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ABSTRACT

Hukou Status, Housing Tenure Choice and Wealth Accumulation in Urban China*

In Chinese cities, migrants with rural hukou, compared to residents with local urban hukou, face more uncertainty, have limited access to mortgage finance, and are less eligible for low-cost housing. A simple model demonstrates that for these reasons, rural- to-urban migrants are less likely to own housing units in cities and as a result accumulate less wealth. Our empirical analysis examines a nationally representative household survey from 2013 and uses mother's hukou status as an instrumental variable. We find that household heads with rural hukou are about 20 percentage points less likely to own housing units in cities than comparable household heads with local urban hukou. Consequently, the average household head with a rural hukou owns 310 thousand yuan less housing wealth and 213 thousand yuan less total wealth than comparable household heads with local urban hukou. The average household head with a rural hukou has 286 thousand yuan less in housing capital gains than comparable household heads with local urban hukou. Moreover, we find that these differences are much larger in the first- and second-tier cities, cities with more stringent hukou regulations, and among younger cohorts.

JEL Classification: R0, R2, H0

Keywords: hukou, tenure choice, wealth, Chinese economy

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1 Introduction

The household registration (hukou) system is one of the most important institutional arrangements in modern China. Its effects on individual behaviors and outcomes have been studied extensively, especially in terms of human capital investment, welfare access, and labor market outcomes. In this paper, we propose a new approach and examine the effect of hukou status on decisions and outcomes in the urban housing market.

In the past few decades, China's urbanization has had two salient features. First, there has been a massive rural-to-urban migration (Xing and Zhang 2017). Hundreds of millions of rural people moved to cities without being able to convert their hukou status. As a result, in any Chinese city today, a large number of urban residents still have rural hukou, which has a wide range of implications about their access to local services and opportunities. Second, China's urban housing market has experienced a rapid price appreciation (Fang et al. 2016). Nationally, the average residential housing price increased from 1,948 to 7,614 yuan per square meter from 2000 to 2017, and this growth was much faster in larger cities.[1] Thus owning housing properties has become the most important way of accumulating household wealth for urban families in China.

We argue that for three key reasons, urban residents with rural hukou are less likely to become homeowners than comparable residents with local urban hukou. First, rural hukou status implies higher uncertainty, which is a result of job instability for adults, a lack of educational resources for their children, and limited access to social benefits. Second, rural hukou status implies limited access to subsidized mortgage loans. Third, rural hukou status implies limited access to subsidized home ownership opportunities that are available to residents with local urban hukou. We propose a simple model to clarify the conditions under which all three reasons lead to a lower probability of becoming a homeowner and in turn accumulating less wealth.

We use the 2013 China Household Finance Survey (CHFS) data to estimate the effect of hukou status on housing tenure choice and household wealth. Although not easy to accomplish, there are some ways to covert hukou status. Thus one might be concerned that an urban resident's hukou status reflects unobserved ability or motivation that is correlated with our outcome

[1] Average housing price data is from the National Bureau of Statistics (see http://data.stats.gov.cn/easyquery.htm?cn=C01).

variables. To mitigate potential bias, we use the mother's hukou status as an instrumental variable (IV) for an individual's hukou status, taking advantage of the hukou policy that a person inherits the hukou status of his or her mother. Our IV results show that after controlling for a set of individual and household-level characteristics, the probability of owning a housing unit in cities for urban household heads with rural hukou is about 20 percentage points lower than that for urban household heads with local urban hukou. The average net housing wealth and average net total wealth of household heads with rural hukou are 310 thousand yuan and 213 thousand yuan lower than those of comparable household heads with local urban hukou, respectively. The average household head with a rural hukou has 286 thousand yuan less in housing capital gains than comparable household heads with local urban hukou. These differences are larger in the first- and second-tier cities, in cities with more stringent hukou regulations, and among younger cohorts.

