Housing and Wealth Inequality: The Role of Financial Market Participation[*]

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This paper examines how homeownership and housing value appreciation may contribute to household wealth accumulation, and possibly widen wealth inequality. We argue that housing value appreciation may strengthen households' willingness to invest in financial markets through raising households' risk tolerance on investment and increasing the collateral value of housing. This investment channel benefits the wealthier households more, and further enlarges wealth inequality. Using China Household Finance Survey (CHFS) data in 2019, we lend empirical support to this argument and find it explain well on China's widening wealth inequality.

Key Words: Housing; Wealth accumulation; Financial market Participation; Inequality.

JEL Classification Numbers: E44, G11, O15, G51.

1. INTRODUCTION

For most of households, owning a house is more than a simple consumption behavior that demands for housing services, but also an important investment decision in their portfolio management (Henderson and Ioannides, 1983; Dietz and Haurin, 2003; Flavin and Yamashita, 2002). The housing's dual roles of being both consumption and investment goods are sometimes alleged that consumers "overinvest" in housing, making housing equity account for the largest part of household wealth. Theoretically, homeownership has many potential properties that contribute to more wealth accu-

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mulation relative to renting (Di, 2001, 2007; Di et al., 2007; Turner and Luea, 2009; McCarthy et al., 2001). For example, homeowners are usually "forced" to save more in order to meet monthly mortgage payments. In addition, the positive co-movement between housing prices and CPI makes housing a good investment to hedge against future inflation or rent rises. Furthermore, homeowners may also benefit from homeownership-promoting policies, enjoy government subsidies or tax deduction for real estates and mortgage interest payments. Most importantly, housing can serve as collateral, allowing homeowners better access to financial markets to finance alternative productive activities, such as investments, business and education. Not to mention that housing itself is an important investment asset, increasing house prices represents a one-to-one increase in household net wealth.

Along this line of literature, we are interested in how homeownership may function in wealth accumulation, possibly widening wealth inequality (Li et al. 2014). More specifically, we study whether housing appreciation can help accumulate household wealth, and determine to what extent housing appreciation contributes to wealth inequality. Moreover, we attempt to investigate the channel through which housing appreciation may lead to more inequality. The specific channel is the investment in financial markets, particularly the participation in equity and bank financial product market. We examine if housing appreciation allows households to invest more in financial markets, and probably benefits the wealthier more. Many studies simply focus on the broad effect of homeownership or housing holding periods on wealth accumulation, but do not empirically test this specific investment channel through which housing value appreciation may affect household wealth and cause wealth inequality. For example, using longitudinal data from the Panel Study of Income Dynamics (PSID) between 1984 and 2001, Di et al. (2007) find that those who owned homes and owned for longer periods of time had significantly higher household net wealth by 2001. Each year of ownership is associated with approximately 2 percent increase in household income, and doubling the length of ownership increases household income by about 11 percent. Our research fulfills this gap by not only using homeownership as in the literatures, but also using three different measures, i.e., housing appreciation, housing equity, and housing value, to proxy the change of housing values, and to examine their respective effects on households' wealth accumulation and investment tendency toward other financial assets. There are several relevant studies. Di et al. (2003) use the US Panel Survey of Income Dynamics data to examine whether the house equity in 1984 has significant positive impacts on total net wealth in 1999 and check the effects of home equity share and stock share of total wealth on household net wealth as well. Similar to our study but using 2011 CHFS data, Zhao and Li (2017) study the dual effects of housing on

portfolio choices in China. They find that while housing value appreciation has a positive effect on households' stock investment, house-to-wealth ratio has a negative effect on households' investment on risky financial assets. However, they focus on how housing appreciation affects household stock investment, rather than discussing how housing appreciation affects wealth inequality through financial market participation.

The effects of homeownership on wealth accumulation may not accrue evenly to homeowners across all income brackets. On the one hand, the positive effects of homeownership on wealth accumulation may bias toward high-income households, enlarging wealth inequality.[1] McCarthy et al. (2001) argue that lower-income households tend to accumulate lower-than-average non-housing savings, experience less housing appreciation, and borrow more against their equity with higher borrowing cost compared to high-income households.[2] Holding more than optimal level of housing also makes lower-income households expose to higher price risk. Lower-income homeowners are more likely to suffer from job insecurity and more fragile to housing price volatility, hence they have higher default risk on mortgage and exit homeownership afterward. Empirically, Turner and Luea (2009) also verify that the impact of homeownership varies by income status, with each additional year of homeownership being associated with $15 K more in wealth holdings for high-income households and roughly $6 to 10 K more in wealth holdings for low and middle-income households. On the other hand, housing may affect wealth inequality through various financial market participation rates across different income levels. In portfolio choice theory, lower-income households are more associated with "housing constraint" since housing absorbs a large portion of their income, reducing their exposure to other assets like stocks. This, accordingly, reduces the benefits of stock market participation (Archer et al., 1996; Fratantoni, 1998; Flippen, 2004; Cocco, 2004).[3] Compared to those constrained households, unconstrained high-income homeowners tend to have higher quality collateral and more income, allowing them to enjoy lower refinancing costs. Moreover, wealthier households' higher participation rate in financial mar-

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[1]However, Mathä et al. (2017) find that homeownership and house price dynamics have better explanation for the net wealth differences for middle-income class than the upper one. The net wealth differences among high-income households in the euro area are more erratic, and cannot be better explained by homeownership and house price dynamics.

[2]There are some opposing opinions arguing that low-income homeowners can gain at least as much as high-income homeowners from housing price appreciation, and have lower risks of losses upon resale since the initial housing acquiring cost is low (Quercia et al., 2000; Belsky and Duda, 2002; Di, 2001).

[3]Many studies have found that household wealth is positive associated with participation in stock market or markets for other risky assets (Campbell, 2006; Bertaut and Starr-McCluer, 2001; Guiso et al., 2003).

ket allows them to become a sophisticated investor whose participation in different financial markets has been proved the important driver of income inequality (Kacperczyk et al., 2014; Pastor and Veronesi, 2016). This is the reason why Birdsall and Londono (1997) and Deininger and Olinto (1999) come to the conclusion that the poor being lack of access to the assets necessary for increased productivity and income has been a fundamental constraint on poverty reduction.[4]

Our work is also related to the literature on household portfolio optimization with housing. Unlike stocks and bonds, owner-occupied housing provides significant consumption benefits. Acquisition of such housing is thus driven by dual motives of consumption and investment, inducing consumers to "overinvest" in housing and leave most portfolios inadequately diversified (Brueckner, 1997).[5] While asset substitution argument (Meyer and Mieand, 1996; Fratantoni, 2001) states that homeowners should lower their investment position on risky equities to secure mortgage commitment, diversification argument (Ibbotson and Siegel, 1984) suggests that homeowners should invest more in risky assets due to lower correlation between real estate returns and other investments.[6] Housing characteristics may also have significant influences on households' optimal portfolio. For example, the illiquid nature and the size of housing investment may prevent an investor from taking advantage of investment opportunities. Housing purchase may impose severe homeownership constraint, forcing a family impractical (costly) frequently changing the ownership of residential real estates in their optimal portfolio (Cauley et al., 2007). Most importantly, investments in other risky assets may be indirectly financed via home equity borrowing. Heaton and Lucas (2000) find that a higher mortgage leads to higher stock holdings. Moreover, households borrow against not only home equity itself, but also against the increase in home equity (Foster and Kleit, 2015). Based on the estimate in Mian and Sufi (2011), the av-

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[4]Deininger and Olinto (1999) argue that asset inequality — but not income inequality — has a relatively great negative impact on growth and also reduces the effectiveness of educational interventions. This means that policymakers should be more concerned about households' access to assets, and to the opportunities associated with them, than about the distribution of income.

[5]McCarthy et al. (2001) states that the average homeowner holds more than 40% of net wealth in housing, much higher than the estimated optimal portfolio allocations of 10–20% in early literature (Fogler, 1984; Firstenberg et al., 1988; Kallberg et al., 1996). The overinvestment phenomenon is even more prevailed in low-income and minority households, which often hold more than 60% of their assets in housing.

