The Impact of House Price on Urban Household Consumption: Micro Evidence from China

Xiaoqin Sun, Yuhai Su, Honglei Liu * and Chengyou Li

School of Finance, Shandong University of Finance and Economics, No. 40 Shungeng Road, Jinan 250000, China; sunxiaoqin617@126.com (X.S.); syh1964001@163.com (Y.S.); lichengyou1987@163.com (C.L.)
* Correspondence: reneeliuhonglei@163.com

Abstract: The impact of house prices on consumption is an important concern for academics and policy makers. Several studies have documented that house price changes have an impact on consumption; however, there is far less consensus on how house price changes affect consumption in China. The purpose of this paper is to examine the impact of house prices on household consumption in urban China and to identify the mechanisms behind the impact. This study measures the impact of housing price changes on consumption at the household level, using research data from 71,548 home-owning households in the 2011–2019 China Household Finance Survey database. Our analysis shows that housing prices have a significant negative effect on consumption, with a 1% increase in the value of a household’s property causing a 0.0034% decrease in household consumption, an effect that is significant for households that own a home and for those in the eastern and central regions. We find that rising house prices cause an increase in households’ precautionary savings, which is the main mechanism through which house prices affect consumption in China. Furthermore, the impact of house prices on consumption is asymmetric, with consumption moving in the opposite direction when house prices rise but not when house prices fall. This study provides meaningful insights for policy makers on the usefulness of building a healthy and stable housing market to expand consumption and revitalize the economy.

Keywords: house prices; household consumption; precautionary savings; dynamic consumption decision model

JEL Classification: D19; E21; R21; R22; R31

1. Introduction

China’s housing market has undergone a period of rapid development since the housing market reform in 1998 [1]. Housing prices have risen at an alarming rate since 2002 and, particularly in the last decade, have experienced rapid increases on top of the high levels. Between 2010 and 2020, housing prices in first-tier cities rose 1.5 times at least, some areas even doubled, while housing prices in other cities increased by more than 1 time on average (Data source: National Bureau of Statistics of China. First-tier cities include Beijing, Shanghai, Guangzhou, and Shenzhen.). In contrast, China’s consumption rate remained low, growing slowly from 2010 to 2020, significantly lower than developed countries and even lower than many developing countries (According to the World Bank and the International Monetary Fund, China’s consumption rate declined from 47.7% in 1996 to 35.7% in 2011, and although it rebounded to 54.29% in 2020, it is still significantly lower than developed countries such as the United States (81.96%) and the United Kingdom (84.88%), and also seriously lower than countries at a comparable level of economic development such as India (71.08%) and Brazil (83.21%)). This is clearly at odds with rapidly increasing house prices [2–5]. Whether the rapid rise in house prices in China is a stimulus or a disincentive to consumption is a question that deserves further investigation.
The purpose of this paper is to re-explore the impact of housing price changes on urban residents’ consumption in China. As the most important component of household property, how price fluctuations in housing affect consumption has been of wide interest to scholars and policy makers. When studying the relationship between housing price changes and consumption in developed countries, most scholars conclude that housing price changes have a significant positive effect on consumption [3,6,7], except for a few scholars who do not find a significant effect [8]. In the case of China, however, the issue is still more divisive. Some academics state that rising housing prices boost household consumption and have a positive “wealth effect” [9]; however, some scholars argue that rising housing prices place a big burden on Chinese households, which is an important reason for the low consumption rate, with a “crowding out effect” [1,10,11]. The reasons for the current disagreement are manifold: differences in the channels of action, research data, testing methods, and the time point of the study may lead to opposite results.

The literature points to four possible mechanisms: the wealth effect, the collateral effect, precautionary saving motive, and common factors. First, while several scholars have confirmed the existence of the wealth effect channel through empirical analysis [2,6,12], others have taken a negative view of it [13]. It is undeniable that the dual attributes of housing, the bequest motive of residents, and the high replacement cost of housing may lead to a significant reduction in the wealth effect [14]. Second, with regard to the collateral effect, the additional gains generated by rising housing prices increase the possibility that households borrow out of housing collateral, which may increase residential consumption in countries with high financial liberalization [7,15–17]. However, extensive restrictions on home equity borrowing in China make it almost impossible for the impact of house prices on consumption to work through the mortgage channel. Thirdly, the common factors hypothesis responds to the irrelevance of the relationship between house prices and residential consumption. Economic prospects, demographic trends, future productivity, and other factors are likely to have a joint impact on housing prices and consumption; such unobserved common factors make OLS regressions in microdata difficult to interpret. Fourth, the impact of housing prices on consumption through the precautionary savings mechanism is more complex. In an uncertain world, property is a buffer stock, and when property values increase, residents’ precautionary saving motives are reduced, thus increasing current consumption [18]. However, families who want to buy a home must save a lot of money in countries with high down payments; thus, when house prices rise, more households may decide to boost their savings (lower their consumption) [6,15,19]. The down-payment ratio in China is at a relatively high level worldwide, with the down-payment ratio for the first home generally at 30% and for the second at around 60%, with some cities even reaching 70% [20].

Studies have found that rising house prices in China have a dampening effect on residential consumption, which is the “crowding out effect” [21,22]. Reasons for increased savings in China due to rising house prices include the following: Firstly, due to the high down-payment requirements, it is a common phenomenon for Chinese parents to help pay the down payment for their adult children, which will create pressure on both young people and their parents to increase their precautionary savings, with a certain “crowding out effect” on consumption [21,22]. Secondly, investors lack investment channels, the Chinese capital market is not yet perfect, and real estate is the main investment [22]; therefore, tempted by rising house prices and investment returns, residents are likely to pour money into speculative housing purchases, thus compressing consumption and creating a “substitution effect” on consumption [22]. Thirdly, Chinese residents expect higher housing price in the future based on the “more up, less down” effect in real estate market, causing households who intend to buy or replace their homes increase precautionary savings and reduce consumption [23]. The mechanism by which house prices affect consumption has been much researched, but there is a lack of research specific to China. The precautionary savings mechanism may better explain the current impact of housing prices on consumption in
China than the other three mechanisms; however, the research about precautionary savings mechanism is only at the theoretical level and there is a gap in the empirical research.

We revisit the question from both theoretical and empirical perspectives to answering the question: How do housing price changes affect household consumption in China? What is the mechanism of influence behind it? Is there a symmetry in the impact of rising and falling housing prices on consumption? To answer the above questions, we make various efforts in mechanism analysis, theoretical model construction, data selection, variable construction, and empirical testing.

We incorporate the property ratio and changing rate in the house price index into a dynamic consumption decision model to obtain a consumption Euler equation that includes changes in the value of housing. Then, we obtain the optimal decision model for household consumption by solving the consumption Euler equation, which provides theoretical evidence of the mechanisms by which changes in property values may shape household consumption. Combined with the real-world analysis, we identify precautionary savings as the main mechanism of influence. This provides a theoretical framework that we can refer to for the following empirical analysis.

We conduct an empirical study using the representative China Household Finance Survey (CHFS) sample of 71,548 micro households in 2011, 2013, 2015, 2017, and 2019. In previous studies, both macro- and microdata have been used as a basis for research on this issue. Macrodata have the advantage of tracking house price changes but suffer from three shortcomings when examining households’ micro decisions: Macrodata ignore potential individual differences in wealth and income [24]; lacks controls for household demographic characteristics, may have omitted variables and endogeneity issues [25]; and does not facilitate heterogeneity analysis. As the household micro survey data have details on household wealth, income, and demographic characteristics, they have the advantage in studies of households’ micro decisions over using the macrodata.

Changes in house prices cause changes in the value of a household’s home equity, and observing movements in the value of one’s own property is the most obvious way for residents to perceive price changes, which affects consumption behavior. We measured changes in housing values by multiplying property values by changes in the regional property value index, drawing on Mian et al. [26]. There are at least two advantages to the measurement. First, it takes into account differences in asset exposures of different households. When studying the impact of housing price changes on household consumption using macroeconomic time series data, cross-sectional differences in asset exposure are often ignored [26], whereas our measure takes into account asset exposure across households. The second is to identify the impact of changes in housing prices. When using microdata, scholars tend to apply panel fixed effects models to test the impact of house price changes on consumption [4,8,9]. The panel fixed effects model applies the principle of differencing to analyze the impact of changes in property values on household consumption, which is appropriate for microdata where surveys are conducted more frequently (e.g., annually or quarterly). However, for microdata surveyed every other year, the fluctuations in house prices during two survey years may be overlooked, leading to final results that may not capture the impact of housing price changes on consumption. The current micro survey data in China are generally surveyed every other year; therefore, our method provides a direct measure of the change in property values for each household over a year, making it easy to examine the impact of changes in property values on consumption.

We empirically test the precautionary saving mechanism for the effect of property value changes on consumption. When faced with risk, people take certain precautionary actions [27]. Changes in the value of housing assets due to house prices can increase the uncertainty of people’s future spending, which in turn can increase precautionary savings and reduce consumption. Based on the household savings classification, we isolate the proxy variable for precautionary savings from total household savings, providing a reliable basis for testing the mechanism of precautionary savings. Although scholars suggest that the precautionary saving motives may be the main mechanism through which house
prices affect household consumption in China, due to the lack of a valid measure of the precautionary saving motives, tests of this mechanism are limited to indirect tests or logical analysis [19].

