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# The Heterogenous Impact of Fluctuation of Housing Prices upon Consumption of Urban Households in China

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## Abstract

This paper found that the increase in housing prices can significantly promote the consumption of urban households with housing in China. And the promotion effect increases with family's net finance asset, i.e., the richer the families are, the more their spending rises. For the urban families without housing, the increase in housing prices inhibit their consumption. When housing prices rise by 1%, the consumption drop by 0.748%. The mechanism is that the increase in housing prices reduce the households' marginal propensity to consume by higher precautionary saving motivation. As a whole, the increase in housing price can stimulate consumption, but the impact is very small. The consumption elasticity to housing prices is only 0.165; On the contrary, the wealth effect of housing assets will enlarge the gap of residents' consumption and worsen social welfare. So it's not feasible to promote consumption by increasing housing prices. In addition, the wealth effect has significantly heterogeneity by the family structure characteristics.

**JEL classification numbers:** D11 D12 R21
**Keywords:** house prices; consumption; wealth effect; heterogeneity

## 1 Introduction

Among the three key factors for economic growth, i.e. consumption, investment and export, relative to investment and export, consumption not only directly stimulates economic growth, but also ensures quality and resilience of economy.

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However, as China's economy enters a new normal, it shifts from high-speed growth to high-quality development. Low consumption rate has become the key factor that obstructs the sustainable and healthy development of China's economy. The analysis of the reasons for the low consumption rate will help fulfill the objectives of the Chinese Communist Party's 19th Congress report that clearly puts forward the aim of "improving the mechanisms for promoting consumption and enhancing the basic role of consumption in economic development."

Though China has introduced a number of stimulus policies to bring into the influence of consumption in economic development and transformation, the overall impact is limited. Since 2000, especially in the past decade, the proportion of household consumption in China's GDP has continued to decline, and the gap with investment in GDP has gradually widened (see Figure 1).

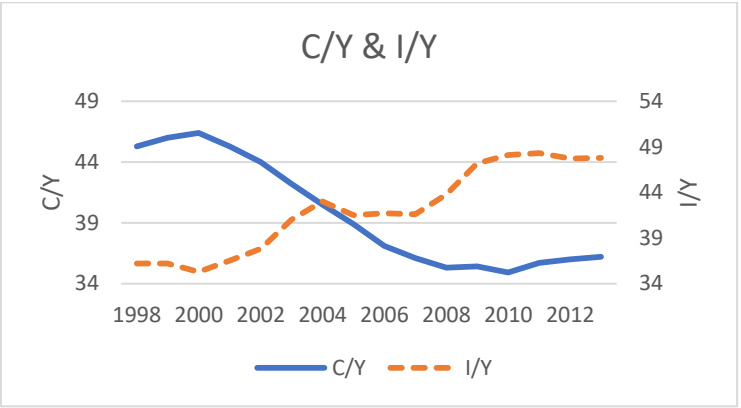


Figure 1: The proportion of Chinese residents' consumption and investment in GDP
Source: TaoZha et al (2015).

In the same period, the residents' consumption of developed countries accounts for between 55% and 65% in GDP (Figure 2). Taking the United States as an example, the proportion of household consumption in GDP has remained at around 70% in recent years.

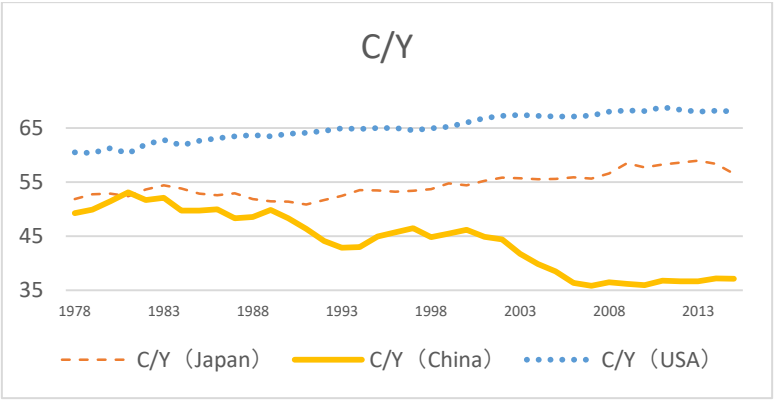


Figure 2: Percentage of Household Consumption in GDP in Different Countries
Source: World Bank.

The academia has explained the long-term weakness in China's consumption from multiple perspectives. First, the precautionary saving theory. In the process of rapid economic development and transformation in China, the imperfections of the welfare system including pensions, medical care, health care, and the unbalanced development of industries have increased the uncertainty faced by residents in the future, resulting in stronger precautionary savings motivation (Chuliang Luo, 2004; Yingxi Guo and Wei Li, 2006; Yi Yang and Binkai Chen, 2009; Chongyu Wu et al., 2015). Second, the liquidity constraint theory. China's financial market is underdeveloped, and the types of credits related to consumption are rare and the scale is very small. The imperfection of the credit system and the asymmetry of information make the credit market suffer from adverse selection and moral hazard. Many consumers are unable to meet the needs of borrowing and restrain from consumer spending (Shaoxiang Tang et al., 2010; Jiangyi Li and Han Li, 2017). Third, the age structure of the population. Based on the life cycle theory, changes in population policies and rapid economic growth have led to a decline in China's dependency ratio and a rise in savings rates (Modigliani and Cao, 2004; Li Wenxing et al., 2008; Wang Wei, 2009). Fourth, income inequality. From the Kuznets curve, we can see that in the early stage of economic development, the income inequality is positively related to economic development. There is a big difference in the propensity to consume between different income groups. Low-income population have a higher motivation for precautionary saving and lower marginal propensity to consume. High-income people tend to have a lower propensity to consume because of the stronger inheritance motive. Therefore, the widening income gap has generally lowered the marginal propensity to consume overall (Yu Yang and Shiyi Zhu, 2007; Binkai Chen, 2012; Tianyu Yang and Yusong Hou, 2009; Wei Wang and Xinqiang Guo, 2011); Fifth, the gender imbalance. With the imbalance of gender ratios in China, families with boys will increase the saving rate in order to increase their children's competitiveness in future's marriage market, and this behavior has spillover effects and will be passed on to other families (Wei and Zhang , 2011; Griskevicius, et al, 2012). Sixth, the perspective of life expectancy. People's expectation of future life becomes longer. According to the life cycle theory, in order to smooth the consumption at retirement, people will increase savings (Xuchun Fan and Baohua Zhu, 2012; Shenglong Liu et al., 2012; Jijun Yang and Erzhen Zhang, 2013; Weihe Wang and Chunrong Ai, 2015); Seventh, the cultural traditions. Traditional Chinese culture believes that thrift is a virtue, so consumption habits are inconsistent with other countries (Bin Hang, 2010; Ninghua Sun and Yang Zhou, 2013; Xiaohua Wang et al., 2016). Although the results of these studies explained to a certain extent the sluggish consumption of Chinese residents, they neglected the important factor of family assets, especially the real estate that occupies an important position in family assets.

