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Housing Wealth as Precautionary Saving: Evidence from Urban China

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Abstract

This article provides new evidence on the housing-wealth effect on consumption using household panel data. A key advantage in studying the Chinese housing market is the absence of the collateral channel because households are prohibited from withdrawing housing equity. The results show that for every 1% increase in housing wealth, household consumption increases by 0.14%, suggesting an implied marginal propensity to consume out of housing wealth of 0.023. Further, we find that this marginal propensity to consume is the largest among employees who face greater income uncertainty, suggesting that precautionary-saving motives are driving the results.

I. Introduction

For many households around the world, housing wealth is the most important component of a household's portfolio and has been linked in many studies to household consumption. Most studies have documented a positive marginal propensity to consume (MPC) out of housing wealth, although its size remains uncertain. The estimates typically range from 0.02 to 0.07 depending on the type of data, the methods used, and the country studied.[1] Understanding how housing wealth

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[1]See Engelhardt (1996), Lehnert (2004), Campbell and Cocco (2007), Muellbauer (2007), Bostic, Gabriel, and Painter (2009), Gan (2010), Carroll, Otsuka, and Slacalek (2011), Mian and Sufi (2011), Mian, Rao, and Sufi (2013), Cooper (2013), Iacoviello and Pavan (2013), Atalay, Whelan, and Yates (2016), Windsor, Jääskelä, and Finlay (2015), Bhatia and Mitchell (2016), and Aladangady (2017). It is worth noting that a few studies find no housing-wealth effect (Skinner (1989), Phang (2004), and

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affects household consumption remains an important area of research because the size of the estimate will determine how housing market shocks translate into the real economy and how policies should respond to these shocks.

It is worth noting that the strong positive consumption responses to housing wealth do not reconcile with predictions from a classical consumption model of the permanent-income hypothesis.[2] Researchers have noted three theoretical mechanisms by which housing wealth can affect consumption outside of the classical model. The first mechanism is often described as "the pure-wealth effect"; it suggests that the housing-wealth effect should primarily exist among older people when they sell or downsize their houses. The second mechanism focuses on the role of housing wealth as collateral and argues that borrowing-constrained homeowners can borrow more to increase consumption when the housing value increases, which gives rise to a positive correlation between housing wealth and consumption. The third mechanism focuses on the role of housing wealth as buffer stock and hypothesizes that the increases in housing wealth reduce the need for precautionary saving and, thus, encourage higher consumption.

Although considerable recent research has gone into understanding the importance of the pure wealth[3] and collateral channels,[4] relatively little is known about the role of housing wealth as a precautionary buffer stock. Studies that focus on the collateral channel often fail to disentangle it from the precautionary-saving channel. Indeed, it is challenging to disentangle the two mechanisms because they are not mutually exclusive. The increase in housing wealth can lead to not only a relaxed borrowing constraint but also declining precautionary saving.

The lack of understanding of the role of the precautionary-saving channel is particularly concerning given the role of precautionary savings in China as well as in other countries, such as the United States.[5] For example, Choi, Lugauer, and Mark (2017) show that more than 80% of China's savings and nearly all of U.S. savings arise from precautionary motives.

In this article, we exploit a unique feature of the Chinese housing market to distinguish different mechanisms that connect changes in housing wealth to

Browning, Gørtz, and Leth-Petersen (2013)). See Section II for a more detailed summary of the literature.

[2]In the classical consumption model under the permanent-income hypothesis, an increase in future housing costs can offset the effect of an increase in housing value, predicting a small housing-wealth effect on consumption. Flavin and Nakagawa (2008) formalize this intuition in a model with households' intertemporal consumption decisions over housing and nonhousing expenditures. Within this framework, housing wealth can have a significant positive impact on household consumption only if the homeowners plan to sell their house and downsize when they get older.

[3]For example, Campbell and Cocco (2007) and Attanasio, Blow, Hamilton, and Leicester (2009) have tested the pure-wealth effect.

[4]For example, articles using data from the United States (Mian et al. (2013), Cooper (2013), DeFusco (2018), and Aladangady (2017)) and the United Kingdom, Australia, and Canada (Muellbauer (2007), Atalay et al. (2016), Windsor et al. (2015), and Bhatia and Mitchell (2016)) all found supporting evidence for the collateral channel.

[5]Several articles have found evidence that precautionary motives play an important role in determining household consumption dynamics in the United States and in China (Carroll, Hall, and Zeldes (1992), Gourinchas and Parker (2002), Carroll and Samwick (1997), (1998), Chamon and Prasad (2010), Chamon, Liu, and Prasad (2013), Choi et al. (2017), and He, Huang, Liu, and Zhu (2018)). See Section III for a more detailed summary on this strand of literature.

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consumption. China's housing market provides a suitable setting for this article for two reasons. First, in contrast to the U.S. housing market, during our sample period (2002–2009), homeowners in China were not allowed to extract equity from their homes,[6] which limits any collateral effects of house price appreciation. This feature implies a very small to nonexistent collateral channel and allows us to test the size of the precautionary-saving channel without the contamination of the collateral effect. Second, during the past 3 decades, China's housing prices experienced dramatic appreciation, and a majority of urban homeowners in China experienced growth in housing wealth. The constant quality housing price index proposed by Wu, Deng, and Liu (2014) shows an 11.5% per annum compound real growth rate in housing prices between 2006 and 2013. Thus, this period provides sufficient variation to examine household consumption responses to housing-wealth changes.

We are using a large household-level panel data set called the Urban Household Survey (UHS),[7] which simultaneously tracks the housing wealth and detailed consumption of more than 19,000 urban households in China. These household-level data make it possible to assess the importance of the precautionary-saving channel by exploring different subpopulations in a way that is not possible using many aggregate-level data sets. To do so, we have designed three tests to explore the precautionary-saving channel. The first test compares the consumption responses of the public- and private-sector employees. The poor coverage of social security in China causes private-sector employees to have a greater need for precautionary saving than public-sector employees, so if the reduction of precautionary saving is an important driving force behind the relationship between housing wealth and household consumption, we expect to observe stronger consumption responses among private-sector employees. The second test compares the consumption responses among college-educated and non-college-educated workers. Non-college-educated workers face greater income uncertainty in the future and thus are more likely to engage in precautionary saving than college-educated workers. If the reduction of precautionary saving is an important channel for explaining housing-wealth effects, then we should observe greater consumption responses to housing-wealth shocks among non-college-educated workers. The final test takes advantage of the UHS data, which include a broad set of consumption categories, enabling us to test the precautionary-saving channel with better-defined discretionary and nondiscretionary consumption.

Additionally, the rich longitudinal data contained in the UHS provide some key advantages that can improve the estimates of housing-wealth effects over other studies. Most studies have not been able to track families over time with complete consumption and wealth data. Often, studies that have relied on cross-sectional data have been forced to merge data sets (Bostic et al. (2009)), to rely on the subcategory of consumption (Gan, Yin, and Zang (2010), Mian et al. (2013)), or to use incomplete consumption data (Skinner (1989)). Household-level panel

[6]Section III.B provides more discussion of China's housing-market development.

[7]The UHS, because of its richness of data on household income and expenditure, has been widely adopted by several high-quality publications to analyze household savings, income inequality, and wage structure in China (Meng, Gregory, and Wang (2005), Chamon and Prasad (2010), Chamon et al. (2013), and Ge and Yang (2014)).

data also enable the household fixed-effects model to better control time-invariant unobservable factors that may influence the size of the estimated housing-wealth effect.

The results suggest that housing wealth has a strong impact on consumption among Chinese households. Within the household fixed-effects model, we find that for every 1% increase in housing wealth, household consumption increases by 0.14%, implying an MPC out of housing wealth of 0.023. This estimated MPC of 0.023 is at the lower end of the estimated MPC in the literature for two possible reasons:[8] First, in China, the absence of the collateral channel lowers the overall MPC; second, many existing studies fail to control for household fixed effects, which likely produces an upward bias in the estimates. When we do not control for household fixed effects, the estimated MPC more than doubles. More importantly, our results suggest that the observed relationship between housing wealth and consumption in China is primarily attributable to precautionary-saving motives. We find that consumption responses are stronger among non-public-sector employees than public-sector employees and are stronger among non-college-educated employees than college-educated employees. These results are robust to several alternative model specifications. In addition, dividing consumption into different categories provides additional evidence on the precautionary-saving channel because we find that discretionary consumption (e.g., dining out, entertainment, and vacation) responds more strongly to changes in housing wealth.

Besides highlighting the importance of the precautionary-saving channel, this article also adds to the growing literature that studies the economic consequences of China's housing market development. China's urban housing market has experienced substantial structural changes and has become a key part of the Chinese economy.[9] Since the 1990s, the housing market has experienced a dramatic and long-lasting boom across China.[10] Thus, understanding the impacts of fluctuations in housing prices on household behavior is important in understanding the long-run economic growth and business cycles in China.

The remainder of this article is organized as follows: The next section summarizes the literature, Section III provides background on housing-market development and household precautionary saving in China, Section IV introduces the UHS data, Section V presents the methods and primary results, Section VI conducts several robustness tests, Section VII discusses other potential mechanisms, and Section VIII concludes.