[6]Yao and Zhang (2005) further construct a theoretical model and find that both arguments can be co-existed. While investors are not under liquidity-constrained, owning a house makes investors not only reduce the equity proportion (bond, stock, and home equity) in their net wealth, but also hold a higher equity proportion in their liquid financial portfolio (bond and stock), reflecting both substitution and diversification effects of home equity for risky equities, respectively.

erage homeowner extracts 25 to 30 cents for every dollar increase in home equity.

Using China Household Finance Survey (CHFS) data in 2019, we empirically examine whether the housing appreciation may help accumulate household wealth, and how this wealth accumulation may bias toward wealthier households and widen wealth inequality through extending homeowners' investment choices and their investment on other financial assets.[7] China is a good candidate to examine these issues since China has experienced extraordinary growth in the housing market during the past decade, accompanied by substantial increases in housing prices. Along with housing boom, China's income inequality has been rising very rapidly as well.[8] Figure 1 shows that the Gini coefficient officially composed by National Bureau of Statistics of China has remained consistently above 0.4 since 1994, the widely accepted alarm level. Even so, the official Gini is still under severe accusation of underestimating China's true income inequality.[9] China's wealth inequality is even more alarming. The household net wealth Gini coefficient reached as high as 0.73 in 2012 based on the survey data of China Family Panel Studies by Peking University.

Our empirical findings are as below. First, a rise of housing values has positive and significant effects on both total net wealth and non-housing wealth. This positive wealth accumulation effect is significantly stronger for multiple-housing homeowners. Second, housing appreciation does extend households investment choices, allowing more investments in financial markets. The change of households' investment behavior may be due to the fact that housing appreciation tends to make households feel wealthier and become more risk tolerance on investment on risky assets. Moreover, housing appreciation may also increase the collateral value of housing, and allows households better access to capital market. Finally, the effects of housing appreciation on wealth accumulation do not accrue evenly across all income groups. Even though owning a house does have equalized effect on household total wealth as in Holloway (1991) and Di (2001), the unequal

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[7]On the contrary, using data from China's Urban Household Survey, Zhang et al. (2016) finds that the income GINI coefficient is positively associated with the housing price-to-income ratio as well as the housing vacancy rate.

[8]See Wang (2011) for the discussion on how China's removal of price distortions, originating from state misallocation, allowed households to increase their consumption of housing and led to an increase in equilibrium housing prices. Khan and Riskin (1998) also states that housing subsidies had become a major contributor to China's urban inequality in the early phase of housing reform transitioning from state allocation to market-determined supply.

[9]Comparing seven nationally representative survey data sets in China, Xie and Zhou (2014) state that the Gini coefficient of China has been rising within the interval of 0.53 and 0.61 in the period of 2005-2012. Wang et al. (2014) has discussed several driving forces behind China's inequality, such as China's "hukou" system, policy biases toward eastern region, globalization and education.

FIG. 1.   Gini Coefficients of Chinese Residential Income
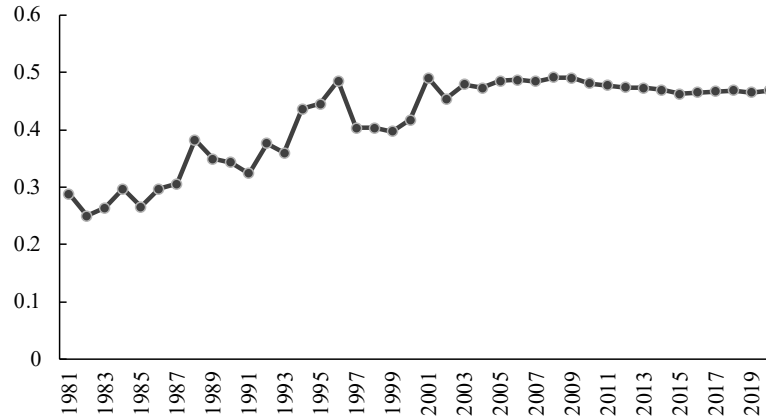
Data source: National Bureau of Statistics of China

non-housing wealth accumulation effects resulted from housing appreciation significantly bias toward wealthier households. This explains the most part of wealth inequality. The negative effect of housing appreciation on wealth inequality is mainly due to the enlarged inequality on household non-housing wealth.

We organize the paper as follows. The next section provides some stylized facts about China's current wealth and inequality situation. Section 3 explains empirical model and data, while Section 4 contains empirical results. The final section concludes.

2. SOME STYLIZED FACTS

In this study, we use the data from China Household Finance Survey (CHFS) in 2019.[10] The dataset provides micro-level financial information of more than 34,000 Chinese households in 29 provinces. CHFS data allows us to have a comprehensive understanding on each respondent household's assets and liabilities, including the information associated with housing and financial assets. In the survey, a respondent reports detail information of the housing units she rents or owns. In addition to the housing information, a household reveals the relevant information about the investment on other financial assets, such as checking, saving, stock, bond, and etc.

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[10]CHFS data set is provided by the Survey and Research Center of China Household Finance, Southwestern University of Finance and Economics, Chengdu, China. For more detail about the dataset, please see Gan et al. (2013) and Li et al. (2022).

TABLE 1.

Household Portfolios of CHFS Survey Data

	Number of households holding the asset	Percentage of total sample	Mean asset share
Owner-occupied housing	29,322	87.75%	43.96%
Other housings	15,844	47.42%	88.11%
Housing mortgage	2,907	8.70%	78.87%
Checking account	27,057	80.98%	10.22%
Saving account	5,862	17.54%	18.08%
Stocks	1,985	5.94%	6.89%
Internet financial products	17,048	51.02%	1.81%
Bank financial products	2,292	6.86%	12.08%
Funds	643	1.92%	4.31%
Bonds	94	0.28%	6.90%
Derivatives	10	0.03%	6.16%
Non-RMB assets	53	0.16%	3.64%
Gold	74	0.22%	3.28%
Other liabilities	7,656	22.91%	24.69%
Net Wealth	33,414	100%	100.00%

Note: The data of net wealth reported only for households with non-negative net worth and households have ownership of the asset.

To examine Chinese households' assets and liabilities, we summarize the information of households' specific assets, and the corresponding mean asset shares in Table 1. Several stylized facts are listed as below: (1) Most Chinese households have their own houses. Among 33,414 households with positive net wealth, around 88% of them have owner-occupied housing, 47% of which have other housings.[11] (2) Housing takes a large portion of household wealth. On average, housing takes around 44% of net wealth for households who have owner-occupied housing. (3) The burden of housing mortgage is not trivial. 8.7% of households have housing mortgage, while this liability is around 79% of the net wealth on average. (4) Most of Chinese households follow a conservative investment strategy. In addition to housing investment, most Chinese households invest in less risky financial assets, such as checking account (81%) and saving account (18%). While more than half of households have internet financial product investment[12]

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[11] In our data sample, 72.3% of households own only one housing unit, 14.94% own two housing units, 1.89% own three housing units, and 0.16% have at least four housing units. The others are renters (10.7 %).

[12] According to the CHFS 2019 survey, the internet financial products refer to products provided by internet companies of Alipay, WeChat Pay, Jingdong Online Banking Wallet, Baidu Wallet, Yu'ebao, WeChat Change Pass, Jingdong Small Treasury, Baidu Baizhuan. Bank financial products refer to products that are equal or more than

(51%), only 6 − 7% of households have investment on stocks and bank financial products. Moreover, less than 2% of households have mutual fund investment. Only 0.28% and 0.41% of households have investment on bonds and other risky assets, respectively. As for the mean asset share, the value of checking and saving account amounts to 10% and 18% of net wealth on average. While the asset value of bank financial products accounts for more than 12% of net wealth, the asset value of internet financial products is only about 2%. The investment on stocks, bonds, and derivatives are all around 6 − 7% of net wealth, while the asset value of other risky assets is less than 5%.

TABLE 2.