This paper contributes to three strands of literature. First, it contributes to the literature on housing demand. A large body of research on housing demand focuses on how income uncertainty affects tenure choice. In the early theoretical work, Desalvo and Eeckhoudt (1982) and Turnbull et al. (1991) show that a higher income uncertainty reduces housing demand. Consistent with the theoretical prediction, subsequent empirical research generally finds that more income uncertainty reduces housing demand and the probability of becoming homeowners (Haurin and Gill 1987; Haurin 1991; Robst et al. 1999; Diaz-Serrano 2005a, 2005b; Shore and Sinai 2010; Gathergood 2011). These existing studies use a variety of measures of income uncertainty, including the share of the female spouse's earnings in family income (Haurin and Gill 1987), the variability of residual income from the earnings equation (Haurin 1991; Robst et al. 1999; Diaz-Serrano 2005a, 2005b), the probability of becoming unemployed (Gathergood 2011), and whether a married couple has the same occupation (Shore and Sinai 2010). Unlike the previous research, we employ a unique institutional factor in China, the hukou system, to measure uncertainty. Because one's hukou status is related to access to secure jobs, public schools, and social welfare, rural hukou workers are highly unsure whether they can continue to live in the cities in the future. We take advantage of this unique source of uncertainty and examine its impact on housing tenure choices in cities.

Second, this paper contributes to the wealth inequality literature. Rising wealth inequality has been an important social problem around the world and has attracted much scholarly attention (Piketty 2014). A large body of literature addresses the wealth inequality issue in developed

countries, including the U.S. (Castaneda et al. 2003; Kopczuk 2015; Kaymak and Poschke 2016; Saez and Zucman 2016), Denmark (Boserup et al. 2016), and Sweden (Lundberg and Waldenström 2018). Since the market-oriented reforms in 1978, wealth inequality in China has been rising too. According to Piketty et al. (2019), the top 10% of people in the wealth distribution in China owned 40% of the total wealth in 1995, and this number had risen to 67% in 2015. Meng (2007) finds that party membership helps households accumulate wealth. By decomposing the Gini coefficient, Li and Wan (2015) conclude that net housing wealth explains a large part of the rising wealth inequality in urban China. However, little is known about how and to what extent the hukou system affects the wealth inequality in urban areas. Our results suggest that hukou status contributes to wealth inequality through its impact on homeownership. That is, rural hukou workers have lower homeownership rates in cities and thus they accumulate less wealth amidst the background of rapid housing price appreciation.

Third, our study adds to the literature about the socio-economic consequences of hukou. Existing studies have found that the hukou policy leads to low educational attainment among the rural population (Liu 2005) and low cognitive task performance of rural migrant students (Afridi et al. 2015). It also creates wage discrimination in the labor market (Meng and Zhang 2001; Démurger et al. 2009; Meng 2012; Zhu 2016; Zhang et al. 2016; Boffy-Ramirez et al. 2018), hinders labor mobility (Bosker et al. 2012), and causes productivity losses (Au and Henderson 2006). Our research provides insight into how the hukou policy affects households' housing tenure choice and in turn, wealth inequality in urban China.[2]

The paper is structured as follows: Section 2 details the institutional context of this study. Section 3 presents the theoretical model of housing tenure choice. Section 4 describes the data and empirical specifications. Section 5 presents empirical results. The final section concludes.

2 Institutional Context

The household registration (hukou) system began in China in 1958. At that time, under the planned economy, the government provided rationed food, jobs, low-rent public housing units,

[2] Whereas previous studies have examined how hukou status is related to housing demand and tenure choice (e.g., Cao et al. 2018; Chen 2016; Coulson and Tang 2013; Huang and Clark 2002), our focus on its ensuing effect on wealth accumulation is a new perspective.

and medical and pension welfare to state employees in urban areas. Rural residents did not receive these benefits. Thus, the standard of living gap between urban and rural areas was large. As a result, rural residents had a strong incentive to move to cities to look for jobs. However, the resources in cities were limited; there was a lack of food and jobs for rural migrants. Also, the government wanted to tie rural people to the land so as to provide cheap agricultural products to develop the urban industrial sector (Chan 2009). In this setting, the government introduced the hukou system to curb rural-to-urban migration.