China's housing prices started to rise rapidly since 2003, especially in economically developed big cities. And the housing self-owned rate in urban China continues to rise, which is close to 90% according to the National Bureau of

Statistics. Housing assets have become the most important part of households' total assets. Therefore, the relationship between housing prices and consumption is a core academic issue. Does the increase in housing prices promotes consumption (wealth effects), or suppress consumption ("house slavery effect")? What is the difference in response to housing prices for households with and without housing? Do consumptions of households with different family wealth have the same sensitivity to changes in housing prices? Does the heterogeneous family structure characteristics impact the housing wealth effect? All these issues are important for the government to make policies to regulate housing prices and stimulate consumption.

This paper use the panel data of 2010, 2012, and 2014 of China Family Panel Studies (CFPS). We construct the corresponding housing price for each family through the family property information to analyzes the housing wealth effect, which not only resolve the problems that generated by using macro-regional housing prices, but also eliminate the error by using the value of housing assets as explanatory variable. Firstly, this paper analyzes the difference of the rising housing price's impact on the consumption of the households with and without housing. Secondly, the paper divides the households with housing into four group by the value of net financial asset, and proves consumption elasticity to housing prices increases with family's net finance asset. Finally, we estimate the heterogeneous housing wealth effect for different family characteristics.

The rest of this paper is organized as follows. In Section 2, we introduce the literatures related to our research. Section 3 is the data source, variable definition and descriptive statistics. Section 4 is the empirical results. The last Section is the conclusion.

# 2 Literature Review and innovation

## 2.1 Relevant theories and literatures

Research on the relationship between housing prices and consumption has not drawn academic attention until the beginning of 2000, when the burst of the internet market bubble did not trigger economic recession as traditional economic theory expected. Take the United States as an example, the continuous rise in housing prices stimulated the resident's consumption, and became the major driving force for the U.S. economy. In 2009, the economic recession caused by the subprime crisis in the US has once again drew scholars' attention to the relationship between housing prices and consumption.

There are four mainstream theories on the relationship between housing prices and consumption.

The first is the wealth effect theory. According to the life cycle hypothesis and permanent income hypothesis, rational consumers will smooth consumption based on their lifetime wealth, i.e., changes in wealth will have an impact on consumption. For example, the increase in housing prices results in house owner's

wealth growth, which further causes them to consume more. Calomiris et al. (2009) found that housing assets have a positive impact on consumption and the impact is greater than stock assets'. Carroll et al. (2011) used the US data to demonstrate that there is a positive relationship between housing assets and consumption. They find that only the family who own multiple houses would have significant wealth effect. For households who do not own a house or need to improve their housing conditions in the future, rising housing prices will decrease their consumption. Xiaoli Wan (2017) discovered that the housing wealth effect does not exist in China from both macro and micro perspectives. The Chinese have a stronger precautionary savings motive and short-sighted behavior. Income is the main factor determining their consumption decisions

The second is the mortgage effect theory. Higher housing prices will rise households' collateral assets. Therefore, households with liquidity constraints can obtain more loans by reversal asset mortgages, which would increase their consumption. Benito and Mumtaz (2006) found that rising house prices promote consumption by mitigating liquidity constraints. Compbell and Cocco (2007) used UK microdata to find that predictable housing prices changes can anticipate the changes in consumption, especially for households with borrowing constraints.

The third is the substitution effect theory and the liquidity constraint theory. The previous two theories are mainly applicable for households owing a house. While for families without housing, if the increasing housing prices make the families who originally want to buy a house give up the purchase, they will consume more other goods. This is the substitution effect. Liquidity constraint theory means, if the family still want to buy a house when the housing prices rising, they will save to buy a house. Sheiner (1995) found that residents in high-priced housing regions prefer to save more in the US. Zhonggen Mao et al. (2017) demonstrated that the increase in housing prices stimulate the consumption of households with housing. For families without housing and those plan to buy one, they will reduce consumption. Se Yan and Guozhong Zhu (2013) set up a theoretical model and found that permanent housing prices growth will significantly promote consumption while temporary rise result in the "house slavery effect", which means residents will reduce consumption in order to purchase houses.

The fourth theory is income expectations, wealth illusions, credit supply conditions and interest rates and other factors. Aron (2006) figured out that after controlling the expected income and credit supply conditions, the housing wealth effect declined by 50%. Calza et al. (2013) showed that in countries with a better mortgage credit market, monetary policy had a greater impact on real estate investment and housing prices, and thus had greater impact on consumption.

### 2.2 Research issues in this article

In China, the conclusions about the impact of housing prices on consumption are inconsistent. Some literatures have found that rising housing prices boosts residents' consumption (Jing Huang, 2009; Dayong Zhang , 2012), some have found that rising housing prices curbs consumption (Jieyu Xie and Li Hongbin,

2012; Jiangyi Li, 2017), and some proved housing price have no relationship with consumption (Tao Li and Binkai Chen, 2014; Xinping Yu and Deping Xiong , 2017).

The reasons for above contradictions results are the differences of data sources and empirical methods. Many literatures use macro panel data or micro cross-section data. However, the macro panel data ignores the micro characteristics of the families and the micro cross-section data has the endogeneity problem caused by individual heterogeneity. Moreover, many studies focus on the impact of changes in housing wealth on consumption rather than the impact of changes in housing prices, while changes in housing wealth may be caused by house replacements or new home purchases.

This paper uses the panel data of urban households of CFPS (China Family Panel Studies) database in 2010, 2012 and 2014 to study the impact of changes in housing price on consumption of households owning or not owning housing respectively. This paper is an important supplementary to previous literatures which ignore the differences of the housing wealth effect among subsamples. This paper also pays more attention to the impact of family heterogeneity on the housing wealth effect, and verifies the positive relationship between the wealth effect and net financial asset. We also estimate the impact of families' characteristics on wealth effect, such as the number of houses owned by households, housing area per capita, housing loans, the age of the head of the household, and the gender of the children.

### 2.3 The innovation of this article

This article has three major contributions to the existing literatures. First, this paper use a three-year micro panel data, which can resolve the endogenous problems caused by the missing unobservable factors at the individual level. Second, rather than the average housing prices of cities, we use the housing prices at family level, which consider the heterogeneity of housing prices in the same city. Third, we examine the heterogeneity of the housing wealth effect by dividing the sample into subsamples according to the characteristics of the family.

Through this study, we can further understand the impact of rising housing prices on China's consumption. It can provide a good reference for government to make policies for regulating the housing prices and stimulating domestic consumption. And the paper also finds that government should not only focus on the overall consumption but also the consumption inequality, which represents the real welfare of households.

# 3 Data sources, variable definitions and descriptive statistics

## 3.1 Data sources

This paper select 2010、2012、2014 panel data of China Family Panel Studies (CFPS). CFPS is collected by the China Social Science Survey Center of Peking University and is a national comprehensive social survey project. The survey is a follow-up survey and is issued every two years. Some samples will be replaced in each survey, at the same time, some new samples are added according to the stratified multi-stage sampling rule. The data includes the information of income, consumption, assets, and demographic variables of families. We identify the head of the family and keep the families which have taken part in the survey in all three years. In addition, we delete households whose income is lower than the lowest level of local minimum guarantees in the current year, and finally obtain 8973 valid samples. There are 7911 samples with housing and 1062 samples without housing. Because of the absence of some variables, the sample size in statistical description and regression analysis is less than 8973.