The Average Value of Financial Assets and Net Wealth Held by Chinese Households–by Different Wealth Levels

Mean	$< P20$	P40	P60	P80	$> P80$
Wealth_all	−6022.54	103069.30	284596.50	688852.60	3223366.00
Wealth_nohouse	−17247.56	29451.83	69799.39	153828.70	606474.20
Homeownership	0.56	0.86	0.93	0.97	0.98
Housing appreciation	332509.90	367580.70	466660.30	722059.90	2508003.00
Housing equity	11225.02	73617.50	214797.20	535023.90	2575506.00
Housing value	20008.04	78895.92	229248.70	567823.60	2677938.00
Loan	39861.41	11441.55	21755.34	45129.90	134708.50
Income	34028.17	42951.00	59870.73	88410.54	186449.50
Risk attitude	4.51	4.44	4.38	4.24	4.00
Invest choices	2.92	3.25	3.55	3.90	4.47
Checking	1979.13	6841.98	12767.71	23306.14	62924.91
Saving	491.53	4692.05	10270.48	20632.37	62970.49
Risky assets	363.48	1476.10	4238.52	14011.97	125808.10
Stock	29.02	198.56	537.25	1869.25	19798.75
Internet financial product	292.66	670.82	1455.91	3534.97	12236.71
Bank financial product	31.78	482.80	1877.97	6455.72	61506.69
Fund	1.89	60.53	143.11	530.02	5875.46
Bond	1.48	14.92	52.59	114.90	1510.53

Note: The definition of variables can be found in Table 4. However, all the variables, such as wealth, housing, and financial asset variables, are presented in real values rather than the log transformed ones.

Table 2 shows the average value of Chinese households' net wealth and financial assets within different wealth percentiles. Compared to the poor households, the rich ones tend to have higher housing appreciation, housing equity, and housing value. With respect to the investment on other financial assets, the rich households have much more investment on risky assets, such

RMB10,000, provided by banks, insurance companies, security companies, fund companies, and trust companies.

as stocks, financial products, and funds, while the poor ones invest mostly in checking and saving accounts.

FIG. 2.   Lorenz Curves for Different Net Wealth
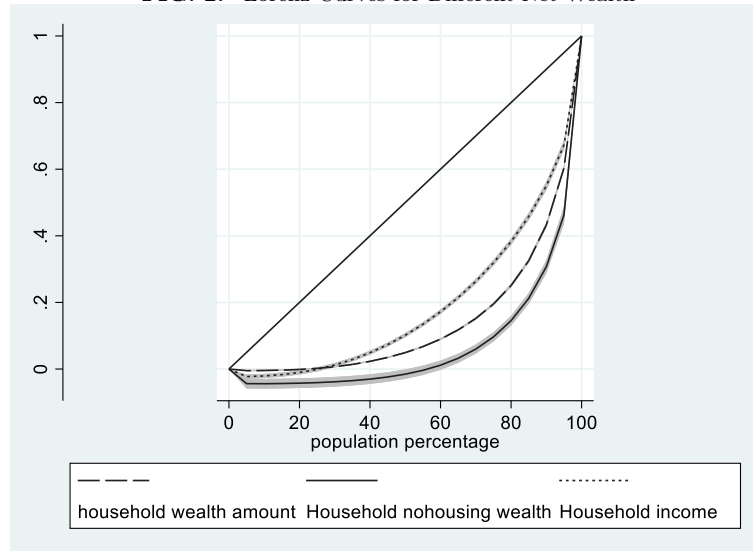
Note: Lorenz Curves are calculated based on nonnegative net wealth and income. The corresponding sample sizes are reported in Table 3.

We further compare China's income inequality with wealth inequality by drawing the Lorenz Curves for household income, household wealth and household non-housing wealth, respectively.[13]   Figure 2 shows that China's household wealth inequality is worse than income inequality. To check if there is a large regional or urban-rural variation in China's wealth inequality, we divide the sample into the subsamples in different regions[14] (i.e., East, Middle, West, and Northeast) and urban and rural areas. Figure 3 illustrates the Lorenz curves in different regions. Non-housing wealth inequality is the largest. The level of income inequality is close to that of household wealth inequality, though the former is better than the latter. This finding holds for all regions. Meanwhile, the inequality of household net wealth for the poor is milder than income inequality. This phenomenon is also found in rural and urban sample in Figure 4. Especially for low-

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[13]The detail definition of households' net wealth and CHFS survey information can be found in section 3.

[14]Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan are classified as eastern region, Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan as central region, Neimenggu, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia as western region, and Liaoning, Jilin, Helongjiang as northeast region in CHFS2019.

FIG. 3. Lorenz Curves for Different Net Wealth–by Regions
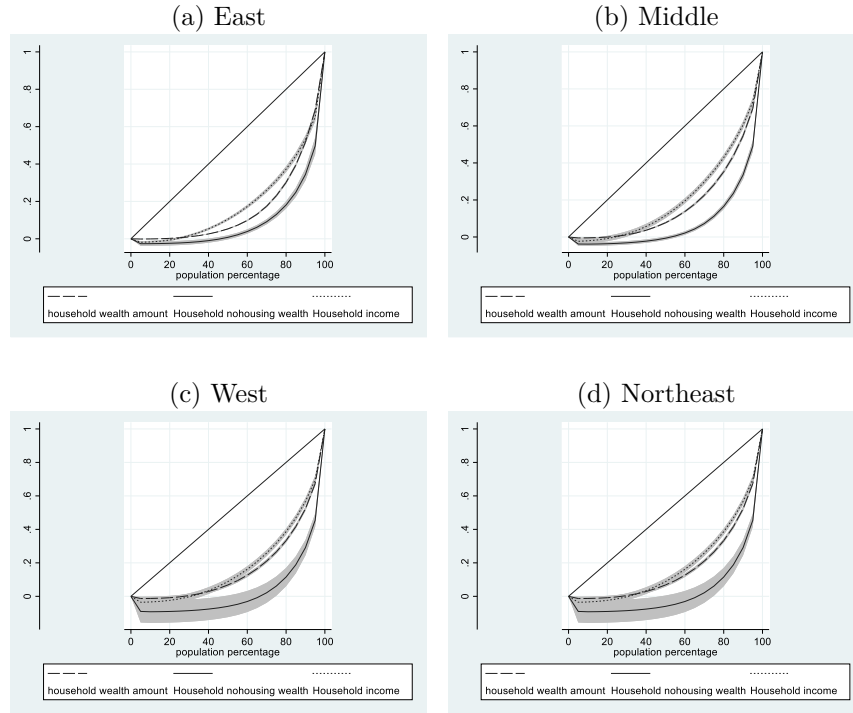
(a) East   (b) Middle

(c) West   (d) Northeast

Note: Lorenz Curves are calculated based on non-negative net wealth and income. The corresponding sample sizes are reported in Table 3.

income households in rural areas, income inequality is worse than wealth inequality. However, in urban areas, this phenomenon is less obvious. The Lorenz curve of urban areas shows a pattern similar to that of previous regional studies.

All the corresponding Gini coefficients are listed in Table 3. The Gini coefficients reach the shockingly high level of 0.58, 0.71, and 0.78 for household income, household net wealth, and non-housing net wealth, respectively. Regarding regional differences, the East has the highest Gini coefficient in labor income, while the West is the second, followed by the Middle. Although the Northeast has the lowest Gini coefficient of labor income, its Gini coefficient of net wealth is relatively high, ranking the second among all regions. The reason is that the Gini coefficient of non-housing wealth in the Northeast is the highest. As for urban-rural areas, all the Gini coefficients are slightly higher for rural households. It is also worth noting that all the income and net wealth Gini coefficients are above 0.5.

FIG. 4. Lorenz Curves for Different Net Wealth — by Urban-Rural Areas
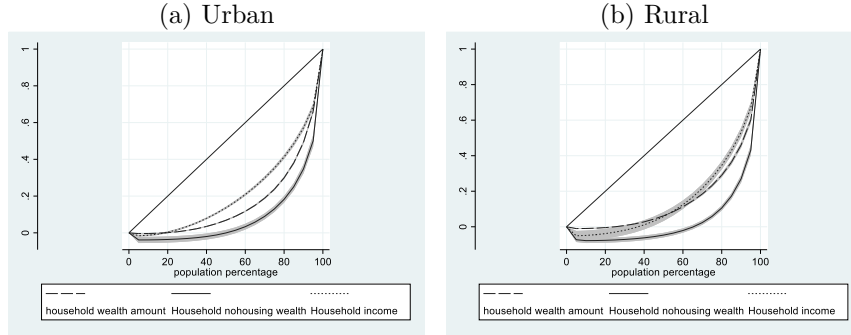
(a) Urban (b) Rural

Note: Lorenz Curves are calculated based on non-negative net wealth and income. The corresponding sample sizes are reported in Table 3.