The hukou system categorizes each person by hukou type and hukou registration place. There are two types of hukou: agricultural (rural) hukou and non-agricultural (urban) hukou. Each person's hukou is registered in a specific place, such as a town or a village. In the early stages of the hukou policy, people with rural hukou could only stay in rural areas and participate in agricultural work. Rural residents had to apply for migration certificates to work in cities, which was a difficult process. It was even harder to change one's hukou type. According to the policy, people inherit their mothers' hukou type when they are born. To change from rural to urban hukou, one had to become a formal state employee. For a long time, the hukou system played an important role in welfare distribution and curbing city population growth (Cheng and Selden 1994; Chan and Zhang 1999).

The government began economic reforms in the 1980s. The subsequent economic growth in cities created more job opportunities and increased labor demand, especially in the manufacturing sector in the coastal regions. Moreover, the increase in productivity in the agricultural sector created a surplus of rural workers, who were eager to seek higher-wage jobs in cities. Therefore, the government started the hukou reform and gradually loosened the original limits on internal migration. Today, people have the freedom to migrate to cities. Getting an urban hukou is easier now. In some cities, people can obtain local urban hukou by college admission, urban employment, or purchasing housing properties. However, obtaining an urban hukou in large cities, such as Beijing and Shanghai, is still difficult.

Despite the substantial reform in the hukou system over time, urban residents with rural hukou are still treated differently from those with local urban hukou. Here we stress three aspects of hukou policies that discriminate against rural hukou holders, which have implications for individual choices in the housing market. *First, urban residents with rural hukou face a higher*

degree of uncertainty, which is reflected in their lack of job security and their limited access to educational resources and social welfare in cities. In every city, well-paying and stable jobs in the state sector are reserved for residents with local urban hukou. Migrants with rural hukou are much more likely to hold jobs in informal sectors or stay self-employed. When a city experiences a negative shock to the local economy, workers with rural hukou almost always get laid off first. Moreover, rural migrants have limited access to the subsidized urban healthcare system and their children have no or limited access to urban public schools (Song 2014). As a result, many of these migrants may need to quit their jobs when their children reach school age or one of the family members becomes seriously ill. For these reasons, rural migrants usually make temporary living and working arrangements in cities.

Second, urban residents with rural hukou have limited access to low-cost housing properties. China did not have a nation-wide urban housing market until the late 1990s. Before that, most urban residents did not own housing properties; they lived in housing units provided by employers and paid low rents, which was essentially an employment benefit. When China started to privatize housing, most employers charged a below-market price and transferred ownership to employees who were occupying their housing units (Wang and Murie 1996). This opportunity of subsidized homeownership was only available to residents with local urban hukou. Meanwhile, many urban neighborhoods were redeveloped. Existing residents were temporarily relocated with a promise to be able to move back and buy some properties at a below-market price. This is also mostly available to residents with local urban hukou. In addition, as housing prices rose rapidly, many cities provided affordable housing units to low-income residents, which is again mostly available to residents with local urban hukou. Thus, with limited access to low-cost housing, migrants with rural hukou essentially face higher housing prices in cities.

Third, urban residents with rural hukou face higher mortgage rates. As part of the national housing reform plan in 1994, the Chinese government introduced a mandatory savings program called the Housing Provident Fund to help urban employees purchase housing units. Under this program, each employee has a personal Housing Provident Fund account. Both employees and employers are contributing to employees' personal Housing Provident Fund accounts on a monthly basis. The contribution rate varies from 5% to 12% of an employee's earnings. In general, the contribution rate is higher among government institutions and state companies. As a mandatory

savings program, employees are able to earn interest from their personal Housing Provident Fund accounts, but the interest rate for savings is very low. The primary benefit of having a Housing Provident Fund account is related to housing mortgages. After contributing to the Housing Provident Fund for a certain period (for example, 12 months in Beijing), individuals can apply for Housing Provident Fund mortgages using money from their Housing Provident Fund accounts to make the monthly mortgage payments. The Housing Provident Fund mortgage interest rate is 3.25% (for mortgage length greater than 5 years) in 2019, which is decided by the central bank and is about two percentage points lower than the interest rates of commercial mortgages. At present, the government requires all government institutions, state companies, and private companies to provide the Housing Provident Fund to their employees. While in principle every urban employee should have access to this fund, in reality many rural hukou workers in cities do not receive this benefit (Burell 2006). This implies that urban residents with rural hukou have to borrow from commercial banks and pay higher mortgage rates when purchasing housing properties.

