How housing prices and homeownership affect household consumption? Evidence from China

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Topic 13: Changes in housing prices, homeownership and household consumption. If the housing price increases, by how much their consumption will rise. Surely, it depends on whether this person rents a house or own the house. Also, they expect the increase as a permanent or temporary change.

Abstract: To what extent does housing prices, homeownership, and expectations affect household consumption? This paper use a rich household panel dataset of Chinese households over the period 2010 to 2018 to study the relationship between housing and consumption in China. We also analyzed the drivers of this phenomenon. The Results show that: (i) Rising house prices (current housing market price or average house price in the province where the household lives) will not only increase the consumption of homeowners but also that of renters. (ii) The increase in the average house price in the province where the household resides stimulates household consumption more than the increase in the market value of the existing household housing. (iii) Expectations and price stickiness play an important role in the response of household consumption to house prices.

Keywords: Housing prices, homeownship, change expectations, household consumption.

1. Introduction

Housing prices have been an important factor affecting household consumption decisions and happiness index. Therefore, studying the relationship between housing and consumption has important implications for policy evaluation and improving the lives of residents.

With China's rapid economic development, China's housing prices and residents' consumption levels have also been rising, as shown in the figure 1, 2. In this economic context, it becomes particularly important to study the impact of house prices on household consumption in recent years. Therefore, the author conducts an empirical analysis of the effects of housing prices and homeownership on household consumption using Chinese data, hoping to make some contributions to the topic.

In the empirical analysis part, we use the well-known CFPS dataset. After cleaning and preprocessing, we obtained 25,190 sets of balanced panel data for five periods from 2010 – 2018 (one year interval), including 24,653 sets of homeowners and 537 sets of renters. The rich data allow us to make a more detailed analysis. First, we conduct separate analyses at the household level and at the provincial level, in contrast to many existing studies that analyze at only one of these levels. Household-level studies can better address the issue of individual heterogeneity, and provincial-level studies can analyze the impact of macro trends and expectation. Second, our data span eight years, which provides a good picture of macroeconomic trends. This allows us to perform an analysis in time series dimension. Third, our data include various regions with different

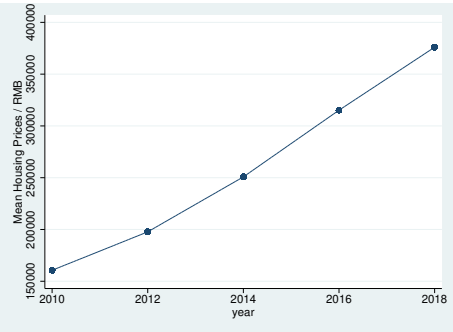

Fig. 1. Housing Prices

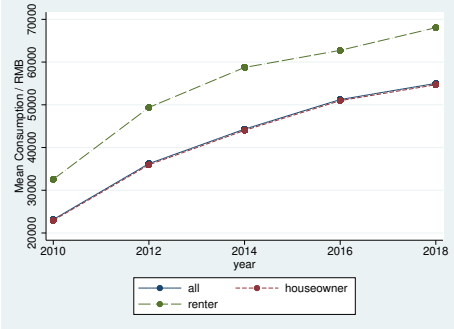

Fig. 2. Consumption

levels of development and regional cultures, preserving a rich set of household characteristics. In addition, considering that provincial fixed effects also affect consumption, we also used provincial macroeconomic variables provided by the National Bureau of Statistics, including gross regional product and unemployment rate.

We came up with the following results. Rising house prices (current housing market price or average house price in the province where the household lives) will not only increase the consumption of homeowners but also that of renters. The micro household house price - consumption elasticity is 0.082 for homeowners and 0.063 for renters; the macro provincial average house price - consumption elasticity is 0.158 for homeowners and 0.412 for renters. The increase in the average house price in the province where the household resides stimulates household consumption more than the increase in the market value of the existing household housing. Expectations and price stickiness play an important role in the response of household consumption to house prices.

2. Literature review

Many scholars have conducted in-depth research and analysis on this topic. For example, L. Zhang et al. (2019) [1] used panel data for Dutch households over the period 2007 to 2014 to examine the effect of homeowner age, house price on household consumption, and explained the phenomenon using wealth effects. Their study showed that a 10% change in home values leads to a 0.7% change in household consumption for homeowners, but a negligible response for renters. Another well-known study (O. P. Attanasio et al. 2009 [2]) examined the cyclical phenomenon of house price and consumption growth and used microeconomic evidence to analyze the link between these trends. They found that the relationship between house prices and consumption is stronger for younger than older households, which appears to contradict the wealth channel. These findings therefore suggest that common causality has been the most important factor behind the link between house price and consumption. K. Saxena and P. Wang (2016) [3] found young homeowners with greater income volatility and older households with a higher housing equity to wealth ratio have higher consumption sensitivity. Another study of Italian households showed that house price increases raise consumption not only for homeowners but also for renters (R. Calcagno et al., 2009 [4]).