TABLE 3.

Gini Coefficients

	Household Income		Household Net Wealth		Household Non-housing Net Wealth	
Total Sample	0.58	(32726)	0.71	(33435)	0.78	(32141)
Region:						
East	0.59	(12246)	0.67	(12263)	0.76	(11949)
Central	0.54	(7148)	0.62	(7080)	0.76	(6788)
West	0.57	(9818)	0.63	(9700)	0.76	(9212)
Northeast	0.51	(3514)	0.65	(3432)	0.78	(3268)
Development level:						
Urban	0.54	(21337)	0.66	(21167)	0.75	(20561)
Rural	0.59	(11389)	0.67	(11308)	0.78	(10656)

Note: The values in brackets are the number of observations with non-negative values that are used to draw the Lorenz curves in Figure 2-3 and the calculation of corresponding Gini coefficients.

3. EMPIRICAL MODEL AND DATA

3.1. Empirical Model

To examine whether the change of housing values may contribute to household total net wealth through extending homeowners' investment choices, and further increasing their total wealth from the investment on other financial assets, we first construct a benchmark model to test if change of housing values may influence households' total wealth as below:

$$\text{Wealth}_i = \alpha_0 + \alpha_1 \text{Housing}_i + \alpha_2(\text{Housing}_i \times \text{Multi}_i) + \alpha_c \text{Control}_i + \varepsilon_i \quad (1)$$

where Wealth$_i$ is household's net wealth (in logarithm) in 2019. Based on different coverage, two kinds of net wealth are used in the paper, i.e., net wealth including all housing values (up to six housing units) (Wealth_all$_i$) and non-housing net wealth (Wealth_nohouse$_i$). Housing$_i$ is the variable associated with households' housing status. It could be the homeownership, proxied by homeownership dummy, or three different measures of housing value changes (in logarithm): (1) housing appreciation, proxied by deducting housing units' initial acquisition cost from the current housing value, (2) housing equity, proxied by deducting unpaid housing mortgages from current housing value, and (3) housing value, proxied by the current housing value reported in 2019. These three measures indicate household's pure capital gain, net wealth, and gross wealth from the housing, respectively. Multi$_i$ is a dummy, taking the value of 1 if households own more than one housing units. The households with multiple housings, compared to the ones with only owner-occupied housing, may behave differently in terms of investment. A multiple-housing homeowner is expected to have more wealth accumulation from housing appreciation due to several reasons. Multiple-housing homeowners tend to benefit from housing appreciation directly from owning more houses. They tend to save more as well due to possible higher mortgage burden. The capital gains from non-owner-occupied housings allow households to be more risk-taking and more capable of investing in financial markets since non-owner-occupied housings are more like investment goods than consumption goods.

To further explore the mechanism of how housing values may influence households' total wealth, we build the second model to analyze whether the rise of housing values extend households' investment choices, and alter households' risk attitude and their investment portfolio toward risky financial assets, as below:

$$Y_i = \beta_0 + \beta_1 \text{Housing}_i + \beta_2 (\text{Housing}_i \times \text{Multi}_i) + \beta_c \text{Control}_i + \varepsilon_i \qquad (2)$$

where Y_i are the variables representing households' investment choices (Investchoices$_i$), risk attitude (Riskattitude$_i$), and total investment (in logarithm) on safe assets (Saving$_i$+Checking$_i$) and risky assets (Riskyassets$_i$). Investchoices$_i$ is a category variable measuring the total number of financial assets that households have invested among the ten financial assets, including RMB denominated checking accounts, outstanding RMB time deposits, stocks, bonds, funds, derivatives, internet financial products, bank financial products, non-RMB assets, and gold. Among the ten financial assets, Riskyassets$_i$ is defined as all assets except cash, checking and saving accounts. Self-reported attitude to risk (Riskattitude$_i$) is considered as an important household demographic feature (Campbell, 2006). The higher the value is, the more conservative risk attitude the household has.

Again, the interaction term of housing appreciation with multiple housing dummy is used to examine if the housing appreciation tends to make multiple-housing homeowners become more risk tolerant and invest more in risky assets.

We use the same control variables in models (1) and (2). To deal with the possible reverse causation between wealth and homeownership[15], households' total loan ($Loan_i$) is used to proxy for households' saving tendency since those who save more tend to borrow less. Meanwhile, total loan is households' liability, reflecting the status of households' budget constraint. Considering the different types of housing units may influence the wealth accumulation, we define a dummy variable, $Commodity_i$, to separate commodity housing from the rest types such as affordable housing, inheritance or gifts, purchased at below market prices, financed housing, self-built, demolition/relocation and others. Moreover, the features of different households and households' head may also influence households' wealth accumulation and investment decision, and thus should be controlled in this study. These control variables include household head's age, gender, education level, marital status, migrant status, investment attitude, household size, income and geographic location. According to life-cycle consumption theory (Modigliani, 1966), the younger households like to borrow than save to smooth life-cycle consumption relative to the elder ones. Hence, we expect to observe a generalized inverted U pattern, indicating that household wealth peaks at middle age. To test this effect, Age_i and Age_i^2 are both added into the empirical model. In the model of estimating households' wealth, household head's permanent income is considered as an important impact factor. Under the condition that her permanent income is generally not accessible, her education achievement ($Education_i$) is taken as a proxy. $Gender_i$ is the dummy to identify household head's gender, taking the value of 1 if household head is male, and 0 otherwise. $Divorce_i$ is the dummy variable to control household head's marital status. One would expect a negative impact of divorce on household wealth since it is possible to split the wealth between divorced couple. $Income_i$ is household's income (in logarithm), controlling for differences in household income in determining household investment. We also expect that migrant households ($Migrant_i$) display different patterns from native households. Household size ($Familysize_i$) is also controlled because the number of dependents may

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[15]Di et al. (2007) argue that there is a potential reverse causation between household wealth and homeownership since those who tend to save and invest also tend to become homeowners. Without controlling for this causality, the estimation could be spurious. They include a saving tendency variable, which is measured by wealth growth (1984–1989) as a share of total cumulative household income, to deal with this causality issue. Since we do not have time-series data to measure households' saving tendency, we simply use households' borrowing status, i.e., total loan, to proxy their willingness to save.

affect household's capacity to save and its motivation to save (Di et al., 2007). Rural and Province are all geographic control variables. Households living in rural area may exhibit quite different pattern in the wealth accumulation, compared with those in urban area.

3.2. Data and Methodology

All the data are collected from China Household Finance Survey (CHFS) in 2019. Households' net wealth (Wealth_all$_i$) is calculated by adding the value of private business, value of at most six housing units,[16] value of all automobiles owned, value of 12 categories of durable goods, value of luxury goods, account balance of checking, saving, stock, bond, fund, future, warrant, other derivatives, financial product, non-RMB assets, gold, cash, lending, and eliminating bank/other loans for private business, housing units, education, or any other loans.[17,18] Non-housing wealth is households' net wealth excluding all the wealth values and liabilities generated from housing.

The initial acquisition cost of housing is the total amount of acquisition cost from at most six housing units. All the acquisition costs are adjusted to the price level in 2019. Households can acquire the housing units from various sources. Besides purchasing housing units, households may build the housing by themselves, inherit from parents, or rent from the landlords. Therefore, the initial acquisition cost of housing units is not necessary to be the purchasing cost. Tables 4 and 5 summarize the definitions and the descriptive statistics of the variables.

The benchmark model (1) examines the impact of housing appreciation on households' wealth. To further check if the appreciation of housing values may enlarge China's wealth inequality, we use quantile regression to examine the different impacts of housing appreciation on households' wealth in different wealth levels. Furthermore, to correct sample bias, a Two-Part Model (TPM) is used to estimate model (2) since there is only a small portion of households conducting the investment. The first

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[16]For renters, value of housing units is set as zero.

[17]The durable goods include camera, BW/color TV, washing machine, refrigerator, air conditioner, computer, stereo, solar/electric water heater, furniture, satellite receiver, musical instruments and others. The luxury goods contain yacht/private plane, antiques, rare animals and plants, stamps/paintings/artwork, gold/silver/jewelry, and others. Bond includes treasure bills, local government bonds, financial bonds, corporate bonds, other bonds. Fund includes stock, bond, money market fund, hybrid, and other funds. Non-RMB assets contain foreign currency deposits, foreign notes/foreign currency, B shares, H shares, Bank forex products, non-bank forex products, foreign stocks/bonds, and others.