## 3.2 Definition of variables

(1) The explained variable

The explained variables in this paper is the household's total consumption expenditure (*consum*) and each sub-item consumption. According to CFPS, total household expenditure includes food (*food*), equipment and daily necessities (*daily*), traffic and communication (*trco*), living expenses (*house*, rental cost and property management fee), and medical expenses (*med*), clothing expenditure (*dress*), cultural, educational and entertainment expenses (*eec*). In order to exclude the impact of inflation and price factors, based on 2010 data, consumption data for 2012 and 2014 are adjusted according to CPI of 2010.

In addition, this article also decomposes total consumption into durable consumption (*durable*) and nondurable consumption (*nondurable*).

(2) Explanatory variables

The core explanatory variable is housing prices (*hp*). CFPS provides detailed information about house asset, including house number (*housenum*), house area(*housearea*), house value (*housevalue*), housing debts (*housing_debts*) etc. Therefore, the housing price of the family can be calculated by house value over its area.

In detail, the housing prices are defined by two ways: one is the price of the current living house. This variable is available for three years in the sample; the other is the average price of the houses owned by the household. This variable could be calculated only in 2010 and 2012. We use the average price to do robustness check.

For families without housing, the housing prices cannot be calculated by the above method. Therefore, we use the median of housing price in the family's countyinstead.

(3) Control variables

In addition to housing prices, this article also controls other variables which affect consumption, including the total income of the family (*famincome*), the age of the family head (the age has a nonlinear effect on consumption, so we set up the families whose head's age is less than or equal to 35 as the base group, and define two dummy variables: *age1*=1 if the age in the range from 35 to 60, *age1*=0 otherwise; *age2*=1 if the age above 60, *age2*=0 otherwise), the education years of the family head (*eduyear*), the marital status of the head (*married*=1 if get married; *married*=0 if single), family size (*familysize*), old-age dependency ratio (*oldratio*), juvenile dependency ratio (*childratio*), ratio of healthy members (*healthratio*).

(4) Other variables

When analyzing the different impact of housing prices on consumption for households at different wealthy level, this paper selects the family's net financial asset (*net_finance*) as the indicator of wealthy level. In addition, when analyzing heterogeneous wealth effects from the perspective of family structures, we selected the number of houses (*housenum*), house area per capita (*housearea*), debt ratio of households, and age of the head, whether the family has a male child (*gender_dummy*=1 if a male child; *gender_dummy* =0 otherwise).

### 3.3 Descriptive statistics

The descriptive statistics of the main variables are shown in Table 1 below.

Table 1: Statistical description of main variables of households with housing

| Variable | Sample Size | Ave | Std Deviation | Min | Median | Max |
|---|---|---|---|---|---|---|
| *consum* | 6753 | 46753 | 49430 | 780 | 33510 | 1.200e+06 |
| *durable* | 6753 | 22266 | 38794 | 0 | 11000 | 1.100e+06 |
| *non-durable* | 7078 | 26419 | 20496 | 2400 | 20400 | 300000 |
| *food* | 7319 | 17385 | 14953 | 0 | 12478 | 290000 |
| *dress* | 7404 | 2439 | 3344 | 0 | 1500 | 50000 |
| *eec* | 7407 | 5110 | 9237 | 0 | 1360 | 320000 |
| *med* | 7459 | 4555 | 11206 | 0 | 2000 | 270000 |
| *trco* | 7364 | 4439 | 6282 | 0 | 2520 | 130000 |
| *daily* | 7322 | 7196 | 36202 | 0 | 1800 | 2.500e+06 |
| *house* | 7364 | 4777 | 16649 | 0 | 2400 | 600000 |
| *famincome* | 7245 | 55951 | 55472 | 2600 | 43360 | 4.100e+06 |
| *hp* | 7428 | 4131 | 6541 | 0.500 | 2361 | 160000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *net_finance* | 7410 | 48618 | 210000 | -4.000e+06 | 10000 | 8.000e+06 |
| *housegross* | 7542 | 490000 | 790000 | 150 | 250000 | 2.900e+07 |
| *housing_debts* | 7498 | 17898 | 81025 | 0 | 0 | 2.000e+06 |
| *net_housing* | 7486 | 470000 | 770000 | -550000 | 250000 | 2.900e+07 |
| *housingshare* | 7336 | 0.810 | 0.230 | 0.0800 | 0.880 | 1.370 |
| *housenum*(suites) | 7517 | 1.230 | 0.510 | 1 | 1 | 8 |
| *age* (years) | 7559 | 52.44 | 12.53 | 17 | 52 | 92 |
| *work* (0 or 1) | 7486 | 0.570 | 0.500 | 0 | 1 | 1 |
| *eduyears* (years) | 7559 | 8.890 | 4.590 | 0 | 9 | 19 |
| *married* | 7558 | 0.890 | 0.310 | 0 | 1 | 1 |
| *familysize* | 7555 | 3.530 | 1.460 | 1 | 3 | 14 |
| *oldratio* | 7554 | 0.190 | 0.310 | 0 | 0 | 1 |
| *childratio* | 7555 | 0.110 | 0.150 | 0 | 0 | 0.710 |
| *healthratio* | 7548 | 0.670 | 0.270 | 0 | 0.670 | 1 |

Note: The unit of variables of consumption, income and asset is Yuan. The unit of hp is Yuan/Per Square Meter.

As shown in Table 1, food expenditure accounts for the largest part of total consumption, followed by daily, eec and house expenditure, the lowest is the dress expenditure.

This means in addition to food, the households are most concerned about the improvement of education and entertainment, as well as the living condition.

The average housing price of the three-year panel data is about 4131 Yuan per square meter, which is close to the average price 4,184 Yuan per square meter published by the National Bureau of Statistics in 2013. Taking Beijing as an example. The average housing price was 26079 Yuan per square meter in 2010, 23510 Yuan per square meter in 2012, 36442 Yuan per square meter in 2014. Compared with the price published in "The housing prices Report China's urban", 22310 Yuan per square meter in 2010, 22650 Yuan per square meter in 2012, and 36421 Yuan per square meter in 2014. The two prices are very close, which indicates that the housing prices of samples are relative accurate.

Each family owns 1.23 houses on average, which is in line with the statistical results of the Chinese Academy of Social Sciences. The housing self-owned rate is 88.16% in the sample, which is consistent with the number published by the National Bureau of Statistics, and is much larger than the average level around world (63%).

The total asset of households consist of net housing asset, net financial asset and other asset. The net financial asset equals total financial asset (including savings, stocks value, funds value, financial derivatives value) minus total financial debts. The net financial asset measures the budgetary constraints of households. Because

the real estate reverse mortgage market is undeveloped in China, even if faced with the rising housing wealth, households still have to make consumption decision according to the value of liquidity assets. This is why we choose the net financial asset as the indicator of family wealthy level.