We analyze the asymmetric impact of changes in property values. The asymmetric impact of housing prices on consumption has been discussed by scholars for a long time, such as Engelhardt [28], who used PSID data combined with quantile regression methods to indirectly support the establishment of asymmetry through the savings perspective. Disney [3] found that for households with negative equity, there is no significant difference in the marginal propensity to consume when housing prices rise or fall. Guren et al. [29] argued that there is no asymmetry in the U.S. housing market in the long run. Using data from China, we find asymmetry in China’s housing market such that rising housing prices cause household consumption to fall, but there is no clear evidence that falling housing prices increase household consumption.

The established literature provides a good basis for the research in this paper, and a comparison with previous studies reveals the following main marginal contributions: Firstly, we construct a dynamic consumption decision model incorporating changes in property values and make an attempt to obtain a consumption Euler equation incorporating changes in the value of housing assets under the framework of the dynamic decision model to explore innovatively the mechanism of the effect of house prices on household consumption. This forms a good theoretical complement to existing research. Secondly, we measure changes in the value of housing assets by multiplying the value of the property by the change in the house price index, which provides an intuitive measure of changes in housing values. Third, we empirically test the precautionary saving mechanism, filling the gap in empirical research on precautionary savings mechanisms. Fourth, we test for asymmetric effects caused by falling house prices, providing evidence to stimulate consumption by regulating house prices.

The rest of the paper proceeds as follows. Section 2 provides a dynamic consumer decisions model. Section 3 explains the data, measurement approach, and empirical methodology. Section 4 reports baseline results and robustness tests. Section 5 discusses a heterogeneity analysis. Section 6 presents channel analysis. Section 7 concludes the paper.

2. Theoretical Framework

Based on a dynamic consumer decision model, we derive the determinants of residential household consumption and illustrate the impact of housing asset price volatility on household consumption through model derivation. Furthermore, we analyze the mechanisms by which housing asset price volatility affects household consumption.

We create a model based on a representative family, assuming that the representative family can survive indefinitely. The household’s income comes mainly from wages and capital gain. Household expenditure in period \( t \) consists mainly of consumption expenditure \( C_t \) and debt repayment expenditure \( b_t \). Note that \( Y_t \) is the household’s labor income in period \( t \) and \( W_t \) is the level of the household’s total assets in period \( t \). Representative households will invest their wealth in different types of assets, and the types of assets are divided into risk-free assets \( F_t \), housing assets \( H_t \), and risky financial assets \( A_t \), where \( r^f_t \) presents for the rate of return on investment in risk-free assets and \( f_t \) presents for the proportion, \( r^h_t \) presents for the rate of return on housing assets and \( h_t \) presents for the proportion, and \( r^a_t \) presents for the rate of return on investment in risky financial assets and \( a_t \) presents for the proportion. The decision problem confronting a representative household at the start of a period can be expressed as follows: Given an initial endowment and income in each period, maximize lifetime utility by selecting consumption \( \{ C_t \}_{t=0}^{\infty} \) and a portfolio of assets \( \{ r^f_t, r^h_t, r^a_t \}_{t=0}^{\infty} \) in each period. This model chooses discrete-time variables and, for a simplified analysis of the problem, assumes the consumer’s utility function to be additive and divisible. The decision problem for this representative household can be expressed as
\[
\max_{c_t, r^f_t, r^h_t} E_0 \sum_{t=0}^{\infty} \frac{1}{(1 + \rho)^t} U(C_t)
\]

The constraints are
\[
W_{t+1} = f_t W_t \left(1 + r^f_t\right) + h_t W_t \left(1 + r^h_t\right) + a_t W_t \left(1 + r^a_t\right) + y_{t+1} - C_{t+1} - b_{t+1}
\]

where \(\rho\) is the subjective discount factor of household utility and \(U(\cdot)\) is the spot utility function of the representative household. In particular, we assume the utility function concave and continuously differentiable: \(U' > 0, U'' < 0\). \(E_0\) is the mathematical expectation of the information based on period 0. \(Y_t\) denotes the income level of the household in period \(t\) and obeys a stochastic process, \(Y_{t+1} = \varphi Y_t + \epsilon_{t+1}, \epsilon_{t+1} \sim (0, \sigma^2)\). The above objective function \(U(\cdot)\) and the state transfer function \(W_{t+1} = f_t W_t \left(1 + r^f_t\right) + h_t W_t \left(1 + r^h_t\right) + a_t W_t \left(1 + r^a_t\right) + y_{t+1} - C_{t+1} - b_{t+1} = g(W_t, C_t)\) all have an invariant functional form that does not change with time. The dynamic programming method solves the household consumption optimization problem, defining the value function.

\[
V(W_t) = \max_{c_t} E \sum_{t=0}^{\infty} \frac{1}{(1 + \rho)^t} U(C_t)
\]

So, the Bellman equation for any stage \(t\) can then be expressed as
\[
V(W_t) = \max \left\{ U \left[f_t W_t \left(1 + r^f_t\right) + h_t W_t \left(1 + r^h_t\right) + a_t W_t \left(1 + r^a_t\right) + y_{t+1} - b_{t+1} - W_{t+1} \right] + \frac{1}{1 + \rho} E_t V(W_{t+1}) \right\}
\]

Finding the partial derivative of \(W_{t+1}\) for Equation (5) gives
\[
-U'(C_t) + \frac{1}{1 + \rho} V'(W_{t+1}) = 0
\]

Taking the partial derivative of \(W_t\) for Equation (4) yields
\[
V'(W_t) = U'(C_t) \left[f_t \left(1 + r^f_t\right) + h_t \left(1 + r^h_t\right) + a_t \left(1 + r^a_t\right)\right]
\]

Combining Equations (6) and (7) yields an Euler equation that satisfies the optimality condition for dynamic programming:
\[
\frac{U'(C_t)}{U'(C_{t+1})} = \frac{f_{t+1} \left(1 + r^f_{t+1}\right) + h_{t+1} \left(1 + r^h_{t+1}\right) + a_{t+1} \left(1 + r^a_{t+1}\right)}{1 + \rho}
\]

To further obtain a closed-form solution of the function, this paper assumes that the utility function of a representative household is a constant, logarithmic, risk-averse utility function (CRRA) of the form \(U(C_t) = -e^{-\theta C_t}\). Further, it assumes that consumption is a linear function of wealth under the optimal consumption path, satisfying \(C^*(W_t) = c_0 + c_1 W_t\). Substituting the above utility function and consumption into the Euler Equation (8) yields
\[
(-\theta(c_0 + c_1 W_t)) = A \exp \left(-\theta \left[c_0 + c_1 \left(f_t W_t \left(1 + r^f_t\right) + h_t W_t \left(1 + r^h_t\right) + a_t W_t \left(1 + r^a_t\right) + y_{t+1} - c_0 - c_1 W_t - b_1\right)\right]\right)
\]

where \(A = \frac{f_{t+1} \left(1 + r^f_{t+1}\right) + h_{t+1} \left(1 + r^h_{t+1}\right) + a_{t+1} \left(1 + r^a_{t+1}\right)}{1 + \rho}\), for a given wealth value. According to Formula (9), the marginal propensity to consume wealth at both ends must be equal to obtain \(c_1\); substitute \(c_1\) into Equation (9) to obtain \(c_0\), respectively:
We can see that precautionary savings are positively related to income risk, negatively related to consumption, given the present higher home prices. The analysis leads to the following equations:

\[ c_0 = \varphi y_t - b_t - \ln \left( \frac{f_t r_t^f + h_t r_t^h + a_t r_t^d}{1+p} \right) - \theta \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right) \sigma^2 \]  \tag{10}

\[ c_1 = f_t r_t^f + h_t r_t^h + a_t r_t^d \]  \tag{11}

Substitute \( c_0 \) and \( c_1 \) into the optimal consumption path \( C^* = c_0 + c_1 W_t \), respectively, to obtain

\[ C_t^* = \varphi y_t - b_t + \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right) W_t - \ln \left( \frac{f_t r_t^f + h_t r_t^h + a_t r_t^d}{1+p} \right) - \frac{\theta \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right) \sigma^2}{2} \]  \tag{12}

Equation (12) consists of five components. \( y_t \) is the total income of the household. \( b_t \) is the current period debt. \( \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right) W_t \) is the property income. The return on risk-free investments is mainly dictated by interest. The return on housing assets considers both rent and housing price movements. Moreover, the return on risky financial assets is from dividends and capital gains. The property income \( \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right) W_t \) may be split into two components: \( \left( R_t^f + R_t^h + R_t^d \right) W_t \) and \( \left( P_t^h + P_t^d \right) \), where \( R_t^f + R_t^h + R_t^d \) is the interest or dividend income generated by the three types of assets themselves and \( \left( P_t^h + P_t^d \right) \) is the fluctuation of asset value due to asset price fluctuations. The fourth part is \( \frac{\ln \left( \frac{1+f_t r_t^f + h_t r_t^h + a_t r_t^d}{1+p} \right)}{\theta \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right)} \), which is the consumption time preference factor. The last part \( \frac{\theta \left( f_t r_t^f + h_t r_t^h + a_t r_t^d \right) \sigma^2}{2} \) is precautionary saving, which, according to the previous decomposition, can be deformed into the precautionary saving component as \( \frac{\theta \left( R_t^f + R_t^h + R_t^d \right) \sigma^2}{2W_t} \). We can see that precautionary savings are positively related to income risk, negatively related to total household wealth, and positively related to the amount of asset value changes. Equation (12) can be written as Equation (13) based on the above analysis.