[8]Some recent results: Mian et al. (2013) estimate an MPC of 0.05–0.07 out of housing wealth using U.S. credit and debit card purchase data; Aladangady (2017) finds the MPC to be 0.051, using the geographically linked Consumer Expenditure Survey; and Atalay et al. (2016) estimate the MPC to be approximately 0.02–0.03, using household-level data from Australia and Canada. These estimates differ because they use different sample, measure, and estimation methods.

[9]According to data from the *China Statistical Yearbook*, real estate investment has accounted for more than 10% of China's gross domestic product since 2010.

[10]The boom in China's housing market has led to substantial concerns over whether the rising housing prices might have developed into a gigantic housing bubble, which might eventually burst and damage China's financial system and economy (e.g., Wu, Gyourko, and Deng (2016), Chen and Wen (2017), Glaeser, Huang, Ma, and Shleifer (2017), and Song and Xiong (2018)).

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II. Literature Review

Numerous articles examine the relationship between consumption and housing wealth. Most early studies examine this relationship using aggregate data and generally find that housing price has a significant positive effect on aggregate consumer spending (Phang (2004), Case, Quigley, and Shiller (2005), and Carroll et al. (2011)). The estimated MPC out of housing wealth in these studies ranges from 0.03 to 0.5.[11] More recent studies take advantage of sets of micro-data to study the housing-wealth effect at the household level and result in smaller estimated MPCs (Lehnert (2004), Hurst and Stafford (2004), Campbell and Cocco (2007), Muellbauer (2007), Bostic et al. (2009), Cooper (2013), Mian et al. (2013), Kaplan, Mitman, and Violante (2020), and Aladangady (2017)).

Although a substantial set of literature has found a positive housing-wealth effect on household consumption, the theoretical rationale for this observed housing-wealth effect remains debated. Flavin and Nakagawa (2008) argue, within a framework based on the permanent income hypothesis (PIH), that housing wealth serves as both an asset and consumption good and, thus, that the effects of increases in the value of a household's home can be offset by increases in future housing costs, leaving the expected lifetime budget constraint unchanged. If households make consumption decisions based on the expected net present value of their resources (PIH), then the effect of housing wealth on consumption should be small. Although the PIH provides an important theoretical basis for understanding housing wealth, the prediction of a small consumption response to housing prices is inconsistent with most of the empirical literature, which finds sizeable positive housing-wealth effects.

There are three primary explanations in the literature that provide justifications for the observed relationship between housing wealth and consumption. The first one is a pure-wealth effect, which argues that within a life-cycle model, housing-wealth effects on consumption are likely to be largest for older homeowners who plan to sell their homes and downsize. Younger homeowners, who are likely to keep their homes for a longer time in the future, should have small wealth effects on consumption (Sinai and Souleles (2005)). Accordingly, several articles have conducted empirical tests on these predictions, but they have come to different conclusions. For example, Campbell and Cocco (2007) and Attanasio et al. (2009) both use British household-level data from the Family Expenditure Survey (FES); the former find that the housing-wealth effect is largest among the oldest homeowners surveyed and suggest that the pure-wealth effect is a plausible explanation, whereas the latter find that this effect is largest among the youngest homeowners and suggest that the relationship between housing wealth and household consumption is not a causal effect. In addition to assessing the size of the wealth effect by age group, Gan (2010) proposes testing the housing-wealth effect by comparing consumption responses to changes in housing wealth for households that own multiple homes. The rationale is that the additional homes represent more of a pure-wealth effect than the home in which one resides. Using credit-card spending data from

[11] See Bostic et al. (2009) for a survey of earlier studies on this topic.

Hong Kong, Gan (2010) finds that consumption responses to housing wealth are larger among households with multiple homes.

The second set of explanations for the observed housing-wealth effect focuses on the collateral channel. This mechanism suggests that one should observe the strongest consumption responses among households at or near borrowing limits. However, identifying constrained households can be difficult in practice because the borrowing limit may not be observable. Growing numbers of studies attempt to evaluate the relative importance of the collateral channel by identifying borrowing-constrained households using proxies, such as the loan-to-value ratio, the amount of liquid assets, and the debt–service ratio (Hurst and Stafford (2004), Gan (2010), Mian and Sufi (2011), Gathergood (2012), Cooper (2013), Bhatia and Mitchell (2016), and Aladangady (2017)). Overall, the majority of these studies find evidence that supports the collateral-effect hypothesis.[12]

The final mechanism for the housing-wealth effect focuses on the role of housing wealth as buffer stock and suggests that a higher housing value can reduce the need for precautionary saving and thus increase consumption. Precautionary motives play an important role in determining household consumption dynamics in the United States and in China (Gourinchas and Parker (2002), Carroll and Samwick (1997), (1998), Chamon and Prasad (2010), Chamon et al. (2013), Choi et al. (2017), and He et al. (2018)). However, only a few studies have discussed the reduction of precautionary-saving motives as a major channel behind the housing-wealth effect. For example, Skinner (1989) develops a model linking uncertainty about income and out-of-pocket health expenses to estimate the effect of housing wealth on consumption and saving. Using panel data on credit-card spending in Hong Kong, Gan (2010) finds some suggestive evidence that reducing precautionary saving plays an important role in determining the comovement of housing wealth and consumption.[13]

Although considerable research has focused on understanding the magnitude of the housing-wealth effect, not all research distinguishes carefully among the different mechanisms that comprise this effect. In particular, previous research has not focused as much on the role of housing wealth as precautionary savings. In China, the collateral channel is likely to have minimal importance. Only 6% of households in the UHS[14] even have mortgages, and households are not allowed to obtain a home-equity loan. Because of this unique feature of the Chinese housing market, this analysis can determine whether the precautionary-saving mechanism is important in understanding consumption responses to changes in housing wealth.

It is also worth noting that despite the voluminous number of studies of the housing-wealth effect on consumption, studies in developing countries are limited. Among them, Chen, Funke, and Mehrotra (2017) and Chen, Guo, and Zhu (2009) both find a strong correlation between housing wealth and household consumption in China. However, they use aggregate-level data instead of household-level data.

[12]DeFusco (2018) has directly estimated a positive propensity to borrow out of housing collateral.

[13]Windsor et al. (2015) also mention the precautionary channel but do not empirically differentiate it from the collateral channel.

[14]In the raw sample of the UHS, 7.6% of households have a mortgage. In our estimation sample of the UHS, the rate is lower, with only 6% of households having a mortgage.

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More recently, Waxman, Liang, Li, and Barwick (2020) studied the impacts of housing-price changes on household consumption using city-level aggregate data. Interestingly, they find a negative housing-price elasticity of consumption, which is likely an effect of their city-level data, which cover both homeowners and renters. As far as we know, this article is among a very few that have adopted household-level data to study the housing-wealth effect in China.

III. Background

A. Precautionary Saving in China

In general, *precautionary saving* is defined as the response of current spending to future risks, such as uncertainty in income or health conditions. As illustrated by Carroll and Samwick (1997), (1998), basic consumption theory incorporating precautionary saving predicts that future risk can depress current consumption and increase the accumulation of wealth as a type of self-insurance. In particular, households may perceive housing wealth as a buffer stock of wealth to be used in the event of a family emergency or to finance a specific expenditure, such as large medical bills or a child's college tuition fees. Thus, a positive housing-wealth shock diminishes the consumer's prudence in allocating resources and encourages extra consumption.

Many articles have evaluated the importance of precautionary-saving motives for U.S. households, generally suggesting that precautionary motives play an important role in driving household consumption.[15] In China, the precautionary-saving mechanism may have particular importance. From 1989 to 2009, the urban household saving rate in China averaged slightly more than 20% of disposable income.[16] This saving rate is high by international standards and contrasts sharply with the 4% average in the United States over roughly the same period. Existing studies suggest that precautionary-saving motives are one plausible explanation for this high saving rate (Meng (2003), Chamon and Prasad (2010), Chamon et al. (2013), and He et al. (2018)).[17] More recently, findings by Choi et al. (2017) suggest that more than 80% of China's saving rate arises from precautionary motives.

[15]For example, two studies find that in the United States, late-in-life medical expenses and Medicaid aversion are crucial factors in motivating precautionary saving and can explain the observed high saving rate of many retirees (Palumbo (1999)). More generally, Carroll (1992) argues that the precautionary-saving model is consistent with a variety of patterns of macroeconomic data on consumption and saving. Carroll and Samwick (1997), (1998) further provide empirical support for the precautionary-saving model using microeconomic data.

[16]The author's own calculation based on the UHS for 1989–2009. Chamon and Prasad (2010) report similar numbers.

[17]Many other explanations have been put forth in the existing literature. The first explanation is based on the life-cycle theory (Ando and Modigliani (1963), Modigliani and Cao (2004)), which argues that China's saving rates are driven up by the rising share of the labor force in the population. However, Chamon and Prasad (2010) find that this explanation is inconsistent with the profile of consumption and savings at the household level in China because older people save more than middle-aged people. The second explanation is related to liquidity constraints (Kraay (2000), Aziz and Cui (2007)) and suggests that the underdevelopment of China's financial market has forced households to save more. Nevertheless, the efficiency of these markets improved even as the household saving rate kept rising, which suggests that the level of financial market development plays, at best, a minor role in household saving.