3 A Model of Housing Tenure Choice

In this section, we build a housing tenure choice model to show that urban residents with rural hukou tend to have lower homeownership rates and less wealth because they face higher uncertainty, higher housing prices, and higher mortgage interest rates. Our model is based on the dual role of housing: As a consumption good, housing provides shelter and a safe place to live; as an investment good, housing is an important component of a household's portfolio.[3] A consumer's housing tenure choice depends on the magnitude of housing investment demand relative to housing consumption demand (Henderson and Ioannides 1983; Fu 1991; Ioannides and Rosenthal 1994).

Following Ioannides and Rosenthal (1994), we use Figure 1 to illustrate a household's tenure choice in different situations. The y-axis represents both housing consumption and investment demand. For simplification, we assume that each consumer consumes one unit of housing. The x-axis represents variables that together impact housing investment demand, which

[3] This has long been recognized by economists. See, for example, Henderson and Ioannides 1983; Rothenberg 1983; Brueckner 1997; Arrondel and Lefebvre 2001; Flavin and Yamashita 2002; Cocco 2005; Chetty et al. 2017.

we refer to as employment uncertainty.[4] Figure 1 assumes that housing investment decreases with the degree of uncertainty, which we will prove rigorously later in this section. From right to left, the figure shows four different cases. In Case I, consumers face a high degree of uncertainty and hence have a low level of housing investment demand. They satisfy their housing consumption by renting homes. In Case II, consumers' housing investment demand rises but is much lower compared to their housing consumption demand. They still rent homes for consumption but at the same time they also invest in housing. They rent out the housing units they purchased to other consumers and collect rents. In Case III, consumers' housing investment demand is close to their housing consumption demand. Consequently, they become owner-occupiers with one housing unit. In Case IV, consumers' housing investment demand far exceeds housing consumption demand. They invest in multiple housing units, occupy part of them, and rent out the remaining units to tenants. Thus overall, higher investment demand implies a higher probability of becoming a homeowner.

Following Desalvo and Eeckhoudt (1982), we assume that consumers maximize a two-period utility function. In the first period, consumers work and earn income, but face a probability π of becoming unemployed. They earn income y_H if they are employed and income y_L $(< y_H)$ if unemployed. Utility in the first period U depends on the consumption of a numeraire good x and one unit of housing. We assume the two-period utility is additively separable. In the first period, consumers choose consumption of x, savings s, and housing investment h_I to maximize the two-period utility. They pay $P\lambda$ for each unit of h_I, where P is the market value of one unit of housing and $\lambda > 0$ is a policy parameter that allows consumers to purchase housing at a discounted below-market price ($\lambda < 1$) or requires them to pay a premium ($\lambda > 1$).[5] They rent out their housing investment to other consumers at the rental rate R. For each unit of housing investment, a consumer can obtain a loan of amount L from the bank. The return on savings is a fixed interest rate r and the rate of return on housing assets is a random variable θ.

[4] Here we use employment uncertainty to proxy for all types of uncertainty faced by workers in cities due to hukou policies.

[5] A few cities, in an effort to cool down the housing market, decided to stop the most recent rural migrants from buying houses (see http://finance.jrj.com.cn/house/focus/xgl/). This is simply to set $\lambda = \infty$ for those migrants.

In the second period, consumers retire and receive no income. The expected indirect utility in the second period, $V(W)$, depends on the wealth at the beginning of the second period W. At the beginning of the second period, consumers need to pay back mortgages with a fixed interest rate δ $(> r)$.

Consumers face the following optimization problem:

$$\max_{x,h_I,s} (1-\pi)U(x_H, h_c = 1) + \pi U(x_L, h_c = 1) + E[V(W)]$$

where $x_H = y_H - (P\lambda - L - R)h_I - s - R$ if consumers are employed and $x_L = y_L - (P\lambda - L - R)h_I - s - R$ if consumers are unemployed in the first period. The wealth in the second period W equals $(1+r)s + P(1+\theta)h_I - L(1+\delta)h_I$.