\[ C_t^* = \varphi y_t - b_t + \left( R_t^f + R_t^h + R_t^d \right) + \left( P_t^h + P_t^d \right) - \frac{W_t \ln \left( \frac{w_t \left( R_t^f + R_t^h + R_t^d \right)}{w_t (1+p)} + \left( P_t^h + P_t^d \right) \right)}{\theta \left( R_t^f + R_t^h + R_t^d \right) + \left( P_t^h + P_t^d \right) \sigma^2} \]  \tag{13}

Equation (13) shows that household consumption is related to fluctuations in the value of housing assets \( P_t^h \). The impact of housing asset price volatility on household consumption comes from a trade-off between three forces. First of all, the increase in the value of housing assets brings about some appreciation in value, and without selling the housing assets, the increase in the price of housing assets only makes the holders of housing assets psychologically richer, thus increasing consumption to a certain extent. This increase in consumption is limited because the actual realization of wealth does not back it up. As the use of mortgages for consumption is strictly regulated in China, it is unlikely that consumption will increase through the “mortgage” channel. The second is the consumption time preference factor associated with changes in housing value. The third is precautionary savings associated with changes in housing assets. Precautionary savings is positively related to housing value change. Given the relatively modest effect of increased consumption owing to psychological influence and the time preference effect, increased precautionary savings is the primary channel via which changes in housing asset values impact consumption, given the present higher home prices. The analysis leads to the paper’s Hypothesis 1.
Hypothesis 1. Changes in the price of housing assets have a negative impact on household consumption (crowding-out effect).

From the analysis and the fifth part of Equation (13): 
$$\theta \left( \left( R_{f} + R_{h} + R_{a} \right) + \left( P_{h} + P_{a} \right) \right) \sigma_{W}^{2},$$
changes in the value of housing assets negatively impact consumption by affecting households’ precautionary savings. Additionally, asset price volatility affecting consumption through the precautionary savings rate has been recognized by many scholars; however, the conclusions are not uniform. Some scholars believe that the more risky assets held, the more savings are needed to hedge against possible future losses [30]. The housing asset itself may not require more savings to hedge against risk, but for households who may purchase a home in the future, it will increase their precautionary savings to cope with the increased cost of buying a home in the future. According to the analysis above, this consists of three main reasons: general demand for housing, investment demand from investors, and expectations of continued house price rises [23]. Especially when the minimum down-payment ratio and housing prices have reached high levels, it may become common to increase precautionary savings to purchase a home. Based on this, Hypothesis 2 of this paper is proposed.

Hypothesis 2. Rising home equity prices negatively affect household consumption by increasing precautionary savings.

So far, we have obtained the impact of house price changes on household consumption at the theoretical level. Next, we will further test this empirically using actual survey data.

3. Data, Variables and Models

3.1. Data

This paper uses the China Household Finance Survey (CHFS) database for 2011, 2013, 2015, 2017, and 2019. The CHFS uses questionnaires and personal interviews distributed across 29 provinces, 367 counties (districts and county-level cities), and 1481 communities. It is representative of national, provincial, and sub-provincial cities. The data surveyed include detailed information on household income and asset holdings, household head information, and household members. The information is comprehensive and detailed, providing a rich microdatabase for this study.

We process the samples according to the following principles. We select the urban household samples. As most rural houses in China are self-built houses on communal land, they are different from “commercial houses” in urban areas in terms of transfer and price. We remove samples with missing and outliers of the main variables. We keep samples where householders are over 18 years old and under 79 years old. We exclude the samples with zero consumption amount and households with income below CNY 500. The final valid sample sizes obtained were 3958 in 2011; 10,358 in 2013; 18,407 in 2015; 21,452 in 2017; and 17,373 in 2019, for a total sample size of 71,548.

3.2. Variables

3.2.1. Dependent Variable

We choose total household consumption expenditure (Consumption) as the dependent variable. CHFS records the status of total household consumption expenditure and categorical consumption expenditure in detail. In the data, total consumption expenditure includes eight categories of consumption expenditure: food and clothing consumption, housing and related consumption, household daily necessities consumption, transportation and communication consumption, culture, entertainment, education consumption, durable goods consumption, healthcare consumption, and other consumption.
3.2.2. Independent Variable

The challenge of this article and the emphasis of this paper is the exact measurement of the change in the value of housing assets \((d_{\text{price}})\) as the independent variable. This paper combines the characteristics of the CHFS database and the provincial house price indices (data source: National Bureau of Statistics). It refers to Mian et al.'s [26] asset value change measure, which uses the value of home equity held by households multiplied by the rate of change in the provincial house price index to represent the change in home equity value due to changes in house prices. The measure of change in home equity value is shown in Equation (14).

\[
d_{\text{price}}_{it} = \text{house}_{a_{it}} \times \text{index}_{h_{jt}}
\]  

(14)

where \(d_{\text{price}}_{it}\) denotes the change in the value of housing assets of household \(i\) in period \(t\) due to changes in house prices, \(\text{house}_{a_{it}}\) denotes the total value of housing assets held by household \(i\) in period \(t\), and \(\text{index}_{h_{jt}}\) denotes the rate of change in the housing price index of province \(j\) to which household \(i\) belongs in period \(t\).

3.2.3. Control Variables

Based on the existing research literature and the data available from the CHFS database, this paper selects household economic status, household head characteristic variables, household characteristic variables, and regional characteristic variables as control variables [2]. Household economic status includes non-financial assets, financial assets, total income, and debt. To prevent the interference of bad control variables, the non-financial assets in this paper are the value of non-financial assets before the price of housing assets fluctuates at the beginning of the year. We control for gender, age, education, marital status, health condition, and the risk-aversion of the head of household. The basic characteristics of the family include family size, child support ratio, old-age dependency ratio, pension insurance ratio, medical insurance ratio, and unhealthy ratio. Changes in consumption and property values may both be influenced by macrofactors at the same time, such as economic cycles, inflation, and other factors. For this purpose, we include a macroeconomic variable in the control variables: provincial GDP per capita and also year-fixed effects. Time variable survey years include 2011, 2013, 2015, 2017, and 2019.

3.2.4. Mechanism Variables

This paper selects precautionary saving as a mechanism variable. As a psychological activity, precautionary motivation is an integral part of household savings. There are absolute and relative prudence coefficients [31] to measure the strength of precautionary saving motives and econometric models under precautionary saving models [32,33]. However, regardless of whether macrodata or microdata are used, the calculated result is generally the proportion of precautionary savings that residents tend to make overall. There is still no perfect measure of the amount of precautionary savings for each household.

According to the different household saving motives, we isolate the variable positively correlated with precautionary saving from the total household saving as a proxy variable for precautionary saving motivation. Although household saving motives are diverse, economists generally classify saving motives into precautionary saving motives, life-cycle saving motives, and bequest saving motives. Life-cycle savings are related to income, wealth, and age [34]. Legacy savings, an important reason for saving in higher-income groups, are also proportional to income and wealth [35]. In this paper, we classify the groups by age, wealth, and income. Life-cycle savings and bequest savings are closely related to these three factors; so, the life-cycle and legacy savings of the samples in the group are not very different, and the difference is due to the different preventive savings of families. We use the difference between the total saving of each household \((\text{save})\) and the mean saving within the group \(\text{save}_{\text{mean}}\) as a proxy for precautionary saving. This paper constructs two indicators to measure the total savings of residents—namely, \(\text{save}_{1} = \text{total household income-household consumption expenditure}\) and residential savings that exclude education and healthcare spending from savings \(\text{save}_{2} = \text{total household income-}\)
household consumption expenditure + education expenditure + healthcare expenditure). Based on these two total savings rates, the two indicators needed to measure precautionary saving in this paper are obtained, namely, $PS_1 = save_1 - save_1$ and $PS_2 = save_2 - save_2$.

The descriptive statistical analysis of the variables is shown in Table 1.