In addition to foreign studies, many scholars have analyzed the topic using Chinese data. X. Yuan, Y. Shen, and H. Zhou, (2020) [5] used a micro-level data set that tracks the house price and consumption of a vast number of households over a period of four years. They found that both acquiring and losing homeownership negatively affects household consumption. J. Chen, W. Hardin III, and M. Hu, (2020) [6] found that the housing wealth effect on household consumption in China is much larger than has been shown for developed economies.

Through literature research, the author found that the results of studies in different regions and at different times are often different. Therefore, the author selected recent domestic data for the

study and compared it with previous studies.

3. Data and measures

3.1. The Data Source

To conduct the research, we construct a sample with household-level panel data from the CFPS surveys in 2010 and 2018. CFPS is a nationally representative survey of Chinese communities, families and individuals.

First, taking into account the effect of individual heterogeneity, we need to clean out a balanced panel data sample. The method we use here is to select individuals who appear in all survey years, using the family id in CFPS 2010 ($fid10$) as a benchmark. Then, since the names of some variables were different in different survey years, we standardized them to facilitate subsequent data processing. After that, we removed households with missing or unrealistic key explanatory variables.

3.2. Measures of main variables

We use the sum of consumer spending to measure $household\ consumption$, which includes spending on food, clothing, medical care, education, transportation, culture and entertainment.

$Income$ is defined as the total household net income, which includes wage income, business income, property income, and transfer income.

We divided $homeownership$ into two categories: homeowners and renters. According to the division of the CFPS questionnaire, we consider householders who have full or partial ownership of their houses as homeowners ($fq2 = 1, 2$), and those who live in low-cost housing, public housing, or commercial housing rented on the market as renters ($fq2 = 4, 5, 6$).

For homeowners, the $house\ price$ is defined as the market price of the current housing. For renters, we need to consider alternative methods of definition due to the high number of missing data provided by CFPS. According to the theory of preference similarity developed by S. B. Linder, (1961) [7], consumers with similar incomes have similar preference in goods. That means, if renter have the same level of income as homeowners, they could afford to build or buy a house similar to the homeowners' house. X. Yuan et al., (2020) [5] defined the house price of renters as the house price of homeowners with similar income and discussed the rationality of this method. Referring to these studies, we define the $house\ price$ of a renter as the $house\ price$ of a homeowner in the same province with similar income.

Other $control\ variables$, such as $house\ size$, $cash\ and\ deposit$, $mortgage\ payments$, $non-housing\ debts$, and $family\ size$, are directly adopted from CFPS. We also remove datas that does not make sense.

In addition, taking province fixed effects into account, we also use indicators of $provincial\ GDP$ and $unemployment\ rates$ provided by the National Bureau of Statistics.

Table I reports the summary statistics for the whole sample. Figure 3 consistently illustrates the relationship between house prices, home ownership and consumption

4. Estimation strategy

4.1. Household level model

To study the effect of house prices on consumption at the household level, we use house price data on the market value of current housing for homeowners and house price estimates for renters. We examine how the development of house prices, income, and other household characteristics explain the variation in household consumption. The model is as followed:

$$\log(C_{it}) = \beta_0 + \beta_1 \log(HP_{it}) + \beta_2 \log(Inc_{it}) + \gamma Ctrl_{it} + \kappa S_{st} + \alpha_i + \delta_t + u_{it} \quad (1)$$

where i indexes household, t year, and s province. C_{it} is household consumption, HP_{it} is housing prices, Inc_{it} is household income. $Ctrl_{it}$ is a group of control variables, including mortgage pay-

TABLE I
SUMMARY STATISTICS OF THE WHOLE SAMPLE

Variable	Owner					Renter				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Yearly consumption (RMB)	24,653	41711	50712	235.9	1160600	537	54663.66	44084.92	3218	261350
Owner's house prices (RMB)	24,630	259920.7	558318.2	100	16000000					
Renter's house prices estimation (RMB)						525	330337.9	580814.3	10000	5250000
Provincial house prices (RMB)	24,653	197010.4	317998.2	35000	2600000	537	324560.8	494896.8	35000	2400000
Yearly income (RMB)	24,123	53593.84	110789.6	0	9158800	521	83021.86	174729.1	15	2160000
House size (m^2)	24,653	56.63551	106.5078	0	5447	537	44.0905	53.6002	0	374
Family size	24,653	4.008356	1.748232	1	15	537	3.472998	1.64127	1	14
Cash and deposit (RMB)	24,653	56.63551	106.5078	0	5447	535	44923.71	98874.42	0	900000
Mortgage payments (RMB)	24,557	1731.553	18747.08	0	1200000	537	927.7037	6938.994	0	91200
Non-housing debts (RMB)	24,585	10597.93	65323.93	0	4500000	534	12934.46	36464.33	0	300000
Net asset (RMB)	24,273	422169.2	1099732	-1380838	51000000	523	391405.8	955041	-264800	11800000