The net housing wealth (*net_housing*) is defined by total housing wealth (*housegross*) minus total housing loans (*housing_debts*). In the sample, the average value of house loans is only 17898 Yuan, and there is only 964 families who have house loans (just accounting for 12.78% of all samples). Define the variable *housingshare* as net housing value over total assets. We found that the housing assets account for 81% of the total assets. The housing assets have become the most important part of household assets.

Among the family heads, 57% have a job when they were interviewed, and 89% are married; The average education years for them is 8.86 years; The average family size is 3.53 person. The old-age dependency ratio and the juvenile dependency ratio are 19% and 11% respectively. The difference between the two dependency ratios reflects China's serious aging problem.

Table 2: Statistical description of major variables of households without housing

| Variable | Sample Size | Average | Std Deviation | Min | Median | Max |
|---|---|---|---|---|---|---|
| *consum* | 954 | 42291 | 38749 | 3190 | 32800 | 470000 |
| *durable* | 954 | 18866 | 28534 | 0 | 11976 | 390000 |
| *non-durable* | 1000 | 23856 | 17524 | 2800 | 19500 | 180000 |
| *food* | 1028 | 16946 | 13725 | 0 | 13000 | 180000 |
| *dress* | 1042 | 1939 | 2956 | 0 | 1000 | 50000 |
| *eec* | 1042 | 4305 | 8177 | 0 | 960 | 200000 |
| *med* | 1048 | 3860 | 8109 | 0 | 1300 | 150000 |
| *trco* | 1034 | 3698 | 5306 | 0 | 2160 | 54000 |
| *daily* | 1034 | 5187 | 19550 | 0 | 1380 | 320000 |
| *house* | 1013 | 5824 | 11534 | 0 | 3060 | 140000 |
| *famincome* | 1007 | 45271 | 38619 | 3000 | 34180 | 420000 |
| *hp* | 1053 | 5370 | 7712 | 375 | 2247 | 42975 |
| *net_finance* | 1040 | 35413 | 110000 | -380000 | 5000 | 1.200e+06 |
| *age* | 1060 | 50.44 | 14.81 | 19 | 48 | 93 |
| *work* (0 or 1) | 1050 | 0.500 | 0.500 | 0 | 0 | 1 |
| *eduyears* (years) | 1060 | 8.970 | 4.240 | 0 | 9 | 19 |
| *married* | 1060 | 0.820 | 0.390 | 0 | 1 | 1 |
| *familysize* | 1060 | 3.040 | 1.300 | 1 | 3 | 9 |
| *oldratio* | 1060 | 0.200 | 0.340 | 0 | 0 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *childratio* | 1060 | 0.120 | 0.170 | 0 | 0 | 0.600 |
| *healthratio* | 1056 | 0.640 | 0.290 | 0 | 0.670 | 1 |

Note: The unit of variables of consumption, income and asset is Yuan. The unit of hp is Yuan/Per Square Meter.

Compared with the results in Table 1, we find that, for families without housing, the total income, total consumption, and net financial assets are significantly lower than those of households with housing. For all sub-items consumption, food is still at the most important position. Different from the households with housing, the living expenses (mainly rent) occupies the second important position. From the housing prices (5370 Yuan>4131 Yuan), we know that families without housing live in the areas which have higher housing price. The family structure characteristics, such as age, working status and education years, have no significant difference from the families with housing. This means the family structure characteristics are not the reason the families do not have a house.

# 4 The Impact of Housing Price Increase on Consumption

## 4.1 The housing wealth effect of households with housing

### 4.1.1 Overall wealth effect

This study is based on the three-year panel data of CFPS, which to a certain extent can solve the endogenous problems caused by the omission of unobservable factors at the individual level.

The model is as follows

$$\ln consum_{it} = \beta_0 + \beta_1 \ln hp_{it} + \beta_2 \ln fa\min come_{it} + \gamma' family_{it} + \upsilon_i + \varepsilon_{it} \quad (1)$$

$\beta_1$ represents the impact of housing price changes on consumption. We take logarithm of consumption, income and housing price. So the coefficients are consumption elasticity. In addition, we control the fixed effects of family and year. The regression results are shown in Table 3.

Table 3: Wealth Effect for households with housing

| | (1) lnconsum | (2) lnconsum | (3) lnconsum |
|---|---|---|---|
| lnhp | 0.194*** | 0.180*** | 0.180*** |
| | (8.34) | (8.11) | (8.08) |
| lnfamincome | 0.328*** | 0.284*** | 0.281*** |
| | (13.54) | (12.37) | (12.12) |
| age1 | | 0.437*** | 0.434*** |
| | | (7.81) | (7.82) |
| age2 | | 0.850*** | 0.784*** |
| | | (10.42) | (8.05) |

| | | | |
|---|---|---|---|
| eduyear | | -0.019 | -0.018 |
| | | (-1.63) | (-1.53) |
| married | | -0.306*** | -0.307*** |
| | | (-2.75) | (-2.75) |
| familysize | | 0.089*** | 0.092*** |
| | | (4.18) | (4.05) |
| childratio | | | -0.281* |
| | | | (-1.90) |
| oldratio | | | 0.165 |
| | | | (1.54) |
| healthratio | | | -0.092* |
| | | | (-1.52) |
| family fixed effect | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes |
| constant | 5.450*** | 5.656*** | 5.746*** |
| | (19.42) | (17.71) | (17.77) |
| *N* | 6569 | 6568 | 6562 |
| $R^2$ | 0.136 | 0.175 | 0.175 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

The results indicate that the increase in housing price has a positive effect on consumption, i.e., housing assets have wealth effect in China. The price elasticity of consumption is 0.180. In other words, for every 1% rise in housing prices, the total consumption rose by 0.180%. In the sample, the average housing prices is 4131 Yuan per square meter, the average total consumption is 45,764 Yuan, and the average housing area is 122 square meters. So, economically, housing prices rose by 1%, the average household assets rose by 5,039.28 Yuan, the average consumption rose by 82.38 Yuan.

For every 1% increase in income, consumption increases by 0.281%; Compared with young families, the consumption of middle-aged and elderly families consume more, especially for elderly people over 60 years old. This is because older people have short life expectancy, so they choose to consume more in every period. The families whose head is married need to raise children and provide support for the elderly, so they consume less than single. Consistent with expectations, the family with more members consume more, the family with higher juvenile dependency ratio save more, and the family with higher proportion of healthy people consume less.