We obtain the following proposition (see the Appendix for the proof):

(1) Under the assumption that the coefficient of absolute risk aversion $-\frac{V''}{V'}$ decreases with wealth, a higher probability of becoming unemployed (higher π) decreases housing investment and expected wealth; that is, $\frac{\partial h_I}{\partial \pi} < 0$ and $\frac{\partial E(W)}{\partial \pi} < 0$.

(2) Under the assumption that the coefficient of absolute risk aversion $-\frac{V''}{V'}$ decreases with wealth, a smaller housing price discount (higher λ) decreases housing investment and expected wealth; that is, $\frac{\partial h_I}{\partial \lambda} < 0$ and $\frac{\partial E(W)}{\partial \lambda} < 0$.

(3) Under the sufficient condition that the coefficient of absolute risk aversion $-\frac{V''}{V'}$ is smaller or equal to $\frac{1}{h_I P_2}$, where $P_2 = P(1+\theta) - L(1+\delta)$, a higher mortgage interest rate (higher δ) decreases housing investment and expected wealth; that is, $\frac{\partial h_I}{\partial \delta} < 0$ and $\frac{\partial E(W)}{\partial \delta} < 0$.

Note that for both (1) and (2), we assume consumers to be less risk-averse when they become wealthier. This seems reasonable and innocuous. In reality, a wealthier person is indeed likely to care less about a potential gain or loss (in absolute amount). With this assumption, the condition in (3) will be satisfied as long as the consumer's wealth level is sufficiently large. In other words, (1)-(3) are all true if $-\frac{V''}{V'}$ is decreasing with W and if W is sufficiently large. It is instructive to think how a violation of either assumption would make the proposition invalid. Suppose for example, $-\frac{V''}{V'}$ is not decreasing but is increasing with W, and consider what happens

when the consumer receives a bigger housing price discount (lower λ). Intuition from standard demand analysis suggests that the consumer should buy more housing due to the cheaper price. However, the price discount also makes the consumer wealthier, more risk averse (because $-\frac{V''}{V'}$ increases with W), and thus buy less risky assets. If this second effect dominates the first one, the bigger housing price discount will lead the consumer to invest less in housing, making prediction (2) false. The assumption of a sufficiently large W can be understood in the same way. Suppose the consumer's expected level of wealth is very low (due to low income or high probability of unemployment). Then the high degree of risk aversion (as a result of low W since $-\frac{V''}{V'}$ decreases with W) may imply a corner solution, i.e., zero investment in the risky asset. In this case, even if the mortgage rate (δ) becomes marginally lower, the consumer may not buy any housing asset, making prediction (3) false.

In sum, our proposition implies that urban residents with rural hukou, facing higher uncertainty, less housing price discount, and higher mortgage interest rates, are less likely to invest in housing and as a result have less wealth. Our empirical work will focus on checking whether these predictions are consistent with observed patterns in the data.

4 Data and Empirical Specifications

We use the 2013 China Household Finance Survey (CHFS) data in our empirical analysis. This is a nationally representative household survey that focuses on Chinese household finance behavior. Its 2013 surveys covered 28,141 households and 97,906 individuals in 262 counties and 29 provincial level jurisdictions.

The CHFS data documents detailed information about household finance, including financial assets, non-financial assets, debts, insurance, and consumption. The financial assets include bank deposits, stocks, bonds, mutual funds, and financial derivatives, while the non-financial assets include farming assets, business assets, housing assets, and land. The survey asks for the current market value of each asset and their related debts, which allows us to calculate a household's net total wealth. The data records household housing characteristics and the self-reported market value for up to three housing units. It also contains rich demographic information

on each household member, including each survey respondent's and the spouse's hukou status, hukou registration places, and the year of status change if changes ever occurred.