[18]Some variables contain negative values, such as net wealth and housing value changes. For such variable X to be log transformed, we first drop the lowest 1%, choose the minimum value a, where a is a negative or 0, then get the log transformation value by using $\ln(X - a + 1)$.

TABLE 4.

Variable Definitions

Variable	Definition
Dependent Variables	
Wealth_all$_i$	Log of household net wealth in 2019
Wealth_nohouse$_i$	Log of household non-housing wealth in 2019
Investchoices$_i$	Category variable, total number of financial assets' category that household has invested
Riskattitude$_i$	Investment attitude of household head
Checking$_i$	Log of total amount of household checking account
Saving$_i$	Log of total amount of household saving account
Riskyassets$_i$	Log of household's net risk assets
Stock$_i$	Log of total amount of stock held by household, including both listed stocks and unlisted stocks
InternetFP$_i$	Log of total amount of internet financial products held by household
BankFP$_i$	Log of total amount of bank financial products held by household
Fund$_i$	Log of funds held by household
Bond$_i$	Log of bonds held by household
Independent Variables	
Housing$_i$:	
Homeownership$_i$	1=household owns housing; 0=household owns no housing
Housing Appreciation$_i$	Log of household's housing value appreciation/depreciation
Housing Equity$_i$	Log of household's housing equity
Housing Value$_i$	Log of household's housing value
Loan$_i$	Log of household's total loan
Multi$_i$	1=household owns multi-housing; 0=household owns one housing unit or no housing
Commodity$_i$	1=any one of housing unit is a commodity housing; 0=none housing unit is a commodity housing
Gender$_i$	1=Male household Head; 0=Female household Head
Age$_i$	Age of household head in survey year
Age$_i^2$	The square of household head age in survey year
Education$_i$	Category variable, 1=no education; 2=elementary school; 3=middle school; 4=high school; 5=technical secondary school; 6=junior college; 7=college; 8=graduate with master degree; 9=graduate with PhD degree
Divorce$_i$	1=divorce; 0=others
Income$_i$	Log of household income
Migrant$_i$	1=migrant without local Hukou; 0=resident with local Hukou
Familysize$_i$	Total number of family members
Rural$_i$	1=household is in the rural area; 0=household is in the urban area
Province$_i$	Province dummies
East$_i$	1=Eastern province; 0=Middle, western, or northeast province
Middle$_i$	1=Middle province; 0=Eastern, western, or northeast province
West$_i$	1=Western province; 0=Eastern, Middle, or northeast province
Northeast$_i$	1=Northeast province; 0=Eastern, Middle, or western province

Note: Some variables contain negative values. For such variable X to be log transformed, we first drop the lowest 1%, choose the minimum value a, where a is a negative or 0, then get the log transformation value by using $\ln(X - a + 1)$.

TABLE 5.

Summary Statistics

	Obs.	Mean	Median	S.D.	Min	Max
Dependent Variables						
Wealth_all$_i$	34423	858720.5	277200	1868601	−25900000	117000000
Wealth_nohouse$_i$	34423	168451.5	32910	944,013	−33900000	103000000
Investchoices$_i$	34635	3.62	4	1.11	2	11
Riskattitude$_i$	28181	4.3	5	1.05	1	5
Checking$_i$	34642	21824.51	1000	91121	0	3000000
Saving$_i$	34642	20083.26	0	93332	0	2000000
Riskyassets$_i$	34632	29760.7	0	414880	−250000	71100000
Stock$_i$	34642	4583.04	0	48856	0	2000000
InternetFP$_i$	34,642	3692.39	0	30157	0	3100000
BankFP$_i$	34,642	14369.86	0	96264	0	2000000
Funds$_i$	34,641	1350.76	0	24854	0	2073517
Bond$_i$	34,641	346.23	0	12969	0	1000000
Independent Variables						
Housing$_i$:						
Homeownership$_i$	34642	0.86	1	0.34	0	1
Housing Appreciation$_i$	34285	888269.4	433166.9	1301378	54.96875	20500000
Housing Equity$_i$	34613	692386.4	200000	1435126	−13600000	22300000
Housing Value$_i$	34631	726531.3	200000	1484950	0	22500000
Loan$_i$	34597	51000.86	0	359864	0	40700000
Multi$_i$	34642	0.47	0	0.50	0	1
Commodity$_i$	34642	0.06	0	0.23	0	1
Gender$_i$	34642	0.75	1	0.43	0	1
Age$_i$	34630	57.37	57	13.71	14	102
Education$_i$	34603	3.35	3	1.62	1	9
Divorce$_i$	34622	0.03	0	0.17	0	1
Income$_i$	33494	83482.23	50922	205870	−5493190	12100000
Migrant$_i$	31026	0.05	0	0.22	0	1
Familysize$_i$	17142	3.03	3	1.52	1	15
Rural$_i$	33620	0.35	0	0.48	0	1
East$_i$	33620	0.37	0	0.48	0	1
Middle$_i$	33620	0.22	0	0.41	0	1
West$_i$	33620	0.30	0	0.46	0	1
Northeast$_i$	33620	0.11	0	0.31	0	1

Note: we report the statistics of raw values of the variables before logarithmic transformation.

part of the estimation uses probit regression to examine whether a housing appreciation increases the probability of household investing on a specific financial asset, while the second part uses the General Linear Model (GLM) regression to determine whether housing appreciation does significantly make households more risk tolerant and increase the magnitude of risky asset investments.

4. EMPIRICAL RESULTS

4.1.   The Impacts of Housing Appreciation on Household Wealth

The baseline model is designed to investigate the impact of housing appreciation on household total net wealth and non-housing net wealth, respectively. The OLS estimation results in Tables 6 and 7 show that, on average, the homeowners accumulate significantly more total wealth than the renters, especially those multiple-housing homeowners. We also find that no matter how housing value is defined, a higher housing value will increase the non-housing wealth of multiple-housing homeowners. However, for owner-occupied households, only housing appreciation can increase their non-housing wealth, while the effect of housing equity and housing values is statistically insignificant. Again, the positive wealth accumulation effect from housing appreciation is stronger for multiple-housing homeowners in all cases, indicating that multiple-housing homeowners may have different investment behaviors in response to housing value changes. The fact that housing appreciation consistently increases households' non-housing wealth may be attributed to the following facts. First, the rise of housing values allows homeowners to be more risk-tolerant, and invest more on risky assets. Second, housing is often used as collateral. A housing value appreciation increases the collateral value of housing, providing more credits for homeowners to invest more in financial markets and benefit more from the investments as well. We will further investigate this argument in the next section.

Most control variables have the expected sign, except that net wealth is lower when the household head is male. This may be due to that being a female household head challenges Patriarchy tradition of Eastern Asia, and such a female may be more aggressive in investment and more capable in making money. The life-cycle theory is only significant in the case of non-housing wealth. Moreover, the households with higher education and income levels tend to have more net wealth. Finally, rural households seem to have lower net wealth compared to urban households.

TABLE 6.

The Impacts of Housing Value Appreciation on Households' Wealth

OLS	Dependent Variable = Wealth_all$_i$			
Housing$_i$ =	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value
Housing$_i$	1.064***	0.776***	0.135***	0.134***
	(0.036)	(0.021)	(0.003)	(0.003)
Housing$_i$ × Multi$_i$	0.547***	0.024***	0.034***	0.033***
	(0.019)	(0.001)	(0.001)	(0.001)
Loan$_i$	0.000	0.004***	−0.004***	−0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
Commodity$_i$	0.153***	−0.074***	0.067***	0.070***
	(0.024)	(0.016)	(0.020)	(0.020)
Gender$_i$	−0.103***	−0.022*	−0.076***	−0.076***
	(0.015)	(0.011)	(0.013)	(0.013)
Age$_i$	0.004	0.000	−0.001	−0.000
	(0.003)	(0.003)	(0.003)	(0.003)
Age$_i^2$	−0.000	−0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Education$_i$	0.131***	0.067***	0.113***	0.113***
	(0.005)	(0.004)	(0.005)	(0.005)
Divorce$_i$	0.059	−0.044	0.082**	0.084**
	(0.041)	(0.028)	(0.036)	(0.036)
Income$_i$	0.270***	0.170***	0.246***	0.246***
	(0.013)	(0.010)	(0.012)	(0.012)
Migrant$_i$	−0.036	0.030	−0.006	−0.009
	(0.027)	(0.022)	(0.025)	(0.025)
Familysize$_i$	−0.010**	0.012***	−0.009**	−0.009*
	(0.005)	(0.004)	(0.004)	(0.004)
Rural$_i$	−0.442***	−0.172***	−0.377***	−0.377***
	(0.016)	(0.013)	(0.014)	(0.014)
Constant	9.807***	1.168***	9.564***	9.552***
	(0.186)	(0.269)	(0.165)	(0.166)
Province$_i$	Y	Y	Y	Y
Observations	11,206	11,017	11,203	11,206
R-squared	0.553	0.752	0.656	0.654

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively.