Table 4: Wealth Effect on Sub-items Consumption for households with housing

| | (1) lnfood | (2) lndress | (3) lneec | (4) lnmed | (5) lntrco | (6) lndaily | (7) lnhouse |
|---|---|---|---|---|---|---|---|
| lnhp | 0.179*** | 0.344*** | 0.214** | -0.051 | 0.132*** | 0.130** | 0.770*** |
| | (6.75) | (6.48) | (2.03) | (-0.63) | (3.06) | (2.54) | (8.28) |
| lnfamincome | 0.285*** | 0.552*** | 0.452*** | 0.140 | 0.225*** | 0.334** | 0.881*** |
| | (8.35) | (9.02) | (3.90) | (1.50) | (6.20) | (4.96) | (9.74) |
| controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| family fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 4.330*** | -2.380** | -3.008* | 7.304*** | 3.711*** | 1.478* | -6.181*** |
| | (8.72) | (-2.56) | (-1.87) | (5.68) | (6.97) | (1.72) | (-4.83) |
| *N* | 7039 | 7011 | 7048 | 7071 | 7010 | 6955 | 7008 |
| $R^2$ | 0.064 | 0.077 | 0.042 | 0.021 | 0.052 | 0.027 | 0.151 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

The increase in housing prices promotes all sub-items consumption except health care. And the effects on house, dress and eec are the three largest ones. This result is consistent with Ziying Fan and Jiayan Liu (2015) and Jiangyi Li (2017). When the family becomes richer, they mainly increase entertainment consumption.
The impact of control variables is the same as those of basic regression (Table 3).

### 4.1.2 The Heterogenous impact of fluctuation of housing prices on the households with different net financial asset

In order to further analyze the housing wealth effect of families at different wealthy level, we set model (2) as bellow

$$\begin{aligned}\ln consum_{it} = {} & \beta_0 + \beta_1 \ln hp_{it} * \text{A\_group1} + \beta_2 \ln hp_{it} * \text{A\_group2} \\ & + \beta_3 \ln hp_{it} * \text{A\_group3} + \beta_4 \ln hp_{it} * \text{A\_group4} \\ & + \beta_5 \ln fa\min come_{it} + \gamma' family_{it} + \upsilon_i + \varepsilon_{it}\end{aligned} \quad (2)$$

The sample is divided into four groups by the household's net financial assets. From low to high, the corresponding dummy variables A_group1, A_group2, A_group3, A_group4 are generated. A_group1=1 represents the group with the minimal net financial assets, and A_group1=0 represents other groups. The other three dummies are similarly defined.

$\beta_1$ , $\beta_2$ , $\beta_3$ , $\beta_4$ represents the impact of housing price changes on consumption (i.e. housing wealth effect) of different group respectively. We take logarithm consumption, income and housing price. In addition, we control the family and year fixed effects.

Table 5: Wealth effects for households with housing at different net financial asset level

| | (1) lnconsum | (2) lnconsum | (3) lnconsum |
|---|---|---|---|
| Lnhp*A_group1 | 0.139*** | 0.122*** | 0.122*** |
| | (3.16) | (3.03) | (2.97) |
| Lnhp*A_group2 | 0.176*** | 0.160*** | 0.165*** |
| | (4.35) | (4.14) | (4.23) |
| Lnhp*A_group3 | 0.208*** | 0.193*** | 0.195*** |
| | (6.04) | (5.65) | (5.64) |
| Lnhp*A_group4 | 0.264*** | 0.257*** | 0.253*** |
| | (3.54) | (3.64) | (3.61) |
| lnfamincome | 0.330*** | 0.287*** | 0.284*** |
| | (13.66) | (12.50) | (12.28) |
| age1 | | 0.425*** | 0.421*** |
| | | (7.79) | (7.78) |
| age2 | | 0.848*** | 0.783*** |
| | | (10.63) | (8.17) |
| eduyear | | -0.017 | -0.016 |
| | | (-1.48) | (-1.39) |
| married | | -0.307*** | -0.306*** |
| | | (-2.65) | (-2.64) |
| familysize | | 0.083*** | 0.086*** |
| | | (4.00) | (3.86) |
| childratio | | | -0.262* |
| | | | (-1.77) |
| oldratio | | | 0.159 |
| | | | (1.53) |
| healthratio | | | -0.088 |
| | | | (-1.50) |
| family fixed effect | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes |
| constant | 5.394*** | 5.598*** | 5.684*** |
| | (18.13) | (16.87) | (16.87) |
| *N* | 6518 | 6517 | 6511 |
| $R^2$ | 0.139 | 0.179 | 0.180 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

From table 5, we find that the wealth effect increases along with net finance asset. That is, richer families will choose to consume more when housing prices rise; From low to high, the price elasticity of consumption to housing prices is 0.122, 0.165, 0.195, and 0.253 respectively. That is to say, for the group with the lowest financial assets level, housing price rose by 1%, the average consumption rose by

55.83 Yuan. The consumption of the other three groups rose by 75.51 Yuan, 89.24 Yuan, and 115.78 Yuan respectively.
The impact of control variables is the same as those of basic regression

### 4.2 The impact of rising housing price on consumption of households without housing

For families who do not own a house, house is a consumer product. When the price rises, households will save more to buy a house because of the income effect, and increase the consumption of other goods because of the substitution effect. The change of total consumption depends on which effect is greater. In China, traditional view takes houses as necessity. People without housing have a strong motivation to buy one. And the rising house prices will make them feel poorer and save more for the purchase of the house, which is commonly known as the "house slavery effect".
The empirical results are shown in Table 6 below.

Table 6: Wealth Effect for households without housing

| | (1) lnconsum | (2) lnconsum | (3) lnconsum |
|---|---|---|---|
| lnhp | -0.793** | -0.735** | -0.748** |
| | (-2.11) | (-2.14) | (-2.13) |
| lnfamincome | 0.441*** | 0.413*** | 0.410*** |
| | (6.71) | (6.14) | (6.00) |
| age1 | | -0.069 | -0.017 |
| | | (-0.38) | (-0.10) |
| age2 | | 0.602** | 0.720** |
| | | (2.45) | (2.38) |
| eduyear | | -0.023 | -0.021 |
| | | (-0.87) | (-0.79) |
| married | | -0.057 | 0.013 |
| | | (-0.41) | (0.09) |
| familysize | | 0.065* | 0.073* |
| | | (1.95) | (1.71) |
| childratio | | | -0.610* |
| | | | (-1.68) |
| oldratio | | | -0.102 |
| | | | (-0.33) |
| healthratio | | | 0.063 |
| | | | (0.33) |
| family fixed effect | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes |
| constant | 19.937*** | 19.746*** | 19.771*** |
| | (2.99) | (3.09) | (3.07) |

| | | | |
|---|---|---|---|
| *N* | 915 | 915 | 911 |
| $R^2$ | 0.200 | 0.240 | 0.255 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

For families without housing, the increase in housing prices will significantly curb the consumption. The housing price rose by 1%, and the total consumption drop by 0.748%. Economically, every 1% increase in housing prices causes total consumption fall by 739.25 Yuan. The result is consistent with the hypothesis that the households without housing has a strong incentive to purchase a house.

We use the sub-items consumptions as explanatory variables to identify the rising house prices inhibition which sub-items consumption.