Our analysis sample consists of household heads who live in urban areas and age between 20 and 60. We compare the tenure choices and household wealth of two groups of household heads. The *base* group (with 7,617 observations) consists of household heads with local urban hukou, who have urban hukou and whose hukou registration places are the same as their places of residence. The *comparison* group (with 4,470 observations) is household heads living in urban areas with rural hukou. Two types of rural hukou holders live in cities: The first type is household heads with local rural hukou, whose hukou registration places are the same as their places of residence (with 3,108 observations); the second type is rural migrants from other prefectures, whose hukou registration places are in more distant countryside (with 1,362 observations). In addition to the base and comparision groups, there is also a third group, household heads with non-local urban hukou, who have urban hukou but with hukou registration places in other prefectures (with 683 observations). This third group is not the focus of our research but we will create a dummy variable to distinguish it from the base group.

Table 1 displays summary statistics for the two primary groups of household heads separately. We see that indeed, compared with household heads with local urban hukou, those with rural hukou are much less likely to own housing units (70.0% vs. 86.5% rate of homeownership), have much less net housing wealth (331 vs. 705 thousand yuan), and have much less net total wealth (561 vs. 950 thousand yuan). In terms of observed characteristics, the two groups are also significantly different. Compared to household heads with local urban hukou, household heads with rural hukou are younger, receive less education, have lower household income, and are less likely to have government-sector jobs. As discussed above, urban residents with rural hukou are much less likely to have access to low-cost housing (8.2% vs. 34.6%) or the Housing Provident Fund (4.7% vs. 36.6%).

To understand the differences in housing tenure choice and household wealth, we naturally want to separate the effects of observed characteristics from that of hukou status, for which we conduct two sets of regression analysis. The tenure choice model is specified as follows:

$$OwnHousing_i = \alpha + \beta * RuralHukou_i + \gamma * X_i + \varepsilon_i \quad (1)$$

where $OwnHousing_i$ indicates whether household head i owns at least one housing unit in the city; $RuralHukou_i$ is a dummy variable representing household heads with rural hukou; X_i is a vector of demographic variables including age, age squared, years of education, marital status, and household income. X_i also includes a dummy variable to represent household heads with non-local urban hukou and a dummy variable to indicate household heads who have government sector jobs. Government jobs are more stable and have better benefits, which could potentially affect household wealth accumulation. City fixed effects are included to control for unobserved city characteristics. ε_i is an error term.

To examine the impact of hukou status on household wealth, we estimate the following linear model:

$$W_i = \delta + \theta * RuralHukou_i + \mu * X_i + \epsilon_i \quad (2)$$

The dependent variable is a household's net housing wealth, net total wealth, or housing capital gains. A household's net housing wealth is the difference between the value of housing properties and housing debts; net total wealth is the difference between the value of total household assets and total household debts; housing capital gains is the difference between current value of housing properties and the purchase price.[6] X_i includes the same variables as in equation (1).

Although not very easy to accomplish, people can change their hukou status in several different ways, such as investing in businesses in cities or obtaining jobs that grant local hukou as a benefit. Thus some unobserved individual characteristics may affect both hukou status and our outcome variables, resulting in a potential omitted-variables bias. In addition, some cities, in an effort to boost their local housing markets, granted local hukou to migrants who purchased homes in those cities. This creates a problem of reverse causality.

For identification, we instrument a household head's current hukou status with his or her mother's current hukou status (i.e., whether the mother has a rural hukou or not). A key feature of China's hukou policy is that people inherited their mothers' hukou status when they were born, so household heads' hukou status should be highly correlated with their mothers' hukou status. Indeed, 76.94% of household heads in our sample have the same hukou status as their mothers.

[6] Housing purchase prices are adjusted to the 2013 price level using the GDP deflator.

Moreover, the instrumental variable strategy requires that conditional on observed demographic characteristics, a mother's hukou status should not directly affect her child's housing tenure choice or household wealth. This assumption may not be satisfied. For example, parents with local urban hukou may be wealthier and more likely to transfer wealth to their children, which will help their children buy housing properties and accumulate wealth. Ideally, we want to include parents' income or wealth in the instrumental variable estimation to control for the potential effect of intergenerational wealth transfers; however, such information on parents was not available in our data. Instead, we include parents' years of education and two dummy variables indicating parents' employment status (whether the parents have ever had a salaried job and whether they have ever owned a business) as proxies for parents' wealth.