TABLE 7.

The Impacts of Housing Value Appreciation on Households' Non-Housing Wealth

OLS	Dependent Variable = Wealth_nohouse$_i$			
Housing$_i$ =	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value
Housing$_i$	−0.015	0.077***	0.004	0.003
	(0.034)	(0.015)	(0.003)	(0.003)
Housing$_i$ × Multi$_i$	0.135***	0.007***	0.010***	0.010***
	(0.026)	(0.002)	(0.002)	(0.002)
Loan$_i$	−0.001	−0.001	−0.002	−0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Commodity$_i$	−0.018	−0.042	−0.030	−0.029
	(0.038)	(0.038)	(0.038)	(0.038)
Gender$_i$	0.022	0.024	0.024	0.024
	(0.023)	(0.023)	(0.023)	(0.023)
Age$_i$	0.017***	0.017***	0.016***	0.016***
	(0.005)	(0.005)	(0.005)	(0.005)
Age$_i^2$	−0.000***	−0.000***	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Education$_i$	0.024***	0.017**	0.023***	0.023***
	(0.007)	(0.007)	(0.007)	(0.007)
Divorce$_i$	0.024	0.013	0.029	0.029
	(0.060)	(0.059)	(0.059)	(0.059)
Income$_i$	0.186***	0.170***	0.184***	0.184***
	(0.020)	(0.019)	(0.020)	(0.020)
Migrant$_i$	−0.015	0.000	−0.014	−0.013
	(0.039)	(0.038)	(0.039)	(0.039)
Familysize$_i$	−0.008	−0.002	−0.008	−0.008
	(0.009)	(0.009)	(0.009)	(0.009)
Rural$_i$	−0.080***	−0.064**	−0.082***	−0.081***
	(0.028)	(0.027)	(0.027)	(0.027)
Constant	10.559***	9.662***	10.564***	10.570***
	(0.261)	(0.313)	(0.260)	(0.260)
Province$_i$	Y	Y	Y	Y
Observations	3,726	3,639	3,719	3,726
R-squared	0.154	0.158	0.157	0.156

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively.

4.2.   The Impacts of Housing Appreciation on Households' Risk Attitude

We examine whether owning a house or housing appreciation increases households' risk tolerance on investment and further accumulates more wealth. The summarized results in Table 8 clearly indicate that multiple-housing homeowners tend to be more risk-tolerant on investment than the renters and the households who own only one house. The latter two have similar risk tolerance levels. Similarly, the increase of housing values tends to make multiple-housing homeowners become more risk-taking on investment. There are several possible explanations. The multiple-housing homeowners tend to benefit more from the housing appreciation and experience greater wealth effects. Moreover, multiple-housing homeowners are more likely to regard housing as investment goods, willing to take a greater risk to collateralize houses for loans to do other productive investments. The households who own only one house are usually more conservative since that one house they have are usually the owner-occupied housings.

TABLE 8.

The Impacts of Housing Value Appreciation on Households' Risk Attitude

OLS	Dependent Variable = Riskattitude$_i$			
Housing$_i$ =	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value
Housing$_i$	−0.036	−0.045***	−0.005**	−0.004*
	(0.028)	(0.015)	(0.002)	(0.002)
Housing$_i$ × Multi$_i$	−0.059**	−0.004**	−0.005**	−0.005**
	(0.027)	(0.002)	(0.002)	(0.002)
Control$_i$	Y	Y	Y	Y
Province$_i$	Y	Y	Y	Y
Observations	11,748	11,555	11,711	11,748
R-squared	0.146	0.145	0.146	0.146

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively.

4.3.   The Impacts of Housing Appreciation on Financial Market Investments

We use a two-part model to examine whether homeowners invest more on financial assets, especially risky financial assets, in response to a housing appreciation. The first part of the model is estimated by probit regression, examining the determinants that may affect a household's investment decision on financial assets. The second part is estimated by the GLM regression, testing how housing value changes affect the number of households' investment choices. The results in Table 9 indicate that the homeown-

ers, especially the multiple-housing homeowners, are more likely to invest more on financial assets, compared to the renters. The rise of housing values, no matter which definition we use, increases households' willingness to invest, and also extends the number of households' investment choices significantly.

TABLE 9.

The Impacts of Housing Value Appreciation on Households' Investment Choices

Two-Part	The Estimated Coefficients for $Housing_i$ and Its Interaction Term							
Model	$Housing_i =$	Homeownership Dummy		Housing Appreciation		Housing Equity		Housing Value	
Dependent Var.		Part I	Part II	Part I	Part II	Part I	Part II	Part I	Part II
$Investchoices_i$	$Housing_i$	0.108**	0.021	0.101***	0.138***	0.014***	0.007***	0.015***	0.006***
		(0.044)	(0.023)	(0.027)	(0.014)	(0.003)	(0.002)	(0.003)	(0.002)
	$Housing_i \times Multi_i$	0.260***	0.191***	0.020***	0.011***	0.018***	0.014***	0.019***	0.014***
		(0.056)	(0.023)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.002)
	Observations	14,476	12176	14,231	14231	14,427	12136	14,476	12176
	Pseudo R^2	0.2279		0.228		0.2291		0.2289	
$Saving_i$	$Housing_i$	0.090***	0.176**	0.020	0.175***	0.010***	0.025***	0.010***	0.025***
$+Checking_i$		(0.035)	(0.072)	(0.019)	(0.034)	(0.003)	(0.005)	(0.003)	(0.005)
	$Housing_i \times Multi_i$	0.198***	0.297***	0.014***	0.017***	0.013***	0.020***	0.013***	0.020***
		(0.036)	(0.059)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
	Observations	14481	8909	14236	8753	14432	8887	14481	8909
	Pseudo R^2	0.1005		0.099		0.1009		0.1008	
$Riskyasset_i$	$Housing_i$	0.042	0.159	0.135***	0.354***	0.013***	0.029***	0.012***	0.028***
		(0.038)	(0.099)	(0.021)	(0.047)	(0.003)	(0.008)	(0.003)	(0.007)
	$Housing_i \times Multi_i$	0.200***	0.628***	0.012***	0.037***	0.014***	0.045***	0.014***	0.045***
		(0.037)	(0.078)	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)	(0.006)
	Observations	14,469	6571	14,225	6452	14,420	6553	14,469	6571
	Pseudo R^2	0.254		0.2563		0.2561		0.255	

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively. All the regressions include the control variables and province fixed effects as the benchmark model (see Table 6), but not report for brevity.

We further classify the financial assets into safe assets, i.e., savings and checking, and risky assets, i.e., stock, financial products, bond, fund, and etc. The results show that homeowners are more likely to save, and do save significantly more compared to renters. This corresponds to the theory that homeowners tend to save more to repay mortgages. Interestingly, homeowners also save more in response to housing value increases. This may be due to that households who benefit more from the housing appreciation have more incentive to save for buying more houses. With respect to risky asset investments, multiple-housing homeowners have significantly

more investment on risky assets compared to the others, even though owning a house itself has significantly increased the willingness to do the risky asset investment. Moreover, homeowners have significantly increased both of their likelihood and the investment magnitude on risky assets in response to a housing value appreciation no matter which definition of housing values we use. Multiple-housing homeowners have even higher investment on risky assets than single-housing homeowners.

TABLE 10.