Table 7: Wealth Effect on Sub-items Consumption for households without housing

| | (1) lnfood | (2) lndress | (3) lneec | (4) lnmed | (5) lntrco | (6) lndaily | (7) lnhouse |
|---|---|---|---|---|---|---|---|
| lnhp | -1.153*** | 0.707 | 1.244 | -3.271 | 0.964 | 0.579 | -2.033** |
| | (-3.02) | (0.23) | (0.18) | (-0.61) | (1.42) | (0.45) | (-2.13) |
| lnfamincome | 0.560*** | 1.055*** | 0.488* | 0.522 | 0.417** | 0.191 | 1.221*** |
| | (5.47) | (4.73) | (1.73) | (1.54) | (2.68) | (0.91) | (4.40) |
| controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| family fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| constant | 19.047*** | -10.049 | -14.175 | 28.549 | -4.634 | -1.073 | 42.872* |
| | (3.33) | (-0.41) | (-0.25) | (0.66) | (-0.81) | (-0.10) | (1.89) |
| *N* | 984 | 984 | 990 | 991 | 981 | 981 | 959 |
| $R^2$ | 0.140 | 0.163 | 0.053 | 0.052 | 0.144 | 0.049 | 0.112 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

The increase in housing prices mainly decrease the food and house (rent) expenses. This is because food and house expenses account for the largest two parts in total consumption.

The rising housing prices has a crowding-out effect on residents' consumption, which is a generalized precautionary saving. The increase in precautionary saving motive will increase the share of income for saving, thus reduce the marginal propensity to consume. Therefore, households in areas with higher housing prices have lower marginal propensity to consume. In this paper, we divide the sample without housing into two groups according to housing prices level.

Correspondingly, generate two dummy variables (*high_hp*=1, high price group; *high_hp*=0, low price group). We add the cross term of *high_hp* and *famincome* in model (1) to examine whether the households in high housing price areas have lower marginal propensity to consume. We use the total consumption (*consum*), food expenditure (*food*), and living expenses (*house*) as explanatory variables, and the results are shown in Table 8 below.

Table 8: The mechanism of Crowding Effect

| | (1) lnconsum | (2) lnfood | (3) lnhouse |
|---|---|---|---|
| lnhp | -0.997* | -1.134*** | -2.763** |
| | (-1.77) | (-3.21) | (-2.24) |
| lnfamincome | 0.447*** | 0.623*** | 0.546*** |
| | (5.32) | (4.91) | (4.31) |
| high_hp*lnfamincome | -0.172** | -0.181 | -0.134** |
| | (-2.44) | (-0.91) | (-2.14) |
| controls | Yes | Yes | Yes |
| family fixed effect | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes |
| constant | 13.601*** | 18.726*** | 40.009* |
| | (3.07) | (3.51) | (1.95) |
| *N* | 920 | 984 | 959 |
| $R^2$ | 0.257 | 0.142 | 0.125 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

### 4.3 Impact of housing price on the overall consumption

From 4.1 and 4.2, we find that the increase in housing prices will significantly promote the consumption of households with housing and curb the consumption of households without housing. And the latter effect is much larger. However, the self-owned rate of house in China is close to 90%, so the overall impact of increase in housing prices on consumption is indefinite. We pool the households with and without housing together, the results are shown in Table 9 below.

Table 9: The overall impact of rising house prices on consumption

| | (1) lnconsum | (2) lnconsum | (3) lnconsum |
|---|---|---|---|
| lnhp | 0.177*** | 0.165*** | 0.165*** |
| | (8.31) | (8.12) | (8.05) |
| lnfamincome | 0.352*** | 0.303*** | 0.295*** |
| | (16.71) | (14.97) | (14.42) |
| age1 | | 0.434*** | 0.429*** |
| | | (8.50) | (8.45) |
| age2 | | 0.861*** | 0.800*** |
| | | (11.61) | (9.01) |
| eduyear | | -0.016 | -0.016 |
| | | (-1.45) | (-1.43) |
| married | | -0.312*** | -0.305*** |
| | | (-3.30) | (-3.25) |
| familysize | | 0.100*** | 0.107*** |

| | | | |
|---|---|---|---|
| | | (5.37) | (5.24) |
| childratio | | | -0.338*** |
| | | | (-2.66) |
| oldratio | | | 0.143 |
| | | | (1.50) |
| healthratio | | | -0.022 |
| | | | (-0.41) |
| family fixed effect | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes |
| constant | 5.326*** | 5.509*** | 5.610*** |
| | (21.04) | (19.47) | (19.56) |
| *N* | 7843 | 7842 | 7830 |
| $R^2$ | 0.136 | 0.178 | 0.178 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

On the whole, the increase in housing prices promote the consumption, but due to the "housing slave effect" of the households without housing, the promotion of overall consumption is small.

Therefore, it is not feasible to promote the overall consumption by raising the housing prices, and it will further widen the consumption and welfare gap among households because of the heterogenous impact of housing prices on consumption. So the regulation policies of housing price should be more targeted.

## 5 Wealth Effect Based on Heterogeneous Family Structure

We know the characteristics of family structures affect the consume behavior, does them also affect the housing wealth effect? In this section, we examine the impact of family structures on wealth effect and further verify the positive relationship between wealth effects and net finance asset by double sort regression. Firstly, we divide the samples with housing into two groups according to the net financial assets, then divide each group into two groups according to family structures characteristic. Thus, we get four sub-samples with different characteristics. We define dummy variables for each sub-sample, and introduce the model (3) as follows:

$$\begin{aligned}\ln consum_{it} = {} & \beta_0 + \beta_1 \ln hp_{it} \text{*A\_group1*feature1} + \beta_2 \ln hp_{it} \text{*A\_group1*feature2} \\ & + \beta_3 \ln hp_{it} \text{*A\_group2*feature1} + \beta_4 \ln hp_{it} \text{*A\_group2*feature2} \\ & + \beta_5 \ln fa\min come_{it} + \gamma' family_{it} + \upsilon_i + \varepsilon_{it}\end{aligned} \quad (3)$$

Here, A_group1=1 represents the group with lower net financial assets, and A_group2=1 represents the group with a higher level of net financial assets. Feature1=1 represents group 1 of the family characteristic variable, and feature

2=1 represents group 2 of the family characteristic variable. The meaning of the coefficient is shown in Table 10 below.

Table 10: Meaning of coefficients

| | A_group1 | A_group2 |
|---|---|---|
| feature1 | $\beta_1$ | $\beta_3$ |
| feature2 | $\beta_2$ | $\beta_4$ |

$\beta_1$ is the wealth effect of the households with lower net financial assets and feature1; $\beta_2$ is the wealth effect of the households with lower net financial assets and feature2; $\beta_3$ is the wealth effect of the households with higher net financial assets and feature1; $\beta_4$ is the wealth effect of the households with higher net financial assets and feature2.

We will test the following hypotheses:

1. Verify $\beta_3 > \beta_1$, $\beta_4 > \beta_2$. If true, it verifies the positive relationship between wealth effect and net financial asset.

2. Verify $\beta_2 > \beta_1$, $\beta_4 > \beta_3$, which estimate the heterogenous wealth effect for different characteristics of family structures.

(1) Grouping according to the number of houses owned by the family.

If the family has one suite, feature1=1, otherwise 0; If the family has multiple suites, feature2=1, otherwise 0.