Table 1. Descriptive statistics (the unit is thousand yuan unless otherwise specified).

| Variables               | Definition                                                                 | N    | Mean       | Std. Dev.   | Min      | Max      |
|-------------------------|-----------------------------------------------------------------------------|------|------------|-------------|----------|----------|
| **Dependent Variable**  |                                                                             |      |            |             |          |          |
| Consumption             | Total household consumption                                                 | 71,548 | 74.139    | 87.669    | 0.690    | 3766.868 |
| **Independent Variables**|                                                                             |      |            |             |          |          |
| dprice                  | Changes in the value of housing assets due to house price changes           | 71,548 | 105.324   | 243.469   | −821.556 | 6808.804 |
| dpricep                 | Change in net housing assets due to change in house prices, where net housing assets equals housing assets less housing liabilities. | 71,548 | 100.851   | 236.970   | −809.820 | 6808.804 |
| **Control Variables**   |                                                                             |      |            |             |          |          |
| Non-financial assets    | Household non-financial assets at the beginning of the period               | 71,548 | 1609.473  | 4769.473  | 0        | 97,973.216 |
| Financial assets        | Household financial assets                                                  | 71,548 | 160.425   | 417.202   | 0        | 26,220   |
| Total income            | Total household income                                                      | 71,548 | 106.186   | 198.610   | 0.500    | 12,122.418 |
| Debt                    | Total household debt                                                        | 71,548 | 66.619    | 295.379   | 0        | 25,000   |
| Gender                  | Head of household is male = 1, other = 0                                   | 71,548 | 0.7245    | 0.4467    | 0        | 1        |
| Age                     | Age of head of household (year)                                            | 71,548 | 52.620    | 13.630    | 18       | 80       |
| Education               | Number of years of education of the head of household (year)               | 71,548 | 10.495    | 3.916     | 0        | 23       |
| Marital status          | Head of household married = 1, other = 0                                   | 71,548 | 0.874     | 0.331     | 0        | 1        |
| Health condition        | Head of household health = 1, other = 0                                    | 71,548 | 0.856     | 0.351     | 0        | 1        |
| Risk-aversion           | Head of household risk attitude                                            | 71,548 | 0.551     | 0.497     | 0        | 1        |
| Family size             | Family size (in persons)                                                   | 71,548 | 3.216     | 1.436     | 1        | 20       |
| Child support ratio     | Household members under 16 years old                                       | 71,548 | 0.118     | 0.163     | 0        | 0.800    |
| Old-age dependency ratio| Ratio of household members over 60 years old                               | 71,548 | 0.289     | 0.383     | 0        | 1        |
| Pension insurance ratio | Percentage of population with pension insurance in households              | 71,548 | 0.636     | 0.336     | 0        | 1        |
| Medical insurance ratio | Proportion of people with health insurance in the household                | 71,548 | 0.697     | 0.375     | 0        | 1        |
| Unhealthy ratio         | Proportion of unhealthy people in households                                | 71,548 | 0.113     | 0.238     | 0        | 1        |
| GDP                     | Regional GDP per capita                                                    | 71,548 | 6.092     | 3.041     | 1.880    | 16.456   |
| **Mechanism Variables** |                                                                             |      |            |             |          |          |
| $PS_1$                  | Precautionary Savings 1                                                    | 71,548 | 0.001     | 12.493    | −258.789 | 1040.588 |
| $PS_2$                  | Precautionary Savings 2                                                    | 71,548 | 0.001     | 11.955    | −237.734 | 1038.266 |

Note: This table was compiled from the database CHFS.

3.3. Empirical Strategy

To analyze the effect of changes in the value of household housing assets on household consumption, this paper constructs a multiple regression model as follows.

$$Consumption_i = \beta_0 + \beta_1 dprice_i + \Gamma X + \epsilon_i \quad (15)$$

where in Equation (15), $Consumption_i$ denotes the total consumption of household $i$, $\beta_0$ is a constant, $dprice_i$ denotes the change in property value of household $i$, $\beta_1$ captures the consumption response to house price changes, $X$ denotes the vector of control variables, $\Gamma$ denotes the vector of coefficients corresponding to the control variables, and $\epsilon_i$ is the random
disturbance term. In regression, variables expressed in currency are treated logarithmically. As the value of housing assets fluctuates in positive and negative directions, \( \log(d\text{price} + 1) \) is used to calculate its logarithm when the value is positive and \( -\log(-d\text{price} + 1) \) is used when the value is negative.

To further examine the mechanism of the effect of home equity appreciation on household consumption, this paper refers to the sequential test of Li et al. [36] and constructs regression models as follows:

\[
ME_i = \alpha_0 + \alpha_1d\text{price}_i + AX + \epsilon_i \tag{16}
\]

\[
\text{consumption}_i = \gamma_0 + \gamma_1d\text{price}_i + \gamma_2ME_i + BX + \epsilon_i \tag{17}
\]

where coefficient \( \alpha_1 \) in Equation (16) is the effect of change in housing asset value on the mediating variable \( ME_i \), coefficient \( \gamma_2 \) in Equation (17) is the effect of the mediating variable \( ME_i \) on household consumption after controlling for the effect of the independent variable, and coefficient \( \gamma_1 \) is the effect of change in housing asset value on household consumption after controlling for the effect of the mediating variable \( ME_i \). The coefficient \( \gamma_1 \) is the direct effect of changes in the value of housing assets on household consumption after controlling for the effect of the mediating variable \( ME_i \). In this paper, precautionary savings is chosen as the mediating variable.

4. House Prices and Chinese Household Consumption

4.1. Baseline Regression Results

Baseline regression estimates the effect of changes in the value of housing assets on household consumption. This paper uses Equation (15) for estimation, and the results are shown in Table 2. Columns (1)–(8) of Table 2 show that changes in the value of housing assets all have negative effects on household consumption at least at the 1% level, specifically in column (8), where every 1% increase in the value of the property will result in a 0.0034% decrease in consumption. This effect does not change in direction or significance when household economic variables, head of household characteristics variables, household characteristics variables, regional economic variables, time fixed effect, and city fixed effect are added gradually. It suggests that the change in the value of housing assets does not have a positive “wealth effect” but rather a “crowding out effect” on consumption. This is the same conclusion obtained by Dong et al. [1] and Waxman et al. [10] using city-level data. Rising house prices could be one of the reasons for China’s current consumption slump, since the house price to income ratio is now at a high level in all provinces and the change in house prices is felt by Chinese households in terms of property appreciation, creating more intuitive pressure and different expectation of rising house prices for those looking to buy or replace their property in the future. In regressions (7) and (8), we consider the effects of macroeconomic variables, which exclude the interference of common factors. Furthermore, the regressions show a negative effect of changes in home equity value on household consumption, indicating that even though other common factors exist, such interference would not be the main channel of influence. At this point, hypothesis 1 has been verified, but further discussion and research on the issue are needed to clarify the channels through which changes in home equity values affect consumption.

4.2. Robustness Check

4.2.1. IV Estimation

When examining the impact of changes in the value of housing assets on household consumption, there are likely to be endogeneity problems. Specifically, the level of household consumption may also affect the household’s wealth status and hence the amount of change in the value of housing assets, which means there may be endogeneity issues arising from two-way causality in this paper. The results of the DWH test in Table 3 also verify our conjecture. To avoid biased estimation results due to the above issues, it is necessary to explore and address the endogeneity issue in this paper. Finding instrumental variables
consistent with exogeneity and relevance is an effective way to address the endogeneity issue. In this paper, “average home equity appreciation of other respondents in the same community and year (IV1)” and the growth rate of the number of college graduates in the province (IV2) are selected as the instrumental variables for the independent variable (dprice). In terms of exogeneity, the average home equity appreciation of other respondents in the same neighborhood and year has a weak effect on respondents’ consumption, while the growth rate of the number of college graduates in the province has almost no effect on the consumption status respondents’ households. In terms of correlation, the change in the home equity value of other respondents’ households in the same community and year closely related to the change in the home equity value of the respondents’ households, as they live in the same community. The growth rate of the number of college graduates in the province, as a macrovariable, has a certain degree of influence on house prices because college graduates tend to choose their place of study for employment. The two variables thus satisfy both the correlation and exogeneity conditions.

Table 2. Impact of housing value changes on household consumption.

| Variables                  | Consumption (ln) |
|----------------------------|------------------|
|                            | (1)             |
|                            | (2)             |
|                            | (3)             |
|                            | (4)             |
|                            | (5)             |
|                            | (6)             |
|                            | (7)             |
|                            | (8)             |
| dprice (ln)                | −0.0024 ***     |
|                            | (0.0004)        |
| Total income (ln)          | 0.3352 ***      |
|                            | (0.0030)        |
| Debt (ln)                  | 0.0151 ***      |
|                            | (0.0004)        |
| Non-financial assets (ln)  | 0.1057 ***      |
|                            | (0.0002)        |
| Financial assets (ln)      | 0.0426 ***      |
|                            | (0.0012)        |
| Gender                     | −0.0986 ***     |
|                            | (0.0051)        |
| Age                        | −0.0129 ***     |
|                            | (0.0007)        |
| Education                  | 0.0110 ***      |
|                            | (0.0007)        |
| Marital status             | 0.1581 ***      |
|                            | (0.0077)        |
| Health condition           | −0.0576 ***     |
|                            | (0.0068)        |
| Risk-aversion              | −0.0475 ***     |
|                            | (0.0051)        |
| Family size                | 0.0566 ***      |
|                            | (0.0102)        |
| Child support ratio        | 0.1321 ***      |
|                            | (0.0109)        |
| Old-age dependency ratio   | −0.0030 ***     |
|                            | (0.0094)        |
| Pension insurance ratio    | −0.0020 ***     |
|                            | (0.0093)        |
| Medical insurance ratio    | 0.0095 ***      |
|                            | (0.0089)        |
| Unhealthy ratio            | 0.1374 ***      |
|                            | (0.0147)        |
| GDP(ln)                    | 0.0584 ***      |
|                            | (0.0056)        |
| Year fixed effects         | YES             |
| City fixed effects         | YES             |
| Constant                   | 5.0311 ***      |
|                            | (0.0297)        |
| N                          | 71,548          |
|                            | 0.4667          |