The Impacts of Housing Value Appreciation on Households' Investment on Other Financial Assets

Two-Part Model	Housing$_i$ =	The Estimated Coefficients for Housing$_i$ and Its Interaction Term							
		Homeownership Dummy		Housing Appreciation		Housing Equity		Housing Value	
Dependent Var.		Part I	Part II	Part I	Part II	Part I	Part II	Part I	Part II
Stock$_i$	Housing$_i$	−0.083	−0.079	0.193***	0.159	0.002	0.002	0.002	0.002
		(0.079)	(0.229)	(0.036)	(0.121)	(0.006)	(0.017)	(0.006)	(0.017)
	Housing$_i$ × Multi$_i$	0.339***	0.283	0.016***	0.014	0.023***	0.022*	0.023***	0.022*
		(0.062)	(0.185)	(0.005)	(0.016)	(0.004)	(0.013)	(0.004)	(0.013)
	Observations	14,176	458	13,938	449	14,130	458	14,176	458
	Pseudo R^2	0.2705		0.2787		0.2703		0.2705	
InternetFP$_i$	Housing$_i$	0.033	0.110	0.099***	0.046	0.011***	0.016***	0.011***	0.016***
		(0.038)	(0.080)	(0.020)	(0.035)	(0.003)	(0.006)	(0.003)	(0.006)
	Housing$_i$ × Multi$_i$	0.169***	0.404***	0.010***	0.031***	0.011***	0.030***	0.011***	0.029***
		(0.036)	(0.064)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.005)
	Observations	14481	6232	14236	6120	14432	6215	14481	6232
	Pseudo R^2	0.2397		0.2416		0.2413		0.2404	
BankFP$_i$	Housing$_i$	0.075	0.021	0.171***	0.085*	0.013***	0.005	0.014***	0.007
		(0.064)	(0.138)	(0.030)	(0.050)	(0.005)	(0.010)	(0.005)	(0.010)
	Housing$_i$ × Multi$_i$	0.247***	0.302***	0.011***	0.018***	0.016***	0.019***	0.016***	0.020***
		(0.050)	(0.089)	(0.004)	(0.007)	(0.004)	(0.006)	(0.004)	(0.006)
	Observations	14481	892	14236	872	14432	891	14481	892
	Pseudo R^2	0.2424		0.2465		0.2434		0.2437	
Fund$_i$	Housing$_i$	0.109	0.203	0.216***	−0.029	0.016*	0.023	0.015*	0.023
		(1.000)	(0.477)	(0.045)	(0.160)	(0.009)	(0.031)	(0.009)	(0.031)
	Housing$_i$ × Multi$_i$	0.080	0.363	−0.001	0.028	0.005	0.021	0.005	0.021
		(1.003)	(1.482)	(0.006)	(0.018)	(0.006)	(0.016)	(0.006)	(0.016)
	Observations	14,131	201	13,887	195	14,083	201	14,131	201
	Pseudo R^2	0.2126		0.2221		0.2141		0.2142	

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively. All the regressions include the control variables and province fixed effects as the benchmark model (see Table 6), but not report for brevity.

4.4. The Impacts of Housing Appreciation on Specific Financial Assets

To further check which financial risky assets that households choose to invest and increase their investment magnitude after housing value changes, we again apply two-part model on investment instruments, which are commonly chosen by Chinese households, i.e., stocks, internet financial products, bank financial products, and mutual funds. The summarized results in Table 10 show that only small portion of Chinese households have invested on risky assets. The first part estimation indicates that the rise of housing values significantly increases households' probability to invest on these risky assets, and this positive effect is even more significant for multi-housing homeowners. While the second part estimations suggest that Chinese households have significantly increased their stock market investment in response to a rise of housing equity and housing value, they have significantly increased their financial product investment as well in response to a rise of housing appreciation. Even though homeowners have more incentive to invest in mutual funds in response to housing value increases, the magnitude of mutual fund investment is not affected by housing value changes. Compared to homeowners with only one house, multiple-housing homeowners seem to invest more on stocks and financial products, including the internet and bank financial products, in response to housing value increases.[19]

4.5. The Impacts of Housing Appreciation on Wealth Inequality

To examine how the housing value change contributes to wealth inequality, we apply quantile regression to the baseline model. The results in Table 11 show that the effects of homeownership and housing value changes have uneven impacts on household total net wealth. Owning a single house or housing appreciation from the single house has contributed more wealth effects for the poor, mitigating wealth inequality. The result is consistent with the past finding that home equity is more equally distributed than most other major components of household net worth. However, the wealth accumulation effects resulted from a housing value change for multiple-housing homeowners are totally opposite. Being a multiple-housing homeowner or a housing value change from multiple-housing contributes more total wealth for the rich, worsening wealth inequality. To find out the reasons, we further examine how the housing value change contributes to non-housing wealth. The results suggest that the housing appreciation has a greater positive impact on non-housing wealth. As households get

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[19]We do not report the results for bond investment because the available number of observations in the second part estimation is less than 40, which may bias the results.

wealthier, these positive effects are stronger for multiple-housing home-owners. Using other housing value definitions, we find that the results are only significant for multiple-housing homeowners. This is again consistent with our previous findings that multiple-housing homeowners tend to have higher risk-tolerance on investment, and may accumulate more non-housing wealth from investing more in financial markets.

TABLE 11.

The Impacts of a Housing Value Appreciation on Stratified Households' Wealth and Non-Housing Wealth

Quantile Regression	Dependent Variable = $Wealth\_all_i$				Dependent Variable = $Wealth\_nohouse_i$			
	20%	40%	60%	80%	20%	40%	60%	80%
	$Housing_i$ = Homeownership Dummy							
$Housing_i$	1.071***	1.071***	1.011***	0.988***	−0.009	−0.019	−0.013	−0.082
	(0.044)	(0.040)	(0.040)	(0.049)	(0.023)	(0.033)	(0.047)	(0.066)
$Housing_i \times Multi_i$	0.494***	0.569***	0.568***	0.582***	0.041***	0.090***	0.143***	0.257***
	(0.024)	(0.022)	(0.022)	(0.027)	(0.015)	(0.022)	(0.031)	(0.044)
Observations	11,206	11,206	11,206	11,206	3,726	3,726	3,726	3,726
Pseudo R^2	0.268	0.327	0.364	0.392	0.0449	0.0716	0.0937	0.116
	$Housing_i$ = Housing Appreciation							
$Housing_i$	1.104***	0.991***	0.885***	0.744***	0.040***	0.065***	0.078***	0.104***
	(0.008)	(0.008)	(0.008)	(0.012)	(0.009)	(0.012)	(0.017)	(0.024)
$Housing_i \times Multi_i$	0.011***	0.016***	0.019***	0.022***	0.002*	0.004***	0.008***	0.014***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
Observations	11,017	11,017	11,017	11,017	3,639	3,639	3,639	3,639
Pseudo R^2	0.531	0.555	0.561	0.553	0.0472	0.0748	0.0974	0.122
	$Housing_i$ = Housing Equity							
$Housing_i$	0.619***	0.316***	0.150***	0.128***	0.001	0.003	0.003	0.002
	(0.001)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)
$Housing_i \times Multi_i$	0.011***	0.026***	0.033***	0.034***	0.003***	0.006***	0.010***	0.019***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
Observations	11,203	11,203	11,203	11,203	3,719	3,719	3,719	3,719
Pseudo R^2	0.471	0.436	0.448	0.458	0.0454	0.0728	0.0950	0.117
	$Housing_i$ = Housing Value							
$Housing_i$	0.593***	0.287***	0.149***	0.127***	0.001	0.002	0.003	0.002
	(0.001)	(0.004)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.005)
$Housing_i \times Multi_i$	0.011***	0.027***	0.033***	0.034***	0.003***	0.006***	0.010***	0.019***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.003)
Observations	11,206	11,206	11,206	11,206	3,726	3,726	3,726	3,726
Pseudo R^2	0.459	0.431	0.446	0.457	0.0454	0.0725	0.0947	0.116

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively. All the regressions include the control variables and province fixed effects as the benchmark model (see Table 6), but not report for brevity.

TABLE 12.