Table 11: double-grouped by net financial asset and the number of houses

| | (1) lnconsum | (2) lnconsum |
|---|---|---|
| Lnhp*A_group1* feature1 | 0.175*** | 0.167*** |
| | (5.77) | (5.82) |
| Lnhp*A_group1* feature2 | 0.182*** | 0.171*** |
| | (5.87) | (5.85) |
| Lnhp*A_group2* feature1 | 0.242*** | 0.236*** |
| | (6.11) | (6.09) |
| Lnhp*A_group2* feature2 | 0.257*** | 0.250*** |
| | (6.57) | (6.52) |
| lnfamincome | 0.324*** | 0.289*** |
| | (13.48) | (12.58) |
| controls | No | Yes |
| family fixed effect | Yes | Yes |
| time fixed effect | Yes | Yes |
| constant | 5.354*** | 5.720*** |
| | (18.44) | (17.15) |
| *N* | 6518 | 6517 |

| | | |
|---|---|---|
| $R^2$ | 0.143 | 0.174 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

We can see $\beta_3 > \beta_1$, $\beta_4 > \beta_2$ in table 11, which means whether the family has one or more suites, as its net financial asset rises, the increase in housing prices will have a greater wealth effect on consumption. $\beta_2 > \beta_1$ , $\beta_4 > \beta_3$ indicates that households with multiple suites has a greater wealth effect. This is because the housing has both consumption and investment property. For families with only one house, it is mainly used for living, thus is a consumer goods. Therefore, the rise in housing prices stimulated consumption through the wealth illusion. For multi-houses families, the houses are investment goods. When housing prices rise, households can realize real estate appreciation by selling other houses except the current living. And other houses can be mortgaged more easily to obtain borrowing funds, which can relax the liquidity constraints. So the wealth effect of households with multi-houses will be larger. In addition, the rise in housing prices means that the house will bring higher rental income or sales of real estate in the future, which will reduce the uncertainty in the future, thus reduce the family's precautionary saving.

The impact of control variables is the same as those of basic regression

(2) Grouping according to housing area per capita.

For households with only one house, we divide the sample into two groups according to the housing area per capita. If the housing area per capita is small, feature1=1, otherwise 0; If the housing area per capita is large, feature2=1, otherwise 0.

Table 12: double-grouped by net financial asset and housing area per capita

| | (1) lnconsum | (2) lnconsum |
|---|---|---|
| Lnhp*A_group1* feature1 | 0.137*** | 0.132*** |
| | (3.94) | (4.08) |
| Lnhp*A_group1* feature2 | 0.149*** | 0.154*** |
| | (4.19) | (4.73) |
| Lnhp*A_group2* feature1 | 0.227*** | 0.211*** |
| | (5.34) | (5.04) |
| Lnhp*A_group2* feature2 | 0.227*** | 0.224*** |
| | (5.28) | (5.26) |
| lnfamincome | 0.335*** | 0.295*** |
| | (12.06) | (10.72) |
| controls | No | Yes |
| family fixed effect | Yes | Yes |
| time fixed effect | Yes | Yes |
| constant | 5.407*** | 5.652*** |

| | | |
|---|---|---|
| | (16.70) | (15.29) |
| $N$ | 5248 | 5242 |
| $R^2$ | 0.135 | 0.175 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

From the results in Table 12, we can see $\beta_3 > \beta_1, \beta_4 > \beta_2$, which is consistant with Table 11. Compare two groups at the same net financial asset level, we find $\beta_2 > \beta_1, \beta_4 > \beta_3$, which indicates that households with larger housing area per capita have a greater wealth effect. This is because in households with a smaller housing area per capita, the motivation for improving the housing condition will induce the households to replace the house or buy a new house.

The impact of control variables is the same as those of basic regression

(3) Grouping by whether the family has a house loan.

If the family does not have house loans, feature1=1, otherwise 0; If the family has house loans, feature2=1, otherwise 0.

Table 13: double-grouped by net financial asset and whether households have house loans

| | (1) lnconsum | (2) lnconsum |
|---|---|---|
| Lnhp*A_group1* feature1 | 0.158*** | 0.153*** |
| | (5.28) | (5.38) |
| Lnhp*A_group1* feature2 | 0.183*** | 0.174*** |
| | (6.04) | (6.04) |
| Lnhp*A_group2* feature1 | 0.235*** | 0.227*** |
| | (5.89) | (5.88) |
| Lnhp*A_group2* feature2 | 0.264*** | 0.256*** |
| | (6.77) | (6.71) |
| lnfamincome | 0.323*** | 0.288*** |
| | (13.76) | (12.72) |
| controls | No | Yes |
| family fixed effect | Yes | Yes |
| time fixed effect | Yes | Yes |
| constant | 5.447*** | 5.860*** |
| | (18.99) | (17.55) |
| $N$ | 6518 | 6517 |
| $R^2$ | 0.152 | 0.184 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

From the results in Table 13, we also find $\beta_3 > \beta_1, \beta_4 > \beta_2$. And $\beta_2 > \beta_1, \beta_4 > \beta_3$ show the households with house loans have greater wealth effect. There are two reasons: On one hand, house loans relieve the current budget constraints of the

households. On the other hand, households with mortgages buy houses through less money. Therefore, when the housing price rises, the leverage effect will make the purchase of housing assets have a higher return. So the wealth effect is more significant

The impact of control variables is the same as those of basic regression

(4) Grouping by the age of the household head.

If the age of the household head is less than or equal to 60, feature1=1, otherwise 0; If larger than 60, feature2=1, otherwise 0.

Table 14: double-grouped by net financial asset and the age of household head

| | (1) lnconsum | (2) lnconsum |
|---|---|---|
| Lnhp*A_group1* feature1 | 0.149*** | 0.160*** |
| | (4.78) | (5.27) |
| Lnhp*A_group1* feature2 | 0.199*** | 0.199*** |
| | (6.61) | (6.74) |
| Lnhp*A_group2* feature1 | 0.225*** | 0.230*** |
| | (5.59) | (5.82) |
| Lnhp*A_group2* feature2 | 0.271*** | 0.264*** |
| | (6.78) | (6.51) |
| lnfamincome | 0.318*** | 0.293*** |
| | (13.51) | (12.63) |
| controls | No | Yes |
| family fixed effect | Yes | Yes |
| time fixed effect | Yes | Yes |
| constant | 5.499*** | 5.868*** |
| | (18.88) | (17.55) |
| $N$ | 6518 | 6511 |
| $R^2$ | 0.154 | 0.168 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

In Table 14, we find $\beta_3 > \beta_1$, $\beta_4 > \beta_2$, which is consistent with the previous conclusions. And $\beta_2 > \beta_1$, $\beta_4 > \beta_3$ prove the households with elderly head have greater wealth effect. This is because according to the life cycle theory, the older the people are, the shorter their life expectation will be. So when the housing assets increase by the same value, they will increase more consumption to each period. This is in line with the results of Chen Jian and Huang Shao'an (2013). Compared with the wealth effects of the elderly in other countries, it is significantly lower in China. This is mainly due to the traditional heritage motive of Chinese old people and the imperfection of the reverse mortgage market of current real estate.