Note: This is based on a multiple linear regression model (15) with stepwise inclusion of household economic characteristics variables, head of household characteristics variables, household-level characteristics variables, regional economic variables, time fixed effects, and city fixed effects. Units expressed in monetary terms in the regressions are logarithmically treated, and such variables include consumption, dprice, total income, debt, non-financial assets, financial assets, and GDP. The regression coefficients of these regression variables indicate elasticities. *** indicates significance at the 1% level. Robust standard errors are reported in parentheses.
Table 3. IV estimation.

| Variables   | 2SLS          | LIML          | GMM          |
|-------------|---------------|---------------|--------------|
|             | (1)           | (2)           | (3)          | (4)           | (5)           | (6)           |
| dprice (ln) | -0.0017 ***   | -0.0022 ***   | -0.0017 ***  | -0.0022 ***   | -0.0017 ***   | -0.0022 ***   |
|             | (0.0004)      | (0.0007)      | (0.0004)     | (0.0007)      | (0.0004)      | (0.0007)      |
| Control     | YES           | YES           | YES          | YES           | YES           | YES           |
| variables   |               |               |             |               |               |               |
| Year fixed  | YES           | YES           | YES          | YES           | YES           | YES           |
| effects     |               |               |             |               |               |               |
| City fixed  | NO            | YES           | NO           | YES           | NO            | YES           |
| effects     |               |               |             |               |               |               |
| Constant    | 2.0789 ***    | 2.1118 ***    | 2.0789 ***   | 2.1118 ***    | 2.0789 ***    | 2.1118 ***    |
|             | (0.0816)      | (0.1929)      | (0.0816)     | (0.1929)      | (0.0792)      | (0.1890)      |
| DWH         | 150.1180 ***  | 124.3980 ***  |              |               |              |               |
| Underidentification test | 1.1251 x 10^4 | 5290.9350    | 6.6859 x 10^4 | 5.7436 x 10^4 |              |               |
|             | (0.0000)      | (0.0000)      | (0.0000)     | (0.0000)      |               |               |
| Weak         | 3.2365 x 10^5 | 5.8348 x 10^5 | 4.8324 x 10^5 | 1.3923 x 10^5 |              |               |
| identification test | (19.9300)      | (19.9300)     | (19.9300)    | (19.9300)     |               |               |
| Overidentification test | 0.0420    | 2.3030       | 0.0045       | 2.3500        |              |               |
|             | (0.8368)      | (0.1292)      | (0.8315)     | (0.1253)      |               |               |
| N           | 71,548        | 71,548        | 71,548       | 71,548        | 71,548        | 71,548        |
| R-squared   | 0.5255        | 0.5254        | 0.5254       | 0.5324        | 0.5255        | 0.5324        |

Note: For the Underidentification test, 2SLS shows the Kleibergen–Paap rk LM statistic, GMM shows the Anderson canon. corr. LM statistic. For the Weak identification test, 2SLS shows the Kleibergen–Paap rk Wald F statistic, GMM shows the Cragg–Donald Wald F statistic, with the 10% threshold for the Stock–Yogo weak identification test in parentheses. For the overidentification test of all instruments, 2SLS shows the Hansen J statistic and GMM shows the Sargan statistic to test the exogeneity of the instrumental variables, with p-values in parentheses; generally, p-values > 0.05 are considered to satisfy the exogeneity requirement. Control variables include non-financial assets, financial assets, total income, debt, gender, age, education, marital status, health condition, risk-aversion, child support ratio, old-age dependency ratio, medical insurance ratio, pension insurance ratio, unhealthy ratio, and GDP. *** indicates significance at the 1% level. Robust standard errors are reported in parentheses.

In addition, this paper also conducted identifiable tests, weak instrumental variable tests, and overidentification tests on the instrumental variables; the test results are shown in Table 3. Table 3 shows that the two instrumental variables pass the identifiability test, and there is no weak instrumental variable problem. From the results of the overidentification test, instrumental variables selected in this paper meet the exogeneity requirement. To further test the robustness, we use two-stage least squares (2SLS); limited information maximum likelihood estimation (LIML), which is more efficient for weak instrumental variables; and generalized method of moments (GMM), which is the most efficient for heteroskedasticity and overidentification, respectively. The coefficients of LIML and GMM are very close to 2SLS, which also confirms that there is no weak instrumental variable problem and the heteroskedasticity problem is not serious.

4.2.2. Robustness Test: Fixed Effects Model

Although we control for as many variables as possible in the baseline regression model to reduce the impact of omitted variables on the estimated results, there may still be variables that are not easily observable, such as household expectations of the future, ability, and risk preferences, among other factors that may have an impact on the results. In order to reduce the effects of omitted variables adversely affecting the estimation results, we further estimate the results using a panel fixed effects model, the results of which are shown in Table 4. Table 4 shows the regression results that remain highly consistent with the baseline regression results, indicating that the issue of omitted variables did not have a significant impact on the findings of this paper and that the regression results are robust.

4.2.3. Robustness Test: Transforming Variables

Issues such as inappropriate selection of variables or omission of certain variables can significantly impact the estimation results of existing models. In this paper, we test the robustness of the baseline regression results from the perspective of transforming variables. We transform the dependent variable. As consumer durables are multi-period consumption goods distributed to all periods of consumption, it is more effective to study the impact of...
changes in the value of housing assets on non-durable goods [6]; this paper transforms the dependent variable total household consumption expenditure (consumption) to non-durable goods consumption expenditure (undurcon). Due to the presence of housing loans, this paper transforms the independent variable home equity value change (dprice) to net home equity value change (dpricep, where dpricep = (housea − housed) × indexh, housed is the housing liability of the household i in period t). This paper combines the household child support ratio and the old-age dependency ratio into the total household support ratio, then uses the household support ratio as a control variable to estimate and analyze the results.

### Table 4. Robustness test: fixed effects model.

| Variables                          | Fixed Effects Model (FE) |
|-----------------------------------|--------------------------|
|                                  | (1) (2) (3) (4)          |
| dprice (ln)                       | −0.0024 ***  −0.0026 **  −0.0031 ***  −0.0031 *** |
|                                  | (0.0004) (0.0011) (0.0011) (0.0011) |
| Household economic status         | YES YES YES YES          |
| Household head characteristic variables | NO YES YES YES          |
| Household characteristic variables | NO NO YES YES          |
| Regional characteristic variable  | NO YES YES YES          |
| Year fixed effects                | YES YES YES YES          |
| Constant                          | 5.0311 ***  7.9217 ***  8.0178 ***  7.8672 *** |
|                                  | (0.0297) (0.3633) (0.3608) (2.2886) |
| N                                | 71,548 71,548 71,548 71,548 |
| Number of hhid                    | 43,793 43,793 43,793 43,793 |
| R-squared                         | 0.4667 0.2483 0.2557 0.2557 |
| N                                 | 43,793 43,793 43,793 43,793 |

Note: The control variables in Table 4 are consistent with those in the baseline regression results and to observe the robustness of the regression results, we gradually added various types of control variables: Household economic status include non-financial assets, financial assets, total income, and debt; household head characteristic variables include gender, age, education, marital status, health condition, and risk-aversion; household characteristic variable include family size, child support ratio, old-age dependency ratio, pension insurance ratio, medical insurance ratio, and unhealthy ratio; regional characteristic variable includes GDP per capita by province. **, *** indicate significance at the 5% and 1% levels, respectively. Robust standard errors are reported in parentheses.

Table 5 shows the regression results. After replacing the dependent variable, the independent variable, and combining the control variables, the regression results remain highly consistent with the baseline regression results, both in direction and significance. This indicates that the baseline regression results are highly robust. In addition, column (1) shows that the impact of changes in the value of housing assets on non-durable goods is reduced compared with total consumption, suggesting that an increase in housing prices does not only dampen spending on non-durable goods but may have a more significant dampening effect on spending on non-durable goods [23].