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The strong precautionary-saving motives among Chinese households can be connected to the reform of state-owned enterprises (SOEs) that took place in the late 1990s. Before the reform, most urban citizens worked as SOE employees, receiving subsistence wages but generous and comprehensive social benefits, such as guaranteed pensions and near-free health care, housing, food, and education. Known as the "iron rice bowl," this cradle-to-grave regime provided job security as well as steady income and retirement benefits. However, SOE reform broke the iron rice bowl for many urban households. Between 1995 and 2002, more than 35 million workers in SOEs were laid off, losing not just their jobs but also the associated benefits (Giles, Park, and Cai (2006), Meng (2012)). Most of these laid-off workers eventually found a job in the private sector. Even though the Social Insurance Law requires private employers to be primarily responsible for contributing to pensions, unemployment, medical insurance, work-related injury, and maternity insurance, enforcement of the law has been very lax (Feng, He, and Sato (2011)). Thus, many private-sector employees are denied the social security benefits they are legally entitled to. Because of these facts, the SOE reform creates divergent impacts in terms of income and benefit security between public-sector and private-sector employees in urban China and, thus, heterogeneity regarding precautionary-saving motives.

B. Development of China's Urban Housing Market

China's urban housing market has experienced substantial structural changes during the past 3 decades, transforming from a welfare housing system to a market-oriented system (Man (2011)). Under the welfare housing system, most of the urban houses were publicly owned by the state. Starting in the early 1990s, the government implemented a series of market-oriented reforms to privatize urban houses.[18]

The privatization of the housing market has had profound impacts on urban households in China. First, it created a rising number of homeowners. According to the UHS, the homeownership rate among urban households increased dramatically, from approximately 20% in the early 1990s to more than 90% in 2009, which is among the highest in the world. By comparison, according to the U.S. Census Bureau, in 2010 the American homeownership rate was only 65.1%.

There has also been enormous housing-price appreciation. According to the *China Statistical Yearbook*, during our sample period (2002–2009), the average nominal housing price increased from 1,276 yuan to 2,380 yuan per square meter. In particular, the median housing price in China's four Tier 1 cities roughly tripled, and in Tier 2 and Tier 3 cities, the median price almost doubled (Wu et al. (2014),

The third explanation involves saving motives for housing and argues that the dramatic increase in housing prices has forced many renters to save more if they want to purchase homes. This explanation, however, is more relevant among renters than homeowners.

[18]In 1998, the government abolished this welfare housing system when it targeted the real estate sector as a new engine of economic growth in response to the adverse effects generated by the 1997 Asian financial crisis. See Man (2011) and Chen, Yang, and Zhong (2020) for a detailed description of the structural changes of the housing market in China in the 1990s.

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Fang, Gu, Xiong, and Zhou (2016)).[19] Such a high homeownership rate and the dramatic increase in housing prices provide a suitable context for us to examine the extent to which urban household consumption responds to changes in housing wealth.[20]

More importantly, the development of housing markets in China is characterized by unique features that can help disentangle different mechanisms of housing-wealth effects. To be more specific, during the sample period, the mortgage market in China was just emerging, meaning that most households were unable to borrow against the value of their homes. In our sample, only 6% of households used mortgages when purchasing a home. This implies that the collateral channel (which argues that an increase in housing prices can increase household consumption by relaxing borrowing constraints) should be insignificant if it exists.

IV. Data and Summary Statistics

The data used in this article are from the UHS for 2002–2009 and are collected by China's National Bureau of Statistics. The UHS provides comprehensive information regarding demographic characteristics, household consumption, and wealth for Chinese urban households.[21] The UHS contains repeated cross sections, but each year, it randomly keeps about one-third of survey households from the previous sample. This allows us to construct a household panel data set that shows a much more robust model of the relationship between household consumption and housing wealth. These panel data include households that appear for at least 3 years during the sample period, which account for approximately 36.4% of the total sample.[22] The analysis sample includes households in which the head of household is between the ages of 21 and 65. The final sample is a household-level panel data set that contains 45,119 observations for 12,878 households.

The UHS asks respondents to report the level of their housing wealth, which is the independent variable of interest. We recognize that self-reported home values can be biased for various reasons (Choi and Painter (2018)). For example, self-reported home values measure respondents' perceived price value, which is likely to be affected by their expectations of the future economy. In addition, the house value does not reflect actual housing wealth. Because self-reported house values could produce biased estimates, we calculate both household fixed-effects models

[19]The four first-tier cities are Beijing, Shanghai, Guangzhou, and Shenzhen. The Chinese city-tier system is a hierarchical classification of Chinese cities; it mainly reflects differences in income level and population size across cities.

[20]During our sample period, only a relatively small fraction of Chinese households held financial assets such as stocks and bonds (16%), and even for owners of such financial assets, the value of these assets constituted a relatively small fraction of total assets (Chen et al. (2009)).

[21]Urban households are defined as households that have urban *hukou* registrations. Therefore, the floating population is not covered in the UHS.

[22]Appendix Table A1 reports the summary statistics for the panel data (which contain households that appear for at least 3 years) and the cross-sectional data. The average characteristics in the panel-data sample are statistically similar to the cross-sectional sample in terms of several household characteristics, which suggests that the construction of the panel data causes little sample-selection bias. The mean estimation results are similar when we use the raw data. These results are available from the authors.

TABLE 1
Summary Statistics

The sample in Table 1 includes households that appear in the data at least 3 times and whose head is between the ages of 21 and 65. The household dependency ratio is defined as the proportion of the sum of household members age 65 or older and household members under age 15. All monetary variables use 1,000 RMB as their unit and are measured using 2009 yuan using national urban consumer price indices. Household income is defined as the sum of salaries, bonuses, and subsidies. Source: Urban Housing Survey, 2002–2009.

Variables	No. of Obs.	Mean	Std. Dev.	Minimum	Maximum
Household-Level Variables					
HOUSEHOLD_HOUSING_WEALTH	45,119	127.10	131.50	10.07	1,149.00
HOUSEHOLD_OWN_MORTGAGE (0,1)	45,119	0.06	0.23	0.00	1.00
HOUSEHOLD_CONSUMPTION	45,119	24.06	16.78	3.88	131.60
HOUSEHOLD_INCOME	45,119	29.87	21.36	0.00	145.10
HOUSEHOLD_SIZE (no. of persons)	45,119	3.04	0.69	1.00	9.00
HOUSEHOLD_DEPENDENCY_RATIO	45,119	0.22	0.18	0.00	0.80
HOUSEHOLD_HEAD_AGE	45,119	43.29	7.65	21.00	65.00
HOUSEHOLD_HEAD_SCHOOL_YEARS	45,119	12.32	2.70	0.00	18.00
HOUSEHOLD_HEAD_FEMALE (0,1)	45,119	0.26	0.44	0.00	1.00
HOUSEHOLD_HEAD_MARRIED (0,1)	45,119	0.97	0.16	0.00	1.00
City-Level Variables					
CITY_HOUSING_PRICE	39,241	2.41	1.61	0.95	14.51
GDP_PER_CAPITA	42,559	17.35	14.43	1.89	91.91
WAGE_BY_INDUSTRY	45,067	18.44	8.08	6.70	52.76

and models that substitute a city-level housing price index for self-reported values as a robustness check.

In terms of household consumption, the UHS includes a broad range of categories: food, clothing and footwear, household appliances, goods and services, medical care and health, transportation, recreational activities, and education expenditures. These variables make it possible for us to explore how housing-wealth effects vary across different categories of consumption. The UHS defines household income as the sum of salaries, bonuses, and subsidies. All household demographic variables are measured for the head of the household where applicable, and all monetary variables are measured using 2009 yuan using national urban consumer price indices.

Table 1 reports the summary statistics of the main variables in the models. In the sample, the average self-reported housing wealth is 131,400 RMB (approximately $18,771). As expected, borrowing against housing assets is not popular in China; only approximately 6% of homeowners in our sample use a mortgage to finance their houses. On average, annual household income is 29,990 RMB (approximately $4,284), and total household consumption is 24,230 RMB (approximately $3,461). The average household size is 3 persons. The average household dependency ratio is 0.22, which is defined as the proportion of the sum of household members age 65 or older and household members under age 15. Regarding the household head, the average age is roughly 44, and the vast majority (97%) are married. Almost 75% of the sampled household heads are men, with an average of 12 years of schooling. The average city-level housing price is 2,470 RMB per square meter (approximately $35.20 per square foot). Regarding local economic conditions, the average GDP per capita is 17,910 RMB (approximately $2,558), and the average industry wage is 17,750 RMB (approximately $2,535). The average industry wage is calculated as the mean of wages for workers in that industry. We use this variable to measure industry-specific income.

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TABLE 2

Housing Wealth and Household Consumption (2002–2009)

The sample in Table 2 includes households that appear in the data at least 3 times and whose head is between the ages of 21 and 65. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Household income is defined as the sum of salaries, bonuses, and subsidies. The city-level housing price is in 1,000 RMB per square meter (*China Statistical Yearbook*). Source: Urban Housing Survey, 2002–2009.