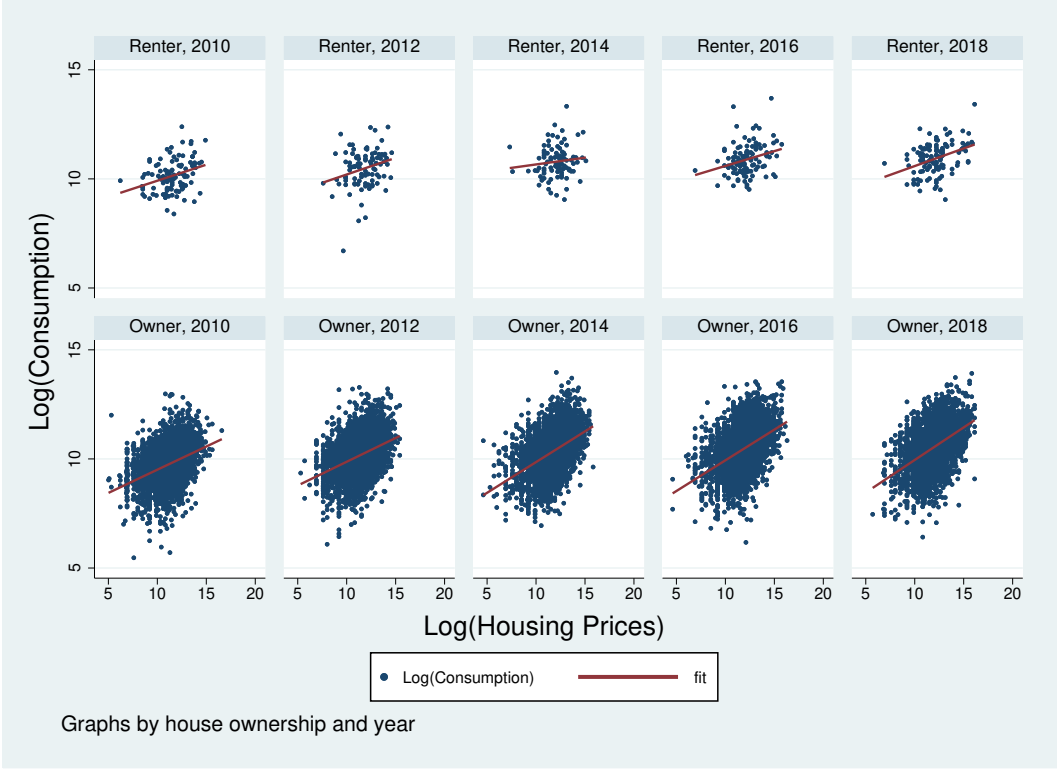

Fig. 3. Consumption and Housing Prices

ments Mtg_{it}, non-housing debts $Debt_{it}$, net assets $Asset_{it}$, cash and deposit $Save_{it}$, household size $Size_{it}$ and family size Num_{it}. S_{st} is macroeconomic data at the provincial level, including the province's GDP $SGDP_{st}$, unemployment rate $SUnemp_{st}$. Equation 1 also includes year-fixed effects δ_t to account for any potential macroeconomic trends that may have an impact on household consumption behaviour, and α_i captures unobserved household-specific fixed effects. u_{it} is white noise error term.

4.2. Province level model

When studying the effect of house prices on consumption at the provincial level, we use house price data as the average house price of the province in the year under study. The model is as followed:

$$\log(C_{it}) = \beta_0 + \beta_1 \log(MHP_{st}) + \beta_2 \log(Inc_{it}) + \gamma Ctrl_{it} + \kappa S_{st} + \alpha_i + \delta_t + u_{it} \tag{2}$$

where MHP_{st} is the average house price of the province in the study year. Other variables are defined the same as at the household level.

4.3. Regression strategy

We use the Hausman test to test whether to use a fixed effects model (FE) or a random effects model (RE). We found that the Hausman test feeds back a small p-value ($< .001$) with or without the inclusion of control variables. A small p-value implies rejection of the original hypothesis that individual heterogeneity is not correlated with explanatory variables. We therefore choose the fixed effects model (FE).