#### 4.2.4. Robustness Testing: Narrowing the Time Window

We narrow the time window and perform robustness checks. To curb the rapid rise in house prices, China’s real estate policy has shifted from being supportive to discouraging speculation in 2010 to curb the rapid rise in house prices and intervene in house prices through various regulatory instruments such as land, finance, and taxation. With the government’s repeated policy “combinations”, have residents’ expectations of rising house prices changed, thus changing the effect of home equity appreciation on household consumption? This is an intriguing question that warrants additional investigation. To determine whether this “crowding out effect” of home prices on household spending during these two years exists or not, we analyze data from 2017 and 2019. Table 6 shows that the “crowding out effect” of rising home equity prices on household consumption still exists and tends to increase, as shown in columns (2) and (4). Column (6) shows that the regression result of −0.0047 for the two-year data also has a certain tendency to expand compared with the baseline regression result of −0.0034. This indicates that this “crowding out effect” of home equity value on household consumption still exists and is likely to increase in the coming period.
Table 5. Robustness test: transforming variables.

| Variables               | (1)          | (2)          | (3)          | (4)          | (5)          | (6)          |
|-------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Undurcon (ln)           |              |              |              |              |              |              |
| dprice (ln)             | −0.0025 ***  | −0.0024 ***  | −0.0037 ***  |              |              |              |
|                         | (0.0007)     | (0.0007)     | (0.0007)     |              |              |              |
| dpricep (ln)            | −0.0022 ***  | −0.0036 ***  | −0.0036 ***  |              |              |              |
|                         | (0.0007)     | (0.0007)     | (0.0007)     |              |              |              |
| Household support ratio |              |              |              |              |              |              |
|                         | 0.0279 ***   |              |              |              |              |              |
|                         | (0.0035)     |              |              |              |              |              |
| Control variables       | YES          | YES          | YES          | YES          | YES          | YES          |
| Year fixed effects      | YES          | YES          | YES          | YES          | YES          | YES          |
| City fixed effects      | YES          | YES          | YES          | YES          | YES          | YES          |
| Constant                | 4.6423 ***   | 4.6309 ***   | 4.6847 ***   | 4.7727 ***   | 4.8137 ***   | 4.8075 ***   |
|                         | (0.1964)     | (0.1963)     | (0.1963)     | (0.1919)     | (0.1920)     | (0.1918)     |
| N                       | 71,548       | 71,548       | 71,548       | 71,548       | 71,548       | 71,548       |
| R-squared               | 0.4948       | 0.4948       | 0.5176       | 0.5172       | 0.5172       | 0.5172       |

Note: Columns (1)–(3) show the regression results for changing the dependent variable, changing both the dependent and independent variables, and changing the dependent variable while adding control variables, respectively; columns (4)–(6) show the results for changing the independent variable, adding control variables, and changing the independent variable while adding control variables. *** indicates significance at the 1% level. Robust standard errors are reported in parentheses.

Table 6. Robustness testing: narrowing the time window.

| Variables   | 2017          | 2019          | 2017–2019    |
|-------------|---------------|---------------|--------------|
|             | (1)           | (2)           | (3)          |
| dprice(ln)  | −0.0030 ***   | −0.0131 ***   | −0.0271 ***  |
|             | (0.0007)      | (0.0031)      | (0.0038)     |
| Control variables | YES          | YES          | YES          |
| City fixed effects | NO           | YES          | NO           |
| Constant    | 1.8031 ***    | 7.5376        | 2.8642 ***   |
|             | (0.1667)      | (6.5614)      | (6.5896)     |
| N           | 21,452        | 21,452        | 17,373       |
| R-squared   | 0.4990        | 0.5114        | 0.5396       |

Note: Columns (1)–(2) present the regression results using the 2017 samples only. Columns (3)–(4) present the regression results using only the 2019 samples. Columns (5)–(6) present the regression results using the 2017 and 2019 samples. *** indicates significance at the 1% level. Robust standard errors are reported in parentheses.

5. Heterogeneity Test

5.1. Heterogeneity Test: Eastern, Central, and Western

There are some differences in the level of economic development, physical geography, and social customs among the eastern, central, and western regions of China, as well as observed between different regions of other continents [37], and there are also large differences in house prices and house price to income ratios [9]. These differences are important in explaining the appreciation of housing assets and their impact on household consumption in China. According to the National Bureau of Statistics’ criteria for dividing the sample into East, Central, and West, this paper analyzes the impact of house price changes on consumption in the eastern, central, and western regions of China, respectively. The regression results in Table 7 show that the impact of rising housing prices on household consumption is more significant in the eastern and central regions than in the western region, indicating that the pressure to purchase a home is more significant in the eastern and central regions than in the western region, with a greater “crowding out effect” on household consumption. Regarding the house price to income ratio, the ratio is significantly lower in the western region than in the eastern and central regions, which means that the increase in house prices in the western region does not have a significant “crowding out effect” on household consumption.
Table 7. Heterogeneity test: eastern, central, and western.

| Variables          | Eastern (1) | Central (2) | Western (3) | Eastern (4) | Central (5) | Western (6) |
|--------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| dprice (ln)        | −0.0019 *** | −0.0048 *** | −0.0013     | −0.0076 *** | −0.0018 **  | −0.0015     |
|                    | (0.0006)    | (0.0015)    | (0.0008)    | (0.0016)    | (0.0008)    | (0.0013)    |
| Control variables  | YES         | YES         | YES         | YES         | YES         | YES         |
| Year fixed effects | YES         | YES         | YES         | YES         | YES         | YES         |
| City fixed effects | NO          | YES         | NO          | YES         | NO          | YES         |
| Constant           | 1.9815 ***  | 2.5870 ***  | 2.6964 ***  | 6.3826 ***  | 1.4885 ***  | 0.2721      |
|                    | (0.1163)    | (0.4587)    | (0.2647)    | (2.0626)    | (0.2587)    | (2.0522)    |
| SUEST test         |             |             |             |             |             |             |
| Eastern–Central    | 0.0010      |             |             |             |             |             |
| Eastern–Western    | 0.0030      |             |             |             |             |             |
| Central–Western    | 0.0040 **   |             |             |             |             |             |
| N                  | 37,090      | 37,090      | 17,611      | 17,611      | 16,847      | 16,847      |
| R-squared          | 0.5255      | 0.5331      | 0.4986      | 0.5080      | 0.5091      | 0.5150      |

Notes: Columns (1)–(2) present the regression results for the eastern region samples. Columns (3)–(4) present the regression results for the central region samples. Columns (5)–(6) show the regression results for the western region samples. Robust standard errors are reported in parentheses. To test the significance of the differences between groups, we conducted the SUEST test, and the data in the first column show the magnitude of the different results between groups. The values in brackets are the results of the chi-square test. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

5.2. Heterogeneity Test: One Home and Multiple Homes

The impact of changes in the value of housing assets on consumption may be different for each household, depending on its asset holdings. Whose consumption is being crowded out by rising house prices? The regression results in Table 8 show that house price changes mainly dampen the consumption of households that own one home. Not only is there no disincentive for households with two or more homes, but there may also be some “wealth effect”, although this “wealth effect” is not significant. This may be because households with multiple homes already have a high level of consumption and the increase in property value does not significantly impact them. It is also possible that the strong desire to bequeath may have led to a minor impact on property appreciation. The SUEST test reveals significant heterogeneity between these two groups of households. The result implies that the increase in house prices is primarily suppressing the consumption of households that are likely to need to purchase a home in the future, such as those with a single home or those without a home, which constitute a more significant proportion of households, implying a negative aggregate effect of the increase in house prices on household consumption.

Table 8. Heterogeneity test: one home and multiple homes.

| Variables          | One Home (1) | Multiple Homes (2) |
|--------------------|--------------|--------------------|
| dprice (ln)        | −0.0015 ***  | −0.0022 ***        |
|                    | (0.0004)     | (0.0004)           |
| Control variables  | YES          | YES                |
| Year fixed effects | NO           | YES                |
| City fixed effects | NO           | NO                 |
| Constant           | 1.5086 ***   | 2.1496 ***         |
|                    | (0.0037)     | (0.0905)           |
| SUEST test         | One home–multiple homes | −0.0043 ** |
|                    | (5.4400)     | (5.4400)           |
| N                  | 56,588       | 56,588             |
| R-squared          | 0.4981       | 0.5032             |

Note: Robust standard errors are reported in parentheses. To test the significance of the differences between groups, we conducted the SUEST test, and the data in the first column show the magnitude of the different results between groups. The values in brackets are the results of the chi-square test. **, *** indicate significance at the 5% and 1% levels, respectively.
5.3. Asymmetric Effects of Rising and Falling House Prices

The need to study the impact of house prices on consumption is self-evident in China’s “dual circulation”. According to the previous findings, house price changes have a negative impact on household consumption, but the question arises as to whether the impact of rising and falling house prices on consumption is symmetrical, given that there are both rising and falling house prices. If rising house prices have a “crowding out effect” on consumption, does the opposite necessarily mean that falling house prices boost consumption? To clarify the asymmetric effect of house price changes, this paper divides the sample into two parts based on house price changes—rising house prices and falling house prices—and the results are shown in Table 9. The results show an asymmetric effect of rising and falling house prices on household consumption. Specifically, rising house prices have a significant dampening effect on household consumption. In contrast, the effect of falling house prices on household consumption is positive but the result is not significant. This asymmetric effect of house price changes on household consumption suggests that the dampening effect of rising house prices on household consumption is self-evident. The Chinese government’s attempts to produce a more pronounced boost to consumption by regulating house prices may not be as effective as they should be. However, if the effectiveness of the policy to stabilize house prices increases and changes residents’ expectations of rising house prices, it may be able to have some boosting effect on consumption.