	HOUSING_WEALTH		HOUSEHOLD_CONSUMPTION		HOUSEHOLD_INCOME		CITY_HOUSING_PRICE	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
2002	91.51	78.43	19.88	12.12	24.20	14.32	1.71	0.69
2003	102.80	92.33	21.74	14.17	26.42	17.17	1.88	0.86
2004	118.00	118.30	23.77	16.09	29.67	20.57	2.33	1.32
2005	162.10	163.80	27.52	19.34	34.42	25.03	3.13	1.86
2006	181.60	177.60	29.48	21.03	37.29	27.38	3.43	2.20
2007	159.80	163.60	26.29	18.44	33.37	24.04	3.20	2.62
2008	181.40	151.10	26.08	19.36	34.53	25.32	3.26	1.95
2009	212.40	206.50	32.16	20.53	44.00	30.40	5.12	2.95

Table 2 displays average descriptive statistics of self-reported housing wealth, household consumption and income, and residential housing prices by year. The table shows that in nominal terms, average housing wealth has increased by approximately 2 times in the UHS sample during 2002–2009, which is consistent with the trend in residential housing prices collected by the *China Statistical Yearbook*. During the same period, household consumption and income nearly doubled. These summary statistics show that housing wealth and household consumption experienced substantial comovement during the period, suggesting a strong correlation between the two.

V. Methods and Results

A. Housing-Wealth Effect

To examine housing-wealth effects, we estimate a standard equation based on the theoretical relationship between consumption and wealth. Thus, the consumption function takes the following form:

$$\log C_{ijt} = \beta_0 + \beta_1 \log \mathrm{HW}_{it} + \beta_2 X_{it} + \epsilon_{ijt}, \tag{1}$$

where $\log C_{ijt}$ is the log of the household consumption for individual i living in city j in period t; $\log \mathrm{HW}_{it}$ is the log of housing wealth; and X_{it} is a vector of control variables, including the log of current household disposable income, household size and dependent ratio, and demographic and economic characteristics of the household head (e.g., age, education, gender, marriage status, and industry).[23] X_{it} also includes city and year dummies to account for macroeconomic trends. The coefficient of interest is β_1, which is interpreted as the elasticity of consumption regarding housing wealth. Throughout this article, the standard errors are adjusted to allow for

[23]Note that most studies in the developed world include financial wealth in their models. In this context, most households do not hold financial assets that are reported in the data. In Section VII, we conduct some robustness checks using stock returns to make sure this omission does not lead to serious bias.

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TABLE 3
Primary Model Results

The dependent variable in Table 3 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	OLS	Fixed Effect				
		Full Sample	Public Sector	Non–Public Sector	College Educated	Non–College Educated
Year	1	2	3	4	5	6
log(HOUSING_WEALTH)	0.2903***	0.1433***	0.0453***	0.1840***	0.0195*	0.1385***
	(0.0031)	(0.0059)	(0.0069)	(0.0144)	(0.0116)	(0.0080)
log(HOUSEHOLD_INCOME)	0.0699***	0.0411***	0.4604***	0.0032	0.1712***	0.0262***
	(0.0015)	(0.0018)	(0.0068)	(0.0025)	(0.0073)	(0.0021)
HOUSEHOLD_SIZE	0.0875***	0.1122***	0.0851***	0.1228***	0.1105***	0.1169***
	(0.0036)	(0.0049)	(0.0057)	(0.0106)	(0.0098)	(0.0062)
HOUSEHOLD_DEPENDENCY_RATIO	−0.0212	−0.0268	0.0034	−0.0340	0.0533	−0.0690***
	(0.0173)	(0.0212)	(0.0235)	(0.0470)	(0.0400)	(0.0263)
HOUSEHOLD_HEAD_AGE	0.0129***	0.0048	−0.0028	0.0194*	0.0110	0.0071
	(0.0030)	(0.0045)	(0.0053)	(0.0106)	(0.0096)	(0.0061)
HOUSEHOLD_HEAD_AGE_SQUARED	−0.0171***	−0.0099*	0.0016	−0.0288**	−0.0126	−0.0122*
	(0.0035)	(0.0051)	(0.0061)	(0.0122)	(0.0111)	(0.0070)
HOUSEHOLD_HEAD_SCHOOL_YEARS	0.0350***					
	(0.0009)					
HOUSEHOLD_HEAD_FEMALE	0.0655***					
	(0.0053)					
HOUSEHOLD_HEAD_MARRIED	0.1296***					
	(0.0141)					
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	45,119	45,119	35,360	9,759	16,939	28,180
No. of households	12,878	12,878	9,829	3,049	4,913	7,965
R^2	0.2964	0.1361	0.2393	0.1236	0.1122	0.1069

clustering at the household level to account for correlation within the household over time.

Estimating equation (1) with OLS likely provides biased estimates of the key coefficient β as a result of omitted variables. One potential confounder is unobserved household preferences. More frugal households tend to forgo consumption to accumulate wealth. Thus, unobserved household frugality potentially causes the OLS estimator to be biased downward. To address this issue, we include household fixed effects, which will account for the impact of household preferences and other time-invariant unobserved factors.

Table 3 reports primary model estimates of consumption responses to housing wealth. Column 1 includes individual- and household-level characteristics, as well as city and year fixed effects. It shows a significant positive relationship between housing wealth and consumption. The estimated consumption elasticity is 0.2903. Column 2 includes household fixed effects. The results show that for every 1% (marginal) change in housing wealth, consumption changes reduce to 0.143%, suggesting that OLS models contain substantial upward bias of the effect of housing wealth on consumption. For the rest of the article, household fixed effects are included in all models.

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To understand the magnitude of this estimated effect, we consider the value of a representative home in China in 2009, which was 131,400 RMB. In the same year, the average consumption, according to the UHS data, was 24,230 RMB per year. Thus, an increase in the value of the house by 1% or 1,314 RMB would lead to an increase in annual consumption of approximately 34 RMB. The coefficient estimates for the housing-wealth variable can be interpreted as households' marginal propensity to consume out of housing wealth, which is calculated as the estimated coefficient multiplied by the ratio of consumption to housing wealth. The average ratio of consumption to housing wealth of the sample is 0.18. Thus, the baseline estimate of 0.143 (column 2 of Table 3) implies an estimated MPC of 0.023. This estimate is on the low end of the range of the MPCs estimated in the literature. However, as we emphasize in the following discussion, the absence of the collateral channel in China partially accounts for this difference. In addition, we find that the inclusion of household fixed effects lowers the MPC by half.

B. Testing the Precautionary-Saving Channel

We next distinguish households that are expected to have larger or smaller precautionary-saving motives. Public-sector employees in China are usually entitled to medical insurance and a generous government-subsidized pension upon retirement. Therefore, a household's lifetime income is less uncertain, which suggests that its members should have smaller precautionary-saving motives. Meanwhile, private-sector employees are poorly covered by social security benefits. As reported in the UHS, 80% of public-sector employees have been enrolled in some type of social security program, whereas only 32% of private-sector employees have been enrolled. Given the differences, we would expect that if the reduction in precautionary saving is an important determinant of the size of the housing-wealth effect, then consumption responses should be stronger for private-sector employees because they would behave more like buffer stock savers than do other groups of households.

Second, we explore consumption responses among college-educated and non-college-educated employees. The hypothesis is that individuals with a lower educational level likely face more uncertainty in their future income trajectory and thus will have stronger precautionary savings. If precautionary saving drives consumption housing–wealth sensitivity, we should expect that the consumption responses should be stronger among households whose heads are non-college-educated workers.[24]

Columns 3–6 of Table 3 report estimation results for the two tests. Columns 3 and 4 divide the sample into households with at least one public-sector employee and households without any public-sector employee. We define public-sector employees as public service workers and state-owned enterprise workers. The results suggest that a 1% increase in housing wealth increases household consumption by 0.1840 for non-public-sector employees, which is approximately 4 times greater than that for public-sector employees (0.0453). These results are consistent

[24]Agarwal and Qian (2014) also explored college-educated and non-college-educated samples to test precautionary-saving motives.

with the hypothesis that the reduction of precautionary saving should make consumption responses stronger among private-sector employees who face great lifetime income risk.

Columns 5 and 6 of Table 3 divide the sample into households whose heads are college graduates or non–college graduates. Households with better education or whose members have enrolled in a certain social security system should face less lifetime income uncertainty and, therefore, have smaller and less significant housing-wealth effects through the channel of reducing precautionary saving. Indeed, we find that the positive housing-wealth effect is greater and significant for households whose head is a non–college graduate (0.1385), whereas it is small and nonsignificant for households whose head is a college graduate (0.0195). These results also support the importance of the precautionary-saving channel because households that face greater future income uncertainty are most affected by the housing-wealth effect.