(5) Grouping by whether the family has a boy.

If the family has a boy, feature1=1, otherwise 0; If the family does not have a boy (only girls or no children), feature2=1, otherwise 0.

Table 15: double-grouped by net financial asset and whether the family has a boy

| | (1) lnconsum | (2) lnconsum |
|---|---|---|
| Lnhp*A_group1* feature1 | 0.172*** | 0.169*** |
| | (5.65) | (5.69) |
| Lnhp*A_group1* feature2 | 0.189*** | 0.188*** |
| | (6.15) | (6.20) |
| Lnhp*A_group2* feature1 | 0.248*** | 0.241*** |
| | (6.19) | (6.09) |
| Lnhp*A_group2* feature2 | 0.249*** | 0.247*** |
| | (6.03) | (6.07) |
| lnfamincome | 0.329*** | 0.300*** |
| | (13.64) | (12.83) |
| controls | No | Yes |
| family fixed effect | Yes | Yes |
| time fixed effect | Yes | Yes |
| constant | 5.284*** | 5.764*** |
| | (18.12) | (17.20) |
| *N* | 6518 | 6511 |
| $R^2$ | 0.142 | 0.164 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

The results in table 15 verify the positive relationship between wealth effect and net financial assets. $\beta_2 > \beta_1, \beta_4 > \beta_3$ indicates the wealth effect of housing assets will decrease if the family has a boy. This is because, according to traditional Chinese customs and concepts, the marriage house is provided by the male family at the time of marriage, so families with boys will save money to buy a house in order to enhance their future competitiveness in the marriage market.
The coefficients of other control variables are consistent with the basic regression.

## 6 Robustness check

In section 6, we perform the following robustness checks.
Test 1: Perform the basic regression (2) on the two years subsamples 2010-2012. We have two definition of housing prices: (1) Housing prices of current living; (2) Average price of all houses of the family.

Table 16: Robust check 1: two years subsamples 2010-2012

| | (1) lnconsum | (2) lnconsum | (3) lnconsum | (4) lnconsum |
|---|---|---|---|---|
| Lnhp*A_group1 | 0.129*** | 0.125*** | 0.132*** | 0.129*** |
| | (2.66) | (3.10) | (2.63) | (3.02) |
| Lnhp*A_group2 | 0.173*** | 0.147*** | 0.153*** | 0.156*** |
| | (3.59) | (3.35) | (3.36) | (2.69) |
| Lnhp*A_group3 | 0.197*** | 0.152*** | 0.178*** | 0.171*** |
| | (3.56) | (3.11) | (3.32) | (2.81) |
| Lnhp*A_group4 | 0.209** | 0.211** | 0.210*** | 0.213*** |
| | (2.11) | (2.54) | (2.68) | (3.32) |
| lnfamincome | 0.275*** | 0.264*** | 0.278*** | 0.262*** |
| | (8.96) | (9.28) | (9.56) | (9.14) |
| controls | No | Yes | No | Yes |
| family fixed effect | Yes | Yes | Yes | Yes |
| time fixed effect | Yes | Yes | Yes | Yes |
| constant | 8.910*** | 6.421*** | 8.973*** | 6.539*** |
| | (34.14) | (15.89) | (39.57) | (16.56) |
| *N* | 5718 | 5710 | 5710 | 5702 |
| $R^2$ | 0.030 | 0.154 | 0.027 | 0.151 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

The price in regression (1) and (2) are the housing prices of current living, and in regression (3) and (4) are the average price of the family.

Test 2: Perform the basic regression (2) on the two years subsamples 2012-2014. The price in the regression is the prices of current living.

Table 17: Robust check 2: two years subsamples 2012-2014

| | (1) lnconsum | (2) lnconsum |
|---|---|---|
| Lnhp*A_group1 | 0.144** | 0.110* |
| | (2.33) | (1.72) |
| Lnhp*A_group2 | 0.167*** | 0.162*** |
| | (3.07) | (3.22) |
| Lnhp*A_group3 | 0.218*** | 0.195*** |
| | (3.95) | (3.40) |
| Lnhp*A_group4 | 0.099 | 0.084 |
| | (1.19) | (1.08) |
| lnfamincome | 0.229*** | 0.195*** |
| | (7.62) | (6.58) |
| controls | No | Yes |
| family fixed effect | Yes | Yes |

| | | |
|---|---|---|
| time fixed effect | Yes | Yes |
| constant | 6.914*** | 6.736*** |
| | (17.00) | (14.90) |
| *N* | 4897 | 4891 |
| $R^2$ | 0.073 | 0.110 |

Note: In parentheses is the t value, ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

The results in table 16 and 17 confirm the conclusions in the basic regression (2).

# 7 Conclusion and Policy Suggestion

This paper uses the three years panel data of 2010, 2012, and 2014 of CFPS, which to a certain extent solves the endogenous problems caused by the omission of unobserved factors at the individual level. In addition, this paper use the micro housing prices of each household as an explanatory variable to analyze the wealth effect of housing asset, which eliminates the bias by using the housing value and regional average macro housing price as explanatory. Furthermore, this paper focuses on the heterogeneous impact of increase in housing prices on consumption. The main conclusions are:

First, for urban households with housing, rising housing prices can significantly promote consumption, and the promotion effect is an increasing function of households' net financial asset. Specifically, when the households are divided into four groups according to their net financial assets, from low to high, the average consumption elasticity of housing prices is 0.122, 0.165, 0.195, and 0.253 respectively. That is, for the group with the lowest level of net financial assets, when housing prices rise by 1%, the consumption rise by about 55.83 Yuan, while households with the highest level of net financial assets rise by about 115.78 Yuan. In other words, the rise in housing prices has a greater promotion effect on the consumption of the rich.

Second, for urban families without housing, when housing prices rise by 1%, the consumption drop by 0.748%. Rising housing prices reduced consumption by decreasing the marginal consumer propensity.

Third, from a macro perspective, rising housing price can stimulate consumption, but the overall elasticity is only 0.165, and the promotion effect is very small. This is because although China have a high housing self-owned rate, the restraining effect for households without housing is far larger than the promotion effect for household with housing. So the overall effect is small after offsetting each other.

Fourth, for the families with different family structure characteristics, such as the number of houses owned by household, housing area per capita, house loans, the age of the head of the family, and the gender of the children, the wealth effect has significant heterogeneity.

This paper has the following policy suggestions:

First of all, housing price regulation policy should be more accurate and targeted. For regions with high housing prices and low housing self-owned rate, government should stabilize housing prices strictly. For regions with high urbanization rates and low housing prices, such as three provinces in the northeast of China, Moderate rise in housing prices can boost consumption and drive economic growth.

Secondly, through the heterogenous wealth effect, the increase in housing prices will increase the consumption gap among the households and worsen the real welfare of the entire society. So it's not feasible to promote consumption by increasing housing prices.

Finally, the government should introduce property tax as soon as possible, which will alleviate the wealth and consumption inequality. This is also the research topic that the author will focus on.

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