Table 9. Asymmetric effects of rising and falling house prices.

| Variables          | Rising House Prices (1) | Rising House Prices (2) | Rising House Prices (3) | Falling House Prices (4) | Falling House Prices (5) | Falling House Prices (6) |
|--------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| dprice(ln)         | -0.0114 ***             | -0.0111 ***             | -0.0172 ***             | 0.0020                  | -0.0010                 | 0.0056                  |
|                    | (0.0017)                | (0.0018)                | (0.0021)                | (0.0032)                | (0.0044)                | (0.0096)                |
| Control variables  | YES                     | YES                     | YES                     | YES                     | YES                     | YES                     |
| Year fixed effects | NO                      | YES                     | NO                      | NO                      | NO                      | YES                     |
| City fixed effects | NO                      | NO                      | YES                     | NO                      | NO                      | YES                     |
| Constant           | 1.3974 ***              | 2.0764 ***              | 2.3681 ***              | 2.0210 ***              | 1.4982 ***              | 3.5562 **               |
|                    | (0.0798)                | (0.0872)                | (0.2069)                | (0.2927)                | (0.3111)                | (1.5854)                |
| N                  | 63,261                  | 63,261                  | 63,261                  | 8287                    | 8287                    | 8287                    |
| R-squared          | 0.5217                  | 0.5269                  | 0.5345                  | 0.5000                  | 0.5001                  | 0.5058                  |

Note: Columns (1)–(3) present the results of the impact of rising house prices on household consumption. Columns (4)–(6) present the results of the impact of falling house prices on household consumption. In the two types of regression results, we include control variables, year-fixed effects, and city-fixed effects, in that order. **, *** indicate significance at the 5% and 1% levels, respectively. Robust standard errors are reported in parentheses.

6. Precautionary Savings Channel in the House Price Impact Effect

The most intuitive experience of rising house prices for residents is the increase in the value of their property holdings, which increases their precautionary savings for those who are likely to purchase a home in the future. In this paper, we choose two measures of precautionary saving ($p_{s1}$ and $p_{s2}$). Then, we apply the causal steps approach to test the existence of the mediating effect. We first apply Equation (16) to test the effect of property appreciation on precautionary saving and then apply Equation (17) to test the mediating effect of property appreciation on household consumption through precautionary saving.

The effect of property appreciation on households’ precautionary savings is shown in Table 10. From columns (1)–(2) of Table 10, it is easy to see that property appreciation has a significant positive impact on household precautionary saving at the 1% level, suggesting that an increase in the value of housing assets due to rising house prices causes an increase in precautionary household savings. As seen from columns (3)–(4), the results remain unchanged after the endogeneity problem is overcome.

The impact of property appreciation on household consumption through the mediating variable precautionary saving is shown in Table 11. The regression results in columns (1)–(2) of Table 11 show that the regression coefficient for precautionary savings is significantly negative, at least at the 1% level. In contrast, the regression coefficient for the property appreciation variable decreases with the inclusion of the precautionary savings variable,
and its significance also decreases at the same time. It suggests that there is a mediating effect of precautionary savings. The Bootstrap (1000) Z-P value for the mediating effect test also suggests a significant mediating effect. In addition, Sobel’s test shows that the mediating effect of \( PS_1 \) is 77.7729\% and that of \( PS_2 \) is 77.2245\%. It indicates that both \( PS_1 \) and \( PS_2 \) are mediating variables that affect household consumption and explain 77.7729\% and 77.2245\%, respectively, of the combined effect of property appreciation on respondents’ household consumption. The above analysis suggests that the increase in property appreciation due to the rise in house prices has contributed to the increase in precautionary household savings, which in turn has had an impact on household consumption, creating a “crowding out effect” on household consumption. Although, some scholars are skeptical when testing the validity of indirect effects using Equation (17) when conducting mediating effects tests [38]. However, the coefficient on the change in the value of housing assets is substantially smaller and less significant after including precautionary savings, which also suggests that the precautionary savings mechanism may be a major channel through which changes in housing asset prices affect household consumption.

Table 10. House prices affect precautionary savings.

| Variables   | OLS (ln)  | IV-GMM  |
|-------------|-----------|---------|
|              | \( PS_1 \) (ln) | \( PS_2 \) (ln) | \( PS_1 \) (ln) | \( PS_2 \) (ln) |
| \( dp ric(ln) \) | 0.0519 *** (0.0107) | 0.0619 *** (0.0104) | 0.0421 *** (0.0118) | 0.0407 *** (0.0114) |
| Control variables | YES | YES | YES | YES |
| Year fixed effects | YES | YES | YES | YES |
| City fixed effects | YES | YES | YES | YES |
| Constant | 44.6358 *** (2.7634) | 38.2856 *** (2.7196) | 45.0553 *** (3.0592) | 39.1938 *** (2.9545) |
| N | 71,548 | 71,548 | 71,548 | 71,548 |
| R-squared | 0.1307 | 0.1374 | 0.1307 | 0.1373 |

Note: Columns (1) and (2) show the estimated results of the impact of property appreciation on \( PS_1 \) and \( PS_2 \), respectively. Columns (3) and (4) are the results of the estimation of (1) and (2) by applying the instrumental variables method. *** indicates significance at the 1%. Robust standard errors are reported in parentheses.

Table 11. House prices affect consumption through precautionary savings.

| Variables   | OLS | GMM |
|-------------|-----|-----|
|              | (1) | (2) | (3) | (4) |
| \( dp ric(ln) \) | 0.0463 *** (0.0002) | 0.0463 *** (0.0002) | 0.0463 *** (0.0002) | 0.0463 *** (0.0002) |
| \( PS_1 \) | 0.0003 (0.0004) | 0.0001 (0.0005) | 0.0002 (0.0005) | 0.0005 (0.0006) |
| \( PS_2 \) | 0.0408 *** (0.0002) | 0.0408 *** (0.0002) | 0.0408 *** (0.0002) | 0.0408 *** (0.0002) |
| Control variables | YES | YES | YES | YES |
| Year fixed effects | YES | YES | YES | YES |
| City fixed effects | YES | YES | YES | YES |
| Constant | 4.2249 *** (0.1323) | 3.7177 *** (0.1467) | 4.2241 *** (0.1259) | 3.7344 *** (0.1463) |
| Bootstrap(1000)Z | −6.7100 (0.0000) | −6.1300 (0.0000) | −6.1300 (0.0000) | −6.1300 (0.0000) |
| Bootstrap(1000)Z-P | 77.7729% | 77.2245% | 77.2245% | 77.2245% |
| N | 71,548 | 71,548 | 71,548 | 71,548 |
| R-squared | 0.7933 | 0.7933 | 0.7933 | 0.7933 |

Note: Columns (1) and (2) present the regression results of house prices affecting household consumption through \( PS_1 \) and \( PS_2 \), respectively. Columns (3) and (4) are the estimated results after applying the instrumental variables method for (1) and (2). The results of the Bootstrap method with a sample of 1000 tests show that there is a significant mediating effect. The results for the percentage of mediating effects are based on the Sobel test. This result can also be calculated by the Bootstrap method. *** indicates significance at the 1% level. Robust standard errors are reported in parentheses.
7. Conclusions

As the most valuable asset of urban households in China, changes in the price of housing assets can have a significant impact on consumption. This paper re-examines the issue from both theoretical and empirical perspectives. Theoretically, the paper constructs a dynamic consumption decision model incorporating the share of home equity and the rate of house prices’ changes to obtain a consumption Euler equation that incorporates housing value changes. Empirically, using data from the China Household Finance Survey 2011–2019, this paper constructs indicators of changes in housing asset values due to price changes, and indicators of precautionary savings, using a variety of measures to analyze the effect of changes in property values on urban residents’ consumption.

The final results show that, firstly, changes in property values have a significant negative impact on household consumption. Specifically, a 1% increase in the value of residential property decreases household consumption by approximately 0.0034%, suggesting that rising house prices have a certain “crowding out effect” on residential consumption, in other words, the continued rise in house prices may be one of the reasons for the low residential consumption in China. Secondly, changes in property values, as the most intuitive perception of house price changes for households, cause households to change their precautionary savings, which in turn have an impact on consumption. Specific empirical results show that the precautionary savings mechanism explains about 77% of the total effect, suggesting that precautionary savings is an essential mechanism of action for house price changes affecting household consumption. Thirdly, there is significant heterogeneity in the impact of house prices on consumption. Specifically, the dampening effect is greater and more significant in the eastern and central regions than in the western region. Rising house prices are mainly a disincentive for households owning one home, but not for those with two or more homes. Fourthly, the impact of house prices on consumption is asymmetric in nature. This is reflected in the fact that rising house prices have a significant dampening effect on consumption, while falling house prices do not have a significant boosting effect on consumption. In addition, the paper uses an instrumental variables approach to deal with possible endogeneity issues in the estimation results, and robustness tests are conducted on the estimation results by shifting the explanatory variables, core explanatory variables, combining control variables, and reducing the sample.