As a robustness check, we divide the sample into more detailed categories by household heads' employer types and education levels in Table 4, and we find similar patterns for the estimated housing-wealth effect. We divide non-public-sector employers into collectively owned firms (COEs), joint venture and foreign firms, and domestic private firms. We find the estimated housing-wealth effect is much greater for these subsamples than for the SOE employers, especially domestic private firms that usually have the poorest employment benefits. Further, we divide

TABLE 4

Housing-Wealth Effects Among Detailed Categories of Non-Public-Sector Employees and Non-College-Educated Workers

The dependent variable in Table 4 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Non-Public-Sector Employees			Non-College-Educated Workers	
	Collectively Owned Firm	Foreign	Private	Middle School	High School
	1	2	3	4	5
log(HOUSING_WEALTH)	0.0458*	0.0799**	0.1039***	0.1413***	0.1058***
	(0.0270)	(0.0390)	(0.0310)	(0.0144)	(0.0116)
log(HOUSEHOLD_INCOME)	0.3009***	0.2242***	0.4266***	0.0151***	0.0500***
	(0.0211)	(0.0268)	(0.0225)	(0.0032)	(0.0035)
HOUSEHOLD_SIZE	0.1138***	0.1165***	0.0860***	0.1204***	0.1235***
	(0.0191)	(0.0301)	(0.0207)	(0.0106)	(0.0091)
HOUSEHOLD_DEPENDENCY_RATIO	−0.0200	0.1406	−0.0680	−0.0923**	−0.0568
	(0.0710)	(0.1031)	(0.0873)	(0.0455)	(0.0348)
HOUSEHOLD_HEAD_AGE	0.0353*	0.0138	0.0084	0.0365***	−0.0012
	(0.0205)	(0.0294)	(0.0217)	(0.0130)	(0.0091)
HOUSEHOLD_HEAD_AGE_SQUARED	−0.0530**	−0.0272	0.0004	−0.0420***	0.0035
	(0.0236)	(0.0351)	(0.0251)	(0.0143)	(0.0105)
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes
No. of obs.	1,983	3,351	4,425	10,816	17,364
No. of households	570	1,124	1,355	2,942	5,023
R^2	0.2423	0.2766	0.1137	0.0962	0.1049

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non-college-educated workers into junior high school graduates and high school graduates, and we find that the housing-wealth effects decrease with the household head's education level. Taken together, Tables 3 and 4 provide the main empirical support for our conclusion that the reduction in precautionary saving is the primary mechanism by which changes in housing wealth affected consumption in China during our sample period (2002–2009).

VI. Discussion of Other Channels

These results suggest that the increase in household consumption is derived in part from the reduction in precautionary saving. As noted previously in the literature section, besides reducing the precautionary savings, housing wealth can also increase household consumption by increasing household borrowing capacity or through a pure-wealth effect. In this section, we test the role of mechanisms other than the precautionary-saving channel.

A. Tests of the Collateral Channel

As suggested in the literature, we first test whether rising housing wealth increases the household's borrowing capacity (DeFusco (2018)). Even though the literature (Cooper (2013), Mian et al. (2013), and Aladangady (2017)) that has emphasized the fact that observed housing-wealth effects should be largest for households at or near a borrowing limit is not relevant here, households may still increase borrowing in response to increased housing wealth. To test this, we compare consumption responses by households that hold debt with those that do not.

Columns 1 and 2 of Table 5 test whether rising housing wealth encourages household borrowing. The dependent variable in column 1 is a dummy that indicates whether households engage in borrowing by holding either a mortgage or other types of debt. The dependent variable in column 2 is the amount of debt a household holds. In both columns, the housing-wealth effect is insignificant, suggesting that the increase in housing wealth does not encourage household borrowing the way it does in developed countries. The estimates in columns 3 and 4 demonstrate that the consumption response among households without debt is positive and significant (0.1501) but that the estimated effect for households with debt is much smaller and statistically insignificant.[25] This evidence suggests that the collateral channel is not driving the observed housing-wealth effect in this sample.

B. Tests of the Pure-Wealth Effect

In a life-cycle model, older homeowners are more likely to sell their homes and downsize (Sinai and Souleles (2005)). Thus, if consumption responses are greater among older homeowners compared with younger homeowners, this fact can be used as evidence supporting a pure-wealth effect mechanism by which housing

[25]The insignificance of the consumption response among households with debt may be due to a lack of power.

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TABLE 5

Housing-Wealth Effects: The Collateral Channel

The dependent variable in column 1 of Table 5 is a dummy variable for whether the household is in debt. The dependent variable in column 2 is the amount of debt. The dependent variable in columns 3 and 4 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

			log(CONSUMPTION)	
	In Debt or Not	Debt Amount	With Debt	Without Debt
	1	2	3	4
log(HOUSING_WEALTH)	−0.0004	0.0045	0.0234	0.1501***
	(0.0042)	(0.0326)	(0.0381)	(0.0061)
log(HOUSEHOLD_INCOME)	0.0002	0.0088	0.0426***	0.0415***
	(0.0013)	(0.0101)	(0.0126)	(0.0019)
HOUSEHOLD_SIZE	0.0020	0.0298	0.0286	0.1130***
	(0.0035)	(0.0268)	(0.0325)	(0.0050)
HOUSEHOLD_DEPENDENCY_RATIO	−0.0085	−0.0764	−0.0147	−0.0281
	(0.0152)	(0.1172)	(0.1227)	(0.0220)
HOUSEHOLD_HEAD_AGE	−0.0018	−0.0070	0.0854***	0.0047
	(0.0032)	(0.0247)	(0.0323)	(0.0046)
HOUSEHOLD_HEAD_AGE_SQUARED	0.0018	0.0071	−0.0917**	−0.0096*
	(0.0037)	(0.0285)	(0.0374)	(0.0053)
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes
No. of obs.	45,119	45,119	3,759	41,360
No. of households	12,878	12,878	2,597	10,281
R^2	0.0133	0.0117	0.1318	0.1475

wealth influences consumption. (Attanasio and Weber (1994), Gan (2010), and Atalay et al. (2016)). Although it is possible to test for this mechanism in China in the way outlined by the literature discussed previously, the interpretation of those results will be different.

Older homeowners in China face substantial uncertainty related to incomplete social security caused by two factors: First, in the late 1990s, the SOE reform broke the iron rice bowl for many workers, leaving them with limited access to retirement plans; second, the introduction of the one-child policy in the 1980s meant that parents could no longer rely on a large extended family to look after them in their old age. Thus, older homeowners in China generally behave more like buffer stock agents,[26] and they may have stronger housing consumption responses because of the pure-wealth effect as well as the reduction of precautionary saving. In other words, checking whether the housing-wealth effect is stronger among older homeowners is not enough to identify the pure-wealth effect.

To complement the standard test of the pure-wealth effect, we provide an alternative method to test the size of the pure-wealth-effect mechanism among different age groups of households. Specifically, the longitudinal structure of the UHS makes it possible for us to measure which households have recently downsized their homes. If the pure-wealth effect is an important channel driving the

[26]For example, Chamon and Prasad (2010) find that older people save more than middle-aged people in China. Additionally, Wei and Zhang (2011) find that Chinese parents tend to increase their savings to improve their children's relative attractiveness for marriage.

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TABLE 6

Housing-Wealth Effects: The Pure-Wealth Effect

The dependent variable in Table 6 is the log of household consumption. DOWNSIZE is a dummy variable indicating whether the household's housing area has increased compared with last year. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Full Sample	Full Sample	Public	Non-Public	College Educated	Non–College Educated
	1	2	3	4	5	6
Household Head's Age Below 35						
log(HOUSING_WEALTH)	0.0892***	0.1238***	0.0418	0.0511*	0.0473	0.0814*
	(0.0280)	(0.0379)	(0.0673)	(0.0305)	(0.0389)	(0.0433)
log(HOUSING_WEALTH) × DOWNSIZE		0.0157				
		(0.0309)				
No. of obs.	7,823	5,233	5,979	1,844	3,899	3,924
No. of households	3,369	2,753	2,616	753	1,724	1,645
R^2	0.1415	0.1093	0.2473	0.1802	0.1706	0.1680
Household Head's Age 35–50						
log(HOUSING_WEALTH)	0.1208***	0.1168***	0.0246*	0.1547***	−0.0233	0.1229***
	(0.0150)	(0.0201)	(0.0149)	(0.0425)	(0.0229)	(0.0212)
log(HOUSING_WEALTH) × DOWNSIZE		0.0180				
		(0.0191)				
No. of obs.	26,666	18,977	21,032	5,634	10,043	16,623
No. of households	9,539	8,718	7,025	2,514	3,957	5,582
R^2	0.1257	0.1071	0.2482	0.1100	0.1353	0.1023
Household Head's Age Above 50						
log(HOUSING_WEALTH)	0.1454***	0.1659***	0.0789**	0.1930***	−0.0718	0.1513***
	(0.0282)	(0.0354)	(0.0307)	(0.0519)	(0.0550)	(0.0322)
log(HOUSING_WEALTH) × DOWNSIZE		0.0047				
		(0.0342)				
No. of obs.	10,630	8,139	8,349	2,281	2,997	7,633
No. of households	4,319	4,004	3,448	871	1,139	3,180
R^2	0.0892	0.0814	0.1640	0.1703	0.0927	0.0999
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes	Yes

observed housing-wealth effect, consumption responses should be greater for households that have recently downsized their homes because of the availability of cash after downsizing. We thus construct a categorical variable indicating whether a household downsized its home in the last year and interact it with the housing-wealth variable. A significant coefficient on the interaction term can be interpreted as evidence that the pure-wealth channel is important.

In column 1 of Table 6, we divide the sample into younger (below 35), middle-aged (35–49), and older (above 50) homeowners. The average age in the sample is 46. We find that housing wealth is positive and statistically significant for all 3 age groups; the magnitude does indeed increase with age because older homeowners have the greatest consumption response to housing-wealth changes (0.089 for younger homeowners, 0.121 for middle-aged homeowners, and 0.145 for older homeowners).[27] To assess whether the greater consumption response among older homeowners is driven by the pure-wealth effect, we include the interaction term of

[27] The χ^2 test statistics for the estimated coefficients across groups to be the same are 23.99, 26.4, and 21.53, respectively.