The Impacts of a Housing Value Appreciation on Stratified Households'
Wealth and Non-Housing Wealth—By Different Regions

OLS	Dependent Variable = Wealth_all$_i$				Dependent Variable = Wealth_nohouse$_i$			
Housing$_i$ =	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value
				Eastern Region				
Housing$_i$	1.399***	0.780***	0.148***	0.147***	−0.029	0.067***	0.002	0.002
	(0.055)	(0.033)	(0.004)	(0.004)	(0.053)	(0.020)	(0.004)	(0.004)
Housing$_i$ × Multi$_i$	0.542***	0.019***	0.031***	0.031***	0.061	0.002	0.005*	0.005*
	(0.031)	(0.002)	(0.002)	(0.002)	(0.038)	(0.003)	(0.003)	(0.003)
Observations	4,204	4,115	4,204	4,204	1,751	1,751	1,751	1,751
R2	0.596	0.798	0.702	0.700	0.168	0.169	0.169	0.168
				Middle Region				
Housing$_i$	0.770***	0.752***	0.114***	0.114***	0.045	0.050	0.007	0.007
	(0.050)	(0.040)	(0.006)	(0.006)	(0.053)	(0.034)	(0.004)	(0.004)
Housing$_i$ × Multi$_i$	0.522***	0.026***	0.034***	0.033***	0.153***	0.009**	0.011***	0.011***
	(0.034)	(0.002)	(0.002)	(0.002)	(0.052)	(0.004)	(0.004)	(0.004)
Observations	2,709	2,679	2,708	2,709	807	795	806	807
R2	0.391	0.613	0.507	0.506	0.086	0.088	0.089	0.090
				Western Region				
Housing$_i$	0.756***	0.767***	0.127***	0.125***	0.066	0.149***	0.012**	0.011**
	(0.066)	(0.030)	(0.008)	(0.007)	(0.066)	(0.033)	(0.005)	(0.005)
Housing$_i$ × Multi$_i$	0.553***	0.030***	0.035***	0.034***	0.164***	0.009**	0.012***	0.012***
	(0.033)	(0.002)	(0.002)	(0.002)	(0.052)	(0.004)	(0.004)	(0.004)
Observations	3,229	3,170	3,227	3,229	895	873	891	895
R2	0.417	0.642	0.534	0.529	0.109	0.133	0.116	0.115
				Northeastern Region				
Housing$_i$	0.462***	0.813***	0.100***	0.099***	−0.216**	0.067	−0.01	−0.011
	(0.122)	(0.064)	−0.013	−0.013	(0.105)	(0.068)	(0.009)	(0.009)
Housing$_i$ × Multi$_i$	0.620***	0.031***	0.044***	0.043***	0.489***	0.030***	0.037***	0.037***
	(0.064)	(0.004)	−0.004	−0.004	(0.099)	(0.007)	−0.007	−0.007
Observations	1,064	1,053	1,064	1,064	273	269	272	273
R2	0.426	0.598	0.517	0.514	0.365	0.333	0.365	0.364

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively. All the regressions include the control variables and province fixed effects as the benchmark model (see Table 6), but not report for brevity.

In general, our empirical work provides evidence that growing housing values benefit the wealthier households in accumulating more non-housing wealth than the poor, enlarging wealth inequality in China. This phenomenon is more significant for multiple-housing homeowners. However,

owning a house does have equalized effect on household total wealth, off-setting part of wealth inequality from non-housing wealth.

4.6.   Robustness Checks: Regional Effects and Urban-Rural Areas

To check the potential uneven impacts of housing value appreciation in different regions, we rerun the regressions by dividing the full sample into the east, the middle, the west, and the northeast. The results in Table 12 indicate that being a homeowner or a housing value increase, in general, has a significant positive impact on household net wealth no matter which regional sample is used. However, in the case of non-housing wealth, this finding only applies for multiple-housing homeowners, especially in the east, the middle, and the northeast regions. For the western region, the rise of housing value increases households' non-housing wealth, regardless they being single- or multiple-housing homeowners.

TABLE 13.

The Impacts of a Housing Value Appreciation on Stratified Households'
Wealth and Non-Housing Wealth—By Urban-Rural Areas

OLS	Dependent Variable = Wealth_all$_i$				Dependent Variable = Wealth_nohouse$_i$			
Housing$_i$ =	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value	Homeownership Dummy	Housing Appreciation	Housing Equity	Housing Value
	Urban Area							
Housing$_i$	1.124***	0.822***	0.129***	0.128***	−0.018	0.078***	0.003	0.003
	(0.038)	(0.015)	(0.003)	(0.003)	(0.036)	(0.016)	(0.003)	(0.003)
Housing$_i$ × Multi$_i$	0.607***	0.023***	0.037***	0.037***	0.147***	0.007***	0.011***	0.011***
	(0.022)	(0.001)	(0.001)	(0.001)	(0.028)	(0.002)	(0.002)	(0.002)
Observations	7,973	7,852	7,970	7,973	3,115	3,049	3,110	3,115
R2	0.545	0.769	0.647	0.644	0.155	0.158	0.158	0.157
	Rural Area							
Housing$_i$	0.420***	0.592***	0.184***	0.184***	0.000	0.078**	0.012	0.012
	(0.103)	(0.067)	(0.017)	(0.017)	(0.102)	(0.039)	(0.009)	(0.009)
Housing$_i$ × Multi$_i$	0.386***	0.026***	0.022***	0.021***	0.075	0.005	0.005	0.005
	(0.034)	(0.002)	(0.002)	(0.002)	(0.063)	(0.005)	(0.005)	(0.005)
Observations	3,233	3,165	3,233	3,233	611	590	609	611
R2	0.257	0.454	0.446	0.445	0.131	0.131	0.135	0.135

Note: Standard errors are reported in brackets. *, **, and *** indicated the significance level of 10%, 5%, and 1%, respectively. All the regressions include province fixed effects and all the control variables as the benchmark model (see Table 6), except dummy variable for rural area. The results for those controls are not report for brevity.

We further divide the full sample into urban and rural areas. The overall results remain robust and are summarized in Table 13. It indicates that a housing value increase contributes to net wealth significantly. The results are robust in both urban and rural areas. Moreover, no matter which

definition of housing values is used, the rise of housing values has greater impacts on the non-housing wealth of multiple-housing households in urban area. However, this finding is less significant in rural area.

5. CONCLUSIONS

This paper examines how homeownership and housing value appreciation contribute to household wealth accumulation. We attempt to investigate the investment channel through which housing value appreciation may raise households' risk-tolerance on investment, increase the collateral value of housing, and allow households better access to financial markets. This paper also focuses on the question whether this investment channel may benefit the wealthier group more and deteriorate wealth inequality.

Using the China's CHFS data in 2019, we find that both homeownership and housing value appreciation have significant and positive effects on household total net wealth and non-housing wealth. This wealth contribution effect is even stronger for multiple-housing homeowners. Moreover, our works do provide empirical evidence of the existence of investment channel resulted from housing value appreciation. The results show that the rise of housing values allows homeowners to invest on more kinds of financial assets as well as increase investment position on both safe assets and risky assets. With respect to risky assets, Chinese homeowners tend to invest more in stock and financial product markets in response to housing value increases. Furthermore, the stratified analysis indicates that non-housing wealth has contributed the significant part of China's wealth inequality. Housing value appreciation has a greater positive impact on non-housing wealth for wealthier households, and this uneven wealth effect is more significant for multiple-housing homeowners.

Our findings are consistent with asset-induced inequality. Housing value appreciation may raise households' risk-tolerance on investment from wealth effect. The housing, after housing value appreciation, can be refinanced to pay for financial market investment, allowing households to benefit more from risky market premium. Therefore, we find that housing value appreciation increases households' likelihood to invest, extends investment channels, and increases their investment positions on both safe and risky assets. This may enlarge wealth inequality, as wealthier households tend to own more houses and benefit more from a housing boom. The empirical evidence can also be used to explain the wealth inequality status in China. According to our calculation based on CHFS data of 2019, China's Gini coefficient for household income is as high as 0.58, while the Gini coefficient for household net wealth is even worse, reaching 0.71. Income inequality is not the only contributor to wealth inequality in China. Further exploration on Chinese households' asset portfolio reveals that housing asset accounts

for the largest share of total household wealth for the homeowners. These stylized facts shed light on the possibility that the extraordinary housing value appreciation in the past decades may be a significant contributor to the rising wealth inequality in China during the same period.

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