5. Empirical Results

5.1. Main results

We tested the effects of adding or not adding control variables and adding or not adding provincial macroeconomic variables on the regressions separately. The regression results are shown in Table II, III.

Table II shows the results of the model at the household level house prices. For homeowners, when no control variables are added, for every 10% change in house prices, consumption responds by 0.82%. For every 10% change in income, consumption responds by 1.31%. When adding control variables, household consumption rises by about 0.69% for every 10% increase in house prices and by about 0.86% for every 10% increase in income. The estimates of the coefficients of the variables do not change much with the inclusion of macroeconomic variables. In addition, the performance of the other control variables are all consistent with our perceptions. And the results for most of the variables are significant. For renters, when no control variables are added, for every 10% change in house prices, consumption responds by 0.63%. For every 10% change in income, consumption responds by 0.1%. When adding control variables, household consumption rises by about 1.21% for every 10% increase in house prices and by about -0.02% for every 10% increase in income. The effect of macroeconomic variables on the coefficient estimates remains small. And, most of the regression coefficients of renter are insignificant. Since there are many more data for homeowners than renters, the regression results for all households are similar to the results for homeowners.

Table III shows the results of the model at the province level house prices. For homeowners, when no control variables are added, for every 10% change in house prices, consumption responds by 1.58%. For every 10% change in income, consumption responds by 1.36%. When adding control variables, household consumption rises by about 1.69% for every 10% increase in house prices and by about 0.89% for every 10% increase in income. After adding the provincial macroeconomic variables, the consumption-house price elasticity becomes 0.128 and the consumption-income elasticity does not change much. For renters, when no control variables are added, for every 10% change in house prices, consumption responds by 4.12%. For every 10% change in income, consumption responds by 0.11%. When adding control variables, household consumption rises by about 3.71% for every 10% increase in house prices and by about 0.01% for every 10% increase in income. After adding the provincial macroeconomic variables, the consumption-house price elasticity becomes -0.03 and the consumption-income elasticity becomes 0.11. The regression results for all households are also similar to the results for homeowners.

5.2. Analysis

Below we combine and compare Table II and table III for analysis.

From the above results we can find that both an increase in the market price of existing housing and an increase in the provincial average house price significantly increase the household consumption of homeowners. The consumption-price elasticity of the former is 0.07, while the latter is 0.15, and the latter is higher. The increase in homeowner consumption due to higher house prices is quite intuitive. According to the wealth effect, an increase in house price implies an increase in homeowners' assets, which boosts their consumption confidence and propensity to consume. As to why household consumption is more sensitive to changes in average provincial house prices, we use consumer expectations and price stickiness theory to explain this phenomenon. According to price stickiness theory, large changes in overall house prices in the market tend to take longer to occur, so households are more likely to perceive such increases as persistent. In contrast, house price increases in householders' own housing may be contingent in nature, and householders will perceive such changes as temporary. In addition, an increase in house prices in the overall market enhances consumers' good expectations for the future and therefore increases consumption in the current period.

TABLE II
HOUSEHOLD LEVEL

	Owner			Renter			All		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log of housing prices	.082***	.069***	.067***	.063	.121	.104	.833***	.065***	.064***
	(.006)	(.011)	(.011)	(.064)	(.084)	(.088)	(006)	(.010)	(.010)
Log of household income	.131***	.086***	.086***	.010	-.002	-.002	.132***	.086***	.086***
	(.005)	(.009)	(.009)	(.034)	(.041)	(.042)	(.005)	(.009)	(.009)
Log of house size		.040**	.038*		.076	.071		.035*	.034*
		(.020)	(.020)		(.109)	(.111)		(.019)	(.019)
Log of savings		.008***	.008***		-.005	.071		.008***	.008***
		(.002)	(.002)		(.013)	(.014)		(.002)	(.002)
Log of mortgage		.013***	.013***		-.002	-.004		.012***	.012**
		(.005)	(.005)		(.027)	(.029)		(.005)	(.005)
Log of debts		.019***	.019***		.002	.00005		.019***	.018***
		(.002)	(.002)		(.011)	(.012)		(.002)	(.002)
Family size		.106***	.106***		.169	.178*		.109***	.109***
		(.010)	(.010)		(.105)	(.106)		(.010)	(.010)
Log of provincial GDP			.198			.665			.194
			(.123)			(.832)			(.113)
Unemployment rate			.016			.0651			.022
			(.034)			(.160)			(.032)
Household FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control Var.		✓	✓		✓	✓		✓	✓
Provincial Macro Var.			✓			✓			✓
Obs	24,100	10,519	10,519	509	332	332	24,614	10,854	10,854
R-Square	0.3216	0.3415	0.3235	0.2167	0.2719	0.1674	0.3219	0.3397	0.3246