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the housing-wealth variable and the downsize dummy in column 2. The estimates are positive but insignificant, suggesting that the pure-wealth effect and downsizing cannot explain the life-cycle pattern we observe in column 1.[28]

In previous tests, we noted that there were significant differences in the size of the housing-wealth effect by employer type and education level. In columns 3–6 of Table 6, we find that consumption responses are much stronger among the non-public-sector and non-college-educated workers among all age groups. For example, for older homeowners, a 1% increase in housing wealth increases household consumption by 0.143 and 0.151 for non-public-sector employees and non-college-educated workers, respectively, which is much greater than for public-sector employees and college-educated workers (–0.0789 and 0.0718, respectively).[29]

In sum, the results suggest that neither the collateral channel nor the pure-wealth effect can adequately explain the housing-wealth effect in China. Rather, precautionary-saving motives are likely to be the dominant channel.

VII. Additional Tests

A. Common Factors

It remains possible that including household fixed effects and controlling for local market conditions do not adequately eliminate bias from all unobserved factors that lead to a spurious correlation between housing wealth and consumption. We address those concerns in this section.

First, expected income growth can drive up both housing prices and spending (Attanasio et al. (2009)). Although households do not have perfect foresight, their expectations are likely correlated with realized income growth in their locality. Thus, to test whether this factor plays an important role in explaining overall housing wealth, we include a control variable, in addition to the baseline model, that measures annual wage growth in the household head's industry at the city level (row 1 of Table 7). Moreover, because local positive macroeconomic shocks are likely to drive up expected income growth, we further include city-level GDP and GDP growth to control for these confounding effects (row 2 of Table 7). If expected income is an important factor driving the correlation between housing wealth and

[28]Another reason that the pure-wealth effect is insignificant, especially among older homeowners, is that only 8% of homeowners in our sample have ever experienced downsizing, and less than 5% of these downsizings happened among older homeowners. Most downsizings are experienced by middle-aged homeowners. This is probably because most homeowners in our sample have owned their home for fewer than 5 years because China's private housing market development began only in the late 1990s. Because most newly developed housing units are of better quality, most Chinese households, even older homeowners, are planning to upsize instead of downsize. Thus, even though the pure-wealth effect may exist among downsized households, this does not explain why housing-wealth effects are positive among the majority of households that do not downsize their homes.

[29]For households whose head is below age 35, we find that the point estimates are smaller than 0.0892 (which is the full sample estimate) for both public and non-public employees. This is likely because of the correlation between housing wealth and household income. When we exclude log household income from the regression model, we find that the point estimates for the full sample, public employees, and non–public employees are 0.082, 0.0933, and 0.0296, respectively.

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TABLE 7

Housing-Wealth Effects: Robustness Checks

The dependent variable in Table 7 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

		Full Sample	Public	Non-Public	College Educated	Non–College Educated
		1	2	3	4	5
Row 1: Include expected industry-level wage and wage growth	log(HOUSING_WEALTH)	0.1465***	0.0463***	0.1892***	0.0227*	0.1410***
		(0.0061)	(0.0071)	(0.0149)	(0.0120)	(0.0083)
	No. of obs.	45,119	35,360	9,759	16,939	28,180
	No. of households	12,878	9,829	3,049	4,913	7,965
	R^2	0.1384	0.2425	0.1243	0.1136	0.1079
Row 2: Include city-level GDP and GDP growth	log(HOUSING_WEALTH)	0.1570***	0.0457***	0.2043***	0.0300**	0.1602***
		(0.0072)	(0.0085)	(0.0170)	(0.0143)	(0.0097)
	No. of obs.	35,593	27,463	8,130	13,441	22,152
	No. of households	10,865	7,419	3,446	3,780	7,085
	R^2	0.1271	0.2310	0.1173	0.1199	0.1031
Row 3: First-tier cities	log(HOUSING_WEALTH)	0.1032***	0.0654***	0.3836**	0.0895*	0.1097***
		(0.0269)	(0.0249)	(0.1594)	(0.0496)	(0.0325)
	No. of obs.	2,412	2,050	362	1,010	1,402
	No. of households	731	577	154	305	426
	R^2	0.1201	0.2926	0.2493	0.1350	0.1752
Row 4: Second-tier cities	log(HOUSING_WEALTH)	0.2034***	0.0564***	0.2668***	0.0534**	0.2203***
		(0.0116)	(0.0149)	(0.0245)	(0.0239)	(0.0159)
	No. of obs.	10,763	7,858	2,905	3,908	6,855
	No. of households	3,044	2,080	964	1,057	1,987
	R^2	0.1695	0.2706	0.1881	0.1287	0.1356
Row 5: Third-tier cities	log(HOUSING_WEALTH)	0.1176***	0.0424***	0.1099***	−0.0027	0.0982***
		(0.0071)	(0.0082)	(0.0184)	(0.0140)	(0.0097)
	No. of obs.	31,944	25,452	6,492	12,021	19,923
	No. of households	9,103	7,072	2,031	3,527	5,576
	R^2	0.1370	0.2298	0.1190	0.1294	0.1033
Row 6: Without stock investment	log(HOUSING_WEALTH)	0.1449***	0.0459***	0.1805***	0.0206*	0.1394***
		(0.0060)	(0.0070)	(0.0146)	(0.0120)	(0.0081)
	No. of obs.	44,084	34,457	9,627	16,425	27,659
	No. of households	12,054	9,020	3,034	5,062	6,992
	R^2	0.1371	0.2399	0.1251	0.1115	0.1080
Row 7: Purchased the home more than a year ago	log(HOUSING_WEALTH)	0.1337***	0.0334***	0.1761***	0.0079	0.1232***
		(0.0061)	(0.0072)	(0.0148)	(0.0124)	(0.0082)
	No. of obs.	43,803	34,296	9,507	16,374	27,429
	No. of households	11,854	8,839	3,015	5,021	6,833
	R^2	0.1341	0.2396	0.1189	0.1116	0.1037
	HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes
	PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes
	YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
	PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
	HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes

household spending, we should observe the estimated effects of housing wealth to be smaller with the inclusion of these additional control variables.

However, the results in rows 1 and 2 of Table 7 are similar to those of the baseline model (Table 3), which is inconsistent with the presence of additional omitted variables. Particularly, we find that the overall housing-wealth effect is significant and positive, and the consumption responses are particularly strong among private-sector employees and non-college-educated workers. These results suggest that the relationship between housing wealth and household consumption is not likely to be driven by the household expectation of future income or unobserved local economic conditions.

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Second, financial liberalization may drive up housing prices and stimulate consumption by relaxing borrowing constraints on all consumers (Attanasio and Weber (1994), Muellbauer (2007)). Considering that financial liberalization varies greatly across regions in China, we test the importance of this factor by looking at whether the housing-wealth effects are greater in regions with more liberalized financial markets, such as the first-tier cities. Thus, we divide our sample into 3 regions depending on economic status: first-tier cities, second-tier cities, and third-tier cities. In rows 3–5 of Table 7, we find that the effect of housing wealth on consumption is positive and significant across all types of cities. In addition, the housing-wealth effect is greater among private-sector employees and non-college-educated workers across all types of cities, especially among third-tier cities, where the financial market is less developed. These results suggest that housing-wealth increases are not a single-region phenomenon and that financial liberalization can not fully explain the housing-wealth effect.

Another concern in the study of housing-wealth effects is that stock market wealth gains may drive both local housing prices and consumption. Because only a relatively small group of people (approximately 7%) purchased stocks in our sample, stock market gains are not likely to severely bias the estimates. Nevertheless, to isolate this effect, row 6 of Table 7 repeats the fixed-effects estimation for households without stocks. The results for this subsample are similar to those using the baseline sample, which implies that buying stocks has little effect on the housing-wealth coefficients.

Finally, the length of housing tenure can affect consumption in ways unrelated to housing wealth. Households that recently purchased a new home are also more likely to buy both durable goods (e.g., a refrigerator and furniture) and nondurable goods (e.g., cleaning products). In this case, the impact of new housing purchases would be picked up by the error term, resulting in an omitted-variable bias. Fortunately, the UHS contains information on the purchase year of the current home. Therefore, we focus on homeowners who have lived in a home for more than 1 year when they first appear in the sample. The estimation results are reported in row 7 of Table 7. We find that the coefficient for these homeowners is still positive and significant (0.1337), which suggests that the main results are not driven by recent home purchases.

B. The Use of City-Level Housing Prices

As discussed in Section IV, self-reported housing wealth may reflect respondents' expectations of the future economy rather than actual levels of housing equity. We do not expect such bias to seriously affect the estimation results because we adopt the household fixed-effects model. Nevertheless, to ensure that the results are not biased because of measurement error, we conduct a robustness check using city-level housing price indices to measure housing wealth. The coefficient estimates shown in Table 8 are similar to those of models with fixed effects reported in Table 3. With the full sample, the estimated coefficients for housing prices are positive and significant. A 1% increase in housing prices in a city leads to a 0.23% increase in household consumption. As with the main results (Table 3), we find that consumption responses are stronger among non-SOE and non-college-educated workers compared with SOE and college-educated workers, respectively.