Rising house prices are a major cause of China’s current consumption slump and an essential perspective on the lack of domestic demand. In the context of building a “dual circulation”, consumption, as an important part of the domestic cycle, it has not brought about a “wealth effect” due to rising house prices, but rather a “crowding out effect”. It requires the Chinese government to continue strengthening its scientific and rational top-level design and formulate practical policies to stabilize land prices and house prices. Of course, to further reduce the “crowding out effect” brought about by rising house prices and bring about consumption growth through stable house prices, it is also necessary to stabilize residents’ expectations of house prices and promote a virtuous cycle of the real estate industry and stable growth of domestic consumption in a city-by-city approach. At the same time, the government should also continue to deepen the financial market reform, promote the innovation of financial products, and broaden the investment channels for residents so that they do not regard property as their “only” trust or investable asset. The government should also guide households to allocate their assets rationally, optimize their investment structure, and shift their capital from the real estate market to the financial and consumer markets. This will not only reduce the “real estate fever”, but also enable residents to obtain property income through multiple channels and increase their consumption.

The central argument of our paper is the relationship between house prices and household consumption. While the results suggest that the precautionary savings mechanism may be the main driver of house prices affecting household consumption in China today, there are certainly other unidentified mechanisms at play. Further identification of the drivers of the relationship between house prices and household consumption also mer-
its further research. In addition, how to break the negative impact of house prices on consumption is also a topic worthy of further research.

Author Contributions: Conceptualization, X.S. and Y.S.; methodology, X.S.; software, X.S.; validation, X.S., H.L., and C.L.; formal analysis, X.S.; investigation, H.L.; resources, X.S.; data curation, H.L.; writing—original draft preparation, X.S.; writing—review and editing, Y.S.; visualization, H.L.; supervision, Y.S.; project administration, C.L.; funding acquisition, C.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by The Youth Project of the National Social Science Fund of China “Research on the Influence of Market Allocation of Factors on the New Trend of ‘Inverted U-shape’ Evolution of Urban-Rural Income Gap” OF FUNDER grant number 20CJY017, and MOE (Ministry of Education of China) Project of Humanities and Social Sciences “Class Subjectivity, Family Asset Allocation, and Optimization Path Research—Based on the New Era of China’s Rural ‘Semi-Working and Semi-Farming’ Family Analysis” under GRANT 19YJC790056.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References
1. Dong, Z.; Hui, E.C.; Jia, S. How does housing price affect consumption in China: Wealth effect or substitution effect? Cities 2017, 64, 1–8. [CrossRef]
2. Carroll, C.D.; Otsuka, M.; Slacalek, J. How large are housing and financial wealth effects? A new approach. J. Money Credit Bank. 2011, 43, 55–79. [CrossRef]
3. Disney, R.; Gathergood, J.; Henley, A. House price shocks, negative equity, and household consumption in the United Kingdom. J. Eur. Econ. Assoc. 2010, 8, 1179–1207. [CrossRef]
4. Cooper, D. House price fluctuations: The role of housing wealth as borrowing collateral. Rev. Econ. Stat. 2013, 95, 1183–1197. [CrossRef]
5. Christelis, D.; Georgarakos, D.; Jappelli, T. Wealth shocks, unemployment shocks and consumption in the wake of the Great Recession. J. Monet. Econ. 2015, 72, 21–41. [CrossRef]
6. Campbell, J.Y.; Cocco, J.F. How do house prices affect consumption? Evidence from micro data. J. Monet. Econ. 2007, 54, 591–621. [CrossRef]
7. Aladangady, A. Housing wealth and consumption: Evidence from geographically linked microdata. Am. Econ. Rev. 2017, 107, 3415–3446. [CrossRef]
8. Browning, M.; Gertz, M.; Leth-Petersen, S. Housing wealth and consumption: A micro panel study. Econ. J. 2013, 123, 401–428. [CrossRef]
9. Pan, X.; Wu, W. Housing returns, precautionary savings and consumption: Micro evidence from China. J. Empir. Finance. 2021, 60, 39–55. [CrossRef]
10. Waxman, A.; Liang, Y.; Li, S.; Barwick, P.J.; Zhao, M. Tightening belts to buy a home: Consumption responses to rising housing prices in urban China. J. Urban Econ. 2020, 115, 103190. [CrossRef]
11. Dong, K.; Chang, C.T.; Wang, S.; Liu, X.S. The dynamic correlation among financial leverage, house price, and consumer expenditure in China. Sustainability 2021, 13, 2617. [CrossRef]
12. Sun, J.C.; Park, H. The effects of regional house prices on consumption in Korea: Heterogeneous behaviors according to homeownership status and lifecycle stage. Sustainability 2020, 12, 3517. [CrossRef]
13. Attanasio, O.P.; Blow, L.; Hamilton, R.; Leicester, A. Booms and busts: Consumption, house prices and expectations. Economica 2009, 76, 20–50. [CrossRef]
14. Suari-Andreu, E. Housing and household consumption: An investigation of the wealth and collateral effects. J. Hous. Econ. 2021, 54, 101786. [CrossRef]
15. Cooper, D.; Dynan, K. Wealth effects and macroeconomic dynamics. J. Econ. Surv. 2016, 30, 34–55. [CrossRef]
16. Cloyne, J.; Huber, K.; Ilzetzki, E.; Kleven, H. The effect of house prices on household borrowing: A new approach. Am. Econ. Rev. 2019, 109, 2104–2136. [CrossRef]
17. Andersen, H.Y.; Leth-Petersen, S. Housing wealth or collateral: How home value shocks drive home equity extraction and spending. J. Eur. Econ. Assoc. 2021, 19, 403–440. [CrossRef]
18. Gourinchas, P.O.; Parker, J.A. The empirical importance of precautionary saving. Am. Econ. Rev. 2001, 91, 406–412. [CrossRef]
19. Chamon, M.D.; Prasad, E.S. Why are saving rates of urban households in China rising? Am. Econ. J. Macroecon. 2010, 2, 93–130. [CrossRef]
20. Xu, X.; Xu, z.; Hu, x. A study on the effect of house price “stabilisers” of differential credit policies. *South China J. Econ.* 2019, 38, 17–36.

21. Li, J. Has the ‘housing effect’ caused a downturn in consumer spending? *China Econ. Q.* 2018, 17, 405–430.

22. Jing, L.; Chen, B. Are rising house prices widening consumption inequality in China? *China Econ. Q.* 2021, 21, 1253–1274.

23. Cheng, D. Housing boom and non-housing consumption: Evidence from urban households in China. *Empir. Econ.* 2021, 61, 3271–3313. [CrossRef]

24. Carroll, C.D. *Implications of Wealth Heterogeneity for Macroeconomics;* Technical Report, Working Paper; The Johns Hopkins University, Department of Economics: Baltimore, MD, USA, 2012.

25. Bostic, R.; Gabriel, S.; Painter, G. Housing wealth, financial wealth, and consumption: New evidence from micro data. *Reg. Sci. Urban Econ.* 2009, 39, 79–89. [CrossRef]

26. Mian, A.; Rao, K.; Sufi, A. Household balance sheets, consumption, and the economic slump*. *Q. J. Econ.* 2013, 128, 1687–1726. [CrossRef]

27. Perrino, E.V.; Wagensommer, R.P. Crop Wild Relatives (CWRs) threatened and endemic to Italy: Urgent actions for protection and use. *Biology* 2022, 11, 193. [CrossRef]

28. Engelhardt, G.V. House prices and home owner saving behavior. *Reg. Sci. Urban Econ.* 1996, 26, 313–336. [CrossRef]

29. Guren, A.M.; McKay, A.; Nakamura, E.; Steinsson, J. Housing wealth effects: The long view. *Rev. Econ. Stud.* 2021, 88, 669–707. [CrossRef]

30. Deidda, M. Precautionary saving, financial risk, and portfolio choice. *Rev. Income Wealth* 2013, 59, 133–156. [CrossRef]

31. Kimball, M.S. Precautionary saving in the small and in the large. *Econometrica* 1990, 58, 53. [CrossRef]

32. Lee, J.J.; Sawada, Y. The degree of precautionary saving: A reexamination. *Econ. Lett.* 2007, 96, 196–201. [CrossRef]

33. Dyman, K.E. How prudent are consumers? *J. Political Econ.* 1993, 101, 1104–1113. [CrossRef]

34. Modigliani, F. Life cycle, individual thrift, and the wealth of nations. *Science* 1986, 234, 704–712. [CrossRef] [PubMed]

35. Dyman, K.E.; Skinner, J.; Zeldes, S.P. The importance of bequests and life-cycle saving in capital accumulation: A new answer. *Am. Econ. Rev.* 2002, 92, 274–278. [CrossRef]

36. Li, C.; Jiao, Y.; Sun, T.; Liu, A. Alleviating multi-dimensional poverty through land transfer: Evidence from poverty-stricken villages in China. *China Econ. Rev.* 2021, 69, 101670. [CrossRef]

37. Stinc, A.; Musarella, C.M.; Rotai, L.; Laface, V.L.A.; Licht, W.; Fanfarillo, E.; Wagensommer, R.P.; Galasso, G.; Fascetti, S.; Esposito, A.; et al. Italian vascular flora: New findings, updates and exploration of floristic similarities between regions. *Diversity* 2021, 13, 600. [CrossRef]

38. Mee Hayes, E.; Sirvio, L.; Ye, Y. A potential mechanism for targeting aggregates with proteasomes and disaggregases in liquid droplets. *Front. Aging Neurosci.* 2022, 14, 854380. [CrossRef]