$^{***}p < .01, ^{**}p < .05, ^{*}p < .1$

TABLE III
PROVINCE LEVEL

	Owner			Renter			All		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Log of housing prices	.158***	.169**	.128*	.412	.371	-.030	.162***	.182***	.148*
	(.031)	(.069)	(.083)	(.222)	(.361)	(.593)	(.030)	(.065)	(.076)
Log of household income	.136***	.089***	.089***	.011	.001	.011	.137***	.089***	.089***
	(.005)	(.009)	(.009)	(.032)	(.041)	(.043)	(.005)	(.009)	(.009)
Log of house size		.071***	.071***		.034	.040		.063***	.063***
		(.019)	(.019)		(.105)	(.106)		(.018)	(.018)
Log of savings		.008***	.008***		-.010	-.014		.008***	.007***
		(.002)	(.002)		(.012)	(.014)		(.002)	(.002)
Log of mortgage		.014***	.014***		-.001	-.007		.013***	.013***
		(.005)	(.005)		(.027)	(.029)		(.005)	(.005)
Log of debts		.019***	.019***		-.002	-.003		.018***	.018***
		(.002)	(.002)		(.011)	(.011)		(.002)	(.002)
Family size		.107***	.106***		.146	.155		.110***	.110***
		(.010)	(.010)		(.102)	(.103)		(.010)	(.010)
Log of provincial GDP			.132			.863			.110
			(.147)			(1.14)			(.133)
Unemployment rate			.012			.02			.017
			(.034)			(.173)			(.033)
Household FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Control Var.		✓	✓		✓	✓		✓	✓
Provincial Macro Var.			✓			✓			✓
Obs	24,123	10,526	10,526	521	339	339	24,644	10,865	10,865
R-Square	0.2627	0.3147	0.3035	0.1758	0.2634	0.1252	0.2639	0.3181	0.3106

$^{***}p < .01, ^{**}p < .05, ^{*}p < .1$

For renters, an increase in house prices of homeowners with similar incomes to them and an increase in the provincial average house price will also increase household consumption. The consumption-house price elasticity is about 0.1 for the former and 0.3 for the latter. Unfortunately, the regression coefficients for renters are not significant and the coefficients of some of the explanatory variables are biased to some extent. The large p-value means that we cannot reject the hypothesis that the coefficient is zero, which implies that house prices have no significant effect on renters' consumption. We also analyze the reasons for this. One reason is that the asymptotic property is not applicable due to the small sample of renters. Or there may have been an endogeneity problem due to omitted variables. Another reason is that the phenomenon does objectively exist. On the one hand, the increase in house prices increases the cost of living, including rent, for renters, or increases the cost of buying a home, which causes renters to reduce their consumption in other areas, creating a crowding-out effect on future consumption. On the other hand, rising house prices imply a booming economy, which will make renters maintain optimistic expectations about the future, thus increasing renters' consumption and forming a confidence effect on future consumption. If the crowding out effect and the confidence effect are of equal magnitude for renters, the consumption behavior of renters will show insensitivity to house prices.

6. Conclusion

The existing literature studying the impact of house prices on consumption largely focused on one of the micro (household house prices) or macro (average regional house prices) dimensions. However, our study provides analysis and cross-sectional comparisons at both the macro and micro levels. We find that the shock of an increase in the average provincial house price brings a larger increment to household consumption than the shock of an increase in the house price of the household's current home. This phenomenon exists for both homeowners and renters.

For homeowners, a 10% increase in the market price of existing housing is associated with a 0.82% increase in household consumption; a 10% increase in the average provincial house price of residence is associated with a 1.58% increase in household consumption. For renters, a 10% increase in the estimated value of house prices (the market value of existing housing for homeowners with similar incomes in the province) is associated with a 0.63% increase in household consumption; a 10% increase in the average house price in the province of residence is associated with a 4.12% increase in household consumption. We believe that wealth effects and expectations play an important role in this difference.

Our observations include 24,653 homeowners and 537 renters. The coefficients of the core variables in the regressions for homeowners are all highly significant, and the coefficients of the other explanatory variables have similar regression results at the macro and micro levels, indirectly validating the robustness of the regressions. On the downside, the significance and robustness of the explanatory variables in the regressions for renters are not as strong. This may be related to the small amount of data for renters and omitted variable bias. One promising direction in which research could be expanded is to find better house price estimates for renters.

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