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TABLE 8

Robustness Checks: Alternative Measures of Housing Wealth

In Table 8, we use city-level housing price indices to measure housing wealth. The dependent variable is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Full Sample	Public	Non-Public	College Educated	Non–College Educated
	1	2	3	4	5
log(HOUSING_WEALTH)	0.2258***	0.0462***	0.2927***	0.0767***	0.2151***
	(0.0103)	(0.0127)	(0.0216)	(0.0215)	(0.0137)
log(HOUSEHOLD_INCOME)	0.0417***	0.5245***	0.0070***	0.1608***	0.0264***
	(0.0020)	(0.0079)	(0.0026)	(0.0077)	(0.0022)
HOUSEHOLD_SIZE	0.1076***	0.0818***	0.1070***	0.1147***	0.1167***
	(0.0054)	(0.0065)	(0.0110)	(0.0111)	(0.0068)
HOUSEHOLD_DEPENDENCY_RATIO	−0.0318	0.0164	−0.0059	0.0430	−0.0917***
	(0.0235)	(0.0267)	(0.0487)	(0.0450)	(0.0292)
HOUSEHOLD_HEAD_AGE	0.0051	−0.0060	0.0210*	0.0113	0.0086
	(0.0049)	(0.0059)	(0.0108)	(0.0106)	(0.0067)
HOUSEHOLD_HEAD_AGE_SQUARED	−0.0110*	0.0054	−0.0314**	−0.0128	−0.0148*
	(0.0056)	(0.0067)	(0.0125)	(0.0122)	(0.0076)
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes
No. of obs.	39,241	29,253	9,988	14,511	24,730
No. of households	10,642	7,412	3,221	3,902	6,740
R^2	0.1379	0.2653	0.1301	0.1177	0.1082

The use of city-level price indices also provides insights into the existence of a "placebo housing wealth" for homeowners and renters. The assumption embedded in this approach is that homeowners and renters in one city should respond differently to similar housing-price fluctuations. Renters, unlike homeowners, would not be expected to have a positive response to a reduction in the need for precautionary saving because of changes in housing wealth. Instead, an increase in housing prices would likely decrease their consumption if rental costs would go up following the increase in housing prices. In addition, because renters are often future buyers of housing, rising home prices would force them to save more and consume less to accumulate a down payment. Thus, if the fixed effects properly address omitted-variable biases, we should observe that city-level home prices have an insignificant or even negative effect on the consumption of renters. In Table 9, we estimate the fixed-effects models for the sample of renters, using the city-level housing price index as our explanatory variable. We find that the relationship between housing prices and consumption among renters is insignificantly negative across different subsamples, which implies that the fixed-effects model appropriately addresses omitted-variable bias.

Furthermore, city-level housing prices can potentially be used as an instrumental variable (IV) to address potential endogeneity (Haurin and Rosenthal (2006), Disney and Gathergood (2018)). When estimating the IV fixed-effects (IVFE) model, city-level housing prices turn out to be weak instruments, with *F*-statistics in the first stage well below 10, ranging from 1.33 to 8.82 (Stock and

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TABLE 9

Robustness Checks: Sample of Renters

The dependent variable in Table 9 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Full Sample	Public	Non-Public	College Educated	Non–College Educated
	1	2	3	4	5
log(HOUSING_WEALTH)	−0.0050	−0.0430	−0.2174	−0.0326	−0.0510
	(0.0861)	(0.1286)	(0.1774)	(0.1933)	(0.1113)
log(HOUSEHOLD_INCOME)	0.0741***	0.4708***	0.0172	0.3636***	0.0367*
	(0.0172)	(0.0532)	(0.0186)	(0.0556)	(0.0191)
HOUSEHOLD_SIZE	0.0447	0.0158	−0.0299	−0.0115	0.0766
	(0.0347)	(0.0403)	(0.1161)	(0.0507)	(0.0493)
HOUSEHOLD_DEPENDENCY_RATIO	−0.0432	0.0001	0.3759	−0.0399	0.1936
	(0.1421)	(0.1585)	(0.3622)	(0.2161)	(0.1990)
HOUSEHOLD_HEAD_AGE	0.0835	0.0469	0.1729	0.0453	0.2621***
	(0.0611)	(0.0685)	(0.2346)	(0.1112)	(0.0945)
HOUSEHOLD_HEAD_AGE_SQUARED	−0.1436*	−0.0928	0.0254	−0.1468	−0.1946*
	(0.0743)	(0.0833)	(0.2182)	(0.1301)	(0.1004)
GDP_PER_CAPITA	−0.0007	−0.0023	−0.0028	−0.0001	−0.0007
	(0.0022)	(0.0025)	(0.0043)	(0.0028)	(0.0033)
GDP_GROWTH_RATE_PER_CAPITA	0.0093	0.0020	0.0046	0.0118	0.0011
	(0.0064)	(0.0082)	(0.0098)	(0.0093)	(0.0085)
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes
No. of obs.	2,521	1,921	600	1,034	1,487
No. of households	1,592	1,185	407	661	931
R^2	0.1736	0.2846	0.3549	0.4269	0.2223

Yogo (2005)).[30] We also include variables to capture expectations of household income growth to help mitigate confounding factors that can threaten city-level housing prices as an instrument.

Despite these concerns about weak instruments, we report the results of the IVFE model in Table 10.[31] The qualitative conclusions from the IVFE model estimates are similar to the baseline estimates, although the magnitudes of the IVFE estimates are larger than those in our baseline results. For instance, housing wealth has a coefficient of 0.536 (statistically significant at the 5% level), whereas the baseline estimate is 0.143 (and statistically significant at the 1% level). Consistent with our baseline estimates, the IV estimates are significant only for the non-public-sector and non-college-educated samples but not significant for the public-sector and college-educated samples, suggesting that precautionary saving is the major driver behind housing-wealth effects in our sample. The IVFE results thus render support to the baseline results. Further, we cannot reject the null hypothesis that the IVFE and the fixed-effects coefficients are statistically equivalent using a Hausman test (Cameron and Trivedi (2005)).

[30]The *F*-statistics are larger when household fixed effects are not included in the regression model.

[31]Note that the housing price index is not available for some cities in our sample. As a result, the sample size for the IV regressions is smaller than that for our baseline estimates.

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TABLE 10

Robustness Checks: Instrumental Variable Estimation

The dependent variable in Table 10 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Full Sample	Public	Non-Public	College Educated	Non–College Educated
	1	2	3	4	5
log(HOUSING_WEALTH)	0.5362**	0.3212	0.7865*	0.1551	0.9791**
	(0.2340)	(1.2780)	(0.4567)	(2.1185)	(0.4642)
log(HOUSEHOLD_INCOME)	0.0326***	0.5083***	0.0065*	0.1571**	0.0236***
	(0.0061)	(0.1518)	(0.0038)	(0.0696)	(0.0031)
HOUSEHOLD_SIZE	0.0544	0.1027*	0.0518	0.1108	0.0598*
	(0.0387)	(0.0569)	(0.0562)	(0.1033)	(0.0350)
HOUSEHOLD_DEPENDENCY_RATIO	−0.0216	−0.0079	−0.0186	0.0445	−0.0432
	(0.0338)	(0.0364)	(0.0595)	(0.0451)	(0.0448)
HOUSEHOLD_HEAD_AGE	0.0049	−0.0075	0.0094	0.0125	0.0010
	(0.0066)	(0.0139)	(0.0141)	(0.0315)	(0.0092)
HOUSEHOLD_HEAD_AGE_SQUARED	−0.0073	0.0053	−0.0175	−0.0141	−0.0057
	(0.0080)	(0.0107)	(0.0161)	(0.0369)	(0.0104)
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes
No. of obs.	38,684	29,334	8,009	13,615	23,812
No. of households	10,085	7,761	2,324	3,751	6,334
R^2	0.1947	0.1596	0.1179	0.1077	0.1813
First Stage					
log(HOUSING_WEALTH)	0.0565**	0.0525**	0.0551**	0.0206	0.0871***
	(0.0248)	(0.0248)	(0.0569)	(0.0356)	(0.0293)
F-statistic	5.18	5.08	5.12	1.33	8.82
Hausman test *p*-value	1.08	0.91	0.9	1.29	1.11

C. Different Categories of Consumption

In this section, we explore consumption responses among different categories of consumption. As proposed by Gan (2010), when people feel less need to save, they might increase their discretionary spending. Thus, if precautionary saving drives consumption housing-wealth sensitivity, discretionary spending should respond more to housing wealth than to nondiscretionary spending. In Gan, consumption data are collected from credit-card records and, thus, might be underrecorded if households' credit cards are not included in the data or if some consumption is paid for by cash. The UHS reports a complete list of consumption that enables us to better distinguish discretionary and nondiscretionary consumption. For example, the UHS provides two major categories for food consumption: consumption of rice and flour and consumption of cakes and other desserts. The former category stratifies households' basic food needs and is usually considered as nondiscretionary consumption, whereas the latter category is discretionary consumption for middle-income households.[32] Moreover, the UHS reports consumption on dining out, entertainment, vacation, and health care, which are considered as discretionary spending.

[32]Other categories of food consumption include oil, eggs, meat, vegetables, and other.