5 Empirical Results

5.1 Hukou and Homeownership

We first examine whether urban residents with rural hukou are less likely to own housing units in cities. We start by estimating a linear probability model as specified in equation (1), using whether the household head owns at least one housing unit in the local city as the dependent variable. Since many observations have missing parents' characteristics, our first estimation does not control for parents' characteristics. The results in column (1) of Table 2 show that for household heads with rural hukou, the probability of having at least one housing unit in local cities is 15.5 percentage points lower than that for household heads with local urban hukou. This is only slightly lower than the unconditional sample difference given in Table 1 (16.5 percentage points), suggesting that although household heads with rural hukou are very different in terms of observed characteristics, such differences are not the key reason behind their lower homeownership rate in cities. In column (2), we further control for parents' characteristics, and the estimated difference increased to 17.1. Further investigation reveals that this increase in difference is entirely a result of the changed sample (rather than a changed specification).[7] Column (3) presents the two-stage least squares (2SLS) results, using the mother's hukou status as the instrumental variable for a

[7] If we estimate the specification in column (1) using the sample in column (2), then the coefficient on $RuralHukou$ is -0.171, identical to the one reported in column (2).

household head's hukou status. The coefficient on $RuralHukou$ is even higher, indicating that for household heads with rural hukou, the probability of having at least one housing unit in local cities is 21.1 percentage points lower than that for household heads with local urban hukou, holding other factors constant.

A comparison of columns (2) and (3) suggests that reverse causality and unobserved individual characteristics have together biased the coefficient of $RuralHukou$ toward zero. Intuitively, reverse causality would bias the estimate upward: If some people bought housing units in order to obtain the local urban hukou, then one should expect a larger difference in homeownership rate between the two hukou groups. This implies that unobserved individual characteristics biased the estimate downward and dominated the bias due to reverse causality. This is perhaps reasonable. Given that rural migrants had to take the initiative to leave the countryside and navigate the institutional barriers to find work and live in cities, they might be inherently less risk averse. Consequently, they would be more willing to invest in risky housing assets than local hukou holders with similar observed characteristics, resulting in a downward bias in the ordinary least squares (OLS) estimate.

In columns (4)-(6), we present the results from Probit estimations corresponding to columns (1)-(3). The Probit estimates are slightly smaller in magnitude than those from linear probability models. Without controlling for parents' characteristics, the Probit results show that urban residents with rural hukou are 14.5 percentage points less likely to own housing units than residents with local urban hukou (column (4)). Once parents' characteristics are controlled for, the difference increases to 16.5 percentage points (column (5)), again entirely due to a change in sample (rather than extra controls). Since our key explanatory variable, one's hukou status, is an endogenous dichotomous variable, we estimate a Bivariate Probit specification in column (6).[8]

[8] The Bivariate Probit model is specified as follows:

$RuralHukou_i = 1$ if $y_{1i}^* > 0$, where $y_{1i}^* = \alpha_1 + \beta_1 * 1_{\{\text{i's mother has a rural hukou}\}} + X_i\gamma_1 + \epsilon_{1i}$;

$OwnHousing_i = 1$ if $y_{2i}^* > 0$, where $y_{2i}^* = \alpha_2 + \beta_2 * RuralHukou_i + X_i\gamma_2 + \epsilon_{2i}$.

X_i contains the same variables as in equation (1). All parameters of the model are estimated simultaneously by maximum likelihood based on the joint distribution of $RuralHukou$ and $OwnHousing$. Angrist and Pischke (2008) note that the Bivariate Probit and 2SLS models usually give similar results. However, the Bivariate Probit model is sensitive to the choice of covariates while the 2SLS model produces more robust results. Hence, Angrist and Pischke (2008) favor the 2SLS method even if the dependent variable is dichotomous.

This regression shows that urban residents with rural hukou are 19.4 percentage points less likely to be homeowners in cities, which is close to the 2SLS estimation results reported in column (3).

The coefficients of control variables in Table 2 have expected signs. Urban residents tend to have a higher probability of owning housing units if they are older, highly educated, married, with high household incomes, or have government-sector jobs. In addition, compared to household heads with local urban hukou, those with non-local urban hukou have a lower