A). The nonlinearity is because different homes serve different purposes, such as residential, investment, and status-signaling. However, the positive marginal effect of owning multiple homes eventually decreases (H1B) as the number of properties exceeds the number of purposes.

Second, there is evidence to suggest that a social transformation has occurred in China. Compared to previous empirical evidence prior to 2010, Chinese households appear to be shifting from a family-oriented value system to a self-oriented one. For instance, marriage is now based on love rather than lineage continuation, as indicated by a positive effect of marriage on mental wellbeing together with an increasing divorce rate in China. Additionally, childcare is seen as costly, both financially and psychologically, as indicated by its negative effect on mental wellbeing. There is a greater focus on personal and social value.

Third, the positive moderating effects of family value (marriage/children) on the relationship between home ownership and mental wellbeing are weaker than what has been found in previous literature[24,42]. This is further evidence of the separation of material appeal and family value in the transitioning China. This phenomenon results from economic and demographic changes, which are rooted in institutional and cultural changes. A rapidly growing economy and aging society are systematically altering the costs and benefits of home ownership, marriage formation, and child rearing. Resources that were once scarce (such as houses) are becoming more readily available, while pursuits that were once highly valued (such as having children) are losing appeal as China enters demographic transition[77]. The legal and value systems are evolving to reflect these shifts in economic and demographic conditions, causing family values to place more emphasis on intrinsic components and reducing the importance of instrumental components.

Our findings have the following implications for policymakers and stakeholders in the housing market. In the short-term (1 to 10 years), the housing market in China is still expected to experience stable growth as the average number of homes owned is about one, as shown in Figure 2. The first home only serves the purpose of residential use. According to Hypothesis (H1A), the demand for second and third homes is still unmet. This tension between housing demand and supply is particularly high in mega-cities due to limited land availability. In the long-term (10 to 50 years), however, this tension is expected to be reversed (H1B). There will be an excess of housing supply due to the declining population (China saw its first population decline in 2022 for the first time since 1961) and an inverted demographic pyramid. Additionally, as values shift towards personal value, social value, and the intrinsic component of family value, the demand for multiple homes as status symbols will also decline. As the asset market in China becomes more diverse and mature, there will be more alternative investment options to property ownership. The stress of urban life is also causing younger generations to seek a higher mental wellbeing by leaving megacities. All these ongoing changes in economic and demographic conditions indicate a secular decline in the housing market.

For individuals, our findings can also offer insights into promoting mental health. The following three implications are based on the estimated personal value, social value, and family value, respectively. First, develop a hobby. As part of leisure spending, hobbies can provide a sense of purpose, boost feelings of accomplishment and self-esteem, and reduce stress and anxiety. They can also serve as a form of escape, helping individuals relax and temporarily forget about family and social tensions. However, it is important to maintain balance and not let the hobby become a source of stress or anxiety. Second, find a job. As social animals, human beings need social connections to build our value systems, especially in a market economy. All other values are created and transmitted within social networks. A larger network means a greater value potential, but social anxiety and stress can also harm mental wellbeing. There exists an optimal size for one's social network. Third, build a healthy relationship (or leave a toxic one). Evidence indicates that marriage can offer emotional support, financial security, and a feeling of social connectedness, all of which can improve mental health. However, marriage can also be a source of stress and conflict, potentially hurting mental wellbeing. It is encouraging to see that more people, especially women, have increased freedom to end unhealthy marriages.

One limitation of the paper is that it employs a reduced-form regression instead of a structural equation model. The primary goal of this study was to establish a theoretical framework and present some basic empirical findings. As a result, we only identify the overall impact of the value layer and capital layer factors, rather than delving into specific transmission mechanisms. Further research could examine the conceptual framework in a more complex manner to uncover additional interactions between the two layers.

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