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TABLE 11

Robustness Checks: Different Types of Consumption

The dependent variable in Table 11 is the log of household consumption. All monetary variables use 1,000 RMB as their unit and are deflated to 2009 yuan using national urban consumer price indices. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Rice and Flour	Dessert	Dining Out	Entertainment	Vacation	Health Care
	1	2	3	4	5	6
log(HOUSING_WEALTH)	−0.0230***	0.0649***	0.1856***	0.2947***	0.3587***	0.1793***
	(0.0074)	(0.0175)	(0.0218)	(0.0270)	(0.0423)	(0.0349)
log(HOUSEHOLD_INCOME)	−0.0066***	0.0615***	0.0920***	0.1223***	0.1155***	0.0678***
	(0.0023)	(0.0054)	(0.0067)	(0.0084)	(0.0131)	(0.0108)
HOUSEHOLD_SIZE	0.1577***	0.0768***	0.0957***	0.1236***	0.1219***	0.1328***
	(0.0061)	(0.0144)	(0.0179)	(0.0223)	(0.0349)	(0.0288)
HOUSEHOLD_DEPENDENCY_RATIO	0.1845***	0.4432***	−0.0761	0.4718***	−0.0135	0.0519
	(0.0266)	(0.0630)	(0.0783)	(0.0972)	(0.1522)	(0.1256)
HOUSEHOLD_HEAD_AGE	0.0219***	−0.0492***	0.0150	−0.0729***	−0.0809**	−0.1798***
	(0.0056)	(0.0133)	(0.0165)	(0.0205)	(0.0321)	(0.0265)
HOUSEHOLD_HEAD_AGE_SQUARED	−0.0026	0.0392**	−0.0545***	0.0551**	0.0477	0.1891***
	(0.0064)	(0.0153)	(0.0190)	(0.0236)	(0.0370)	(0.0305)
HOUSEHOLD_HEAD_INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_EFFECT	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	45,119	45,119	45,119	45,119	45,119	45,119
No. of households	12,878	12,878	12,878	12,878	12,878	12,878
R^2	45,119	45,119	45,119	45,119	45,119	45,119

Table 11 tests the precautionary-saving channel by estimating the response of different types of consumption to housing wealth. As shown in column 1, housing wealth has a significant negative impact on the consumption of rice and flour. In contrast, columns 2–6 indicate that housing wealth has a significant impact on many different forms of discretionary consumption. The point estimates for vacation (0.3587), entertainment (0.2947), and dining out (0.1856) are much higher than the baseline estimate of 0.143 (column 2 of Table 3).[33]

VIII. Conclusion

This article examines the extent to which household consumption responds to changes in housing wealth using household-level panel data in China. The analysis reveals that housing wealth has a positive impact on household consumption. Specifically, the baseline model estimates imply that a 1% increase in housing wealth increases household consumption by 0.143%, which translates into an MPC out of housing wealth of 0.025. More importantly, we find that the households with the largest need for precautionary saving have the largest consumption responses to changes in housing wealth. These households include private-sector employees and non-college-educated workers. In addition, we find that discretionary consumption responds more strongly to housing wealth than nondiscretionary consumption. These results suggest that adjustments in precautionary saving are the most

[33]Regression results for main categories of consumption are presented in Appendix Table A2.

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plausible explanation for the positive relationship between consumption and housing wealth in China. Further estimates confirm a minimal role for the collateral channel or a pure-wealth effect based on the life-cycle model.

These results not only help us understand the economic consequences of housing-market development in China but also have more general implications for other countries. In particular, using the unique context in China, this article provides empirical evidence supporting the role of housing as precautionary-saving stocks and suggests that housing-price fluctuations can transmit into the economy not only by affecting household borrowing capacities (as identified in the previous literature) but also by affecting household precautionary saving. Overlooking this channel could result in inaccurate consumption forecasts, particularly among households that face substantial risks. This could also be true for studies in developing countries that have high household saving rates and poor social security coverage, as in China.

One may argue that households in the developed world typically have more ways to adjust to negative income shocks, and thus they might have lower precautionary-saving motives compared with households in China. Indeed, household saving rates in developed countries are usually lower than those in China, which is partially attributable to the fact that social insurance coverage in these countries is more complete than in China. However, households in developed countries are far from completely insured and are subject to several sources of risks in earnings, health, and mortality. For example, Carroll and Samwick (1997), (1998) find that precautionary-saving motives are consistent with a variety of patterns of household saving and consumption in the United States. Further, Gourinchas and Parker (2002) estimate that precautionary wealth accounts for 65% of U.S. household liquid wealth. More recently, Choi et al. (2017) find that nearly all U.S. saving arises from precautionary motives. These results suggest that precautionary motives are an important factor in determining household consumption in developed countries. Thus, a reexamination of the size of the precautionary-saving channel in developed countries is worth the attention of future research.

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Appendix. Tables

TABLE A1

Summary Statistics

The raw sample in Table A1 includes households with heads between the ages of 21 and 65. The panel sample includes households that appear in the data at least 3 times and whose head is between the ages of 21 and 65. All monetary variables use 1,000 RMB as the unit and are deflated to 2009 yuan using national urban consumer price indices. Household income is defined as the sum of salaries, bonuses, and subsidies. Source: Urban Housing Survey, 2002–2009.

	Raw Sample		Panel Sample	
Variables	Mean	Std. Dev.	Mean	Std. Dev.
HOUSEHOLD_HOUSING_WEALTH	170.70	172.10	127.10	131.50
HOUSEHOLD_OWN_MORTGAGE	0.07	0.25	0.06	0.23
HOUSEHOLD_CONSUMPTION	27.44	18.96	24.06	16.78
HOUSEHOLD_INCOME	34.35	24.75	29.87	21.36
HOUSEHOLD_SIZE	2.89	0.76	3.04	0.69
HOUSEHOLD_DEPENDENCY_RATIO	0.20	0.18	0.22	0.18
HOUSEHOLD_HEAD_OR_SPOUSE_WORKS_IN_SOE	0.72	0.45	0.75	0.43
HOUSEHOLD_HEAD _WORKS_IN_SOE	0.69	0.46	0.72	0.45
HOUSEHOLD_HEAD_COLLEGE_OR_ABOVE	0.39	0.49	0.38	0.48
HOUSEHOLD_HEAD_AGE	43.41	7.84	43.29	7.65
HOUSEHOLD_HEAD_SCHOOL_YEARS	12.42	2.75	12.32	2.70
HOUSEHOLD_HEAD_FEMALE	0.25	0.43	0.26	0.44
HOUSEHOLD_HEAD_MARRIED	0.97	0.18	0.97	0.16
No. of obs.	123,658		45,119	

TABLE A2

Housing-Wealth Effects Across Different Types of Consumption (7 main categories)

The dependent variable in Table A2 is the log of household consumption. All monetary variables use 1,000 RMB as the unit and are deflated to 2009 yuan using national urban consumer price indices. Employers are separated into the following three categories: state-owned enterprise, joint venture or foreign-funded enterprise, and private enterprise. Robust standard errors clustered at the household level are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Source: Urban Housing Survey, 2002–2009.

	Food	Clothing and Footwear	Household Appliances	Medical Care and Health	Transportation and Communication	Education and Recreation	Other
	1	2	3	4	5	6	7
log(HOUSING_WEALTH)	0.0734***	0.2071***	0.1821***	0.1207***	0.2016***	0.2947***	0.1900***
	(0.0046)	(0.0132)	(0.0209)	(0.0269)	(0.0257)	(0.0270)	(0.0187)
log(HOUSEHOLD_INCOME)	0.0208***	0.0851***	0.0866***	0.0961***	0.0995***	0.1223***	0.0930***
	(0.0014)	(0.0041)	(0.0065)	(0.0083)	(0.0080)	(0.0084)	(0.0058)
HOUSEHOLD_SIZE	0.1107***	0.0577***	0.1369***	0.2021***	0.0323	0.1236***	0.0572***
	(0.0038)	(0.0109)	(0.0172)	(0.0222)	(0.0211)	(0.0223)	(0.0154)
HOUSEHOLD_ DEPENDENCY_RATIO	0.0354**	−0.0296	0.0336	0.0744	−0.2767***	0.4718***	0.0592
	(0.0166)	(0.0474)	(0.0751)	(0.0968)	(0.0923)	(0.0972)	(0.0672)
HOUSEHOLD_HEAD_AGE	−0.0068*	0.0410***	−0.0615***	−0.2680***	−0.0839***	−0.0729***	0.0075
	(0.0035)	(0.0100)	(0.0158)	(0.0204)	(0.0195)	(0.0205)	(0.0142)
HOUSEHOLD_HEAD_ AGE_SQUARED	0.0110***	−0.0829***	0.0615***	0.2981***	0.0710***	0.0551**	−0.0231
	(0.0040)	(0.0115)	(0.0182)	(0.0235)	(0.0224)	(0.0236)	(0.0163)
HOUSEHOLD_HEAD_ INDUSTRY	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes	Yes
YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PROVINCE_DUMMIES × YEAR_DUMMIES	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HOUSEHOLD_FIXED_ EFFECT	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	45,119	45,119	45,119	45,119	45,119	45,119	45,119
No. of households	12,878	12,878	12,878	12,878	12,878	12,878	12,878
R^2	0.1517	0.0902	0.0310	0.0254	0.0282	0.0435	0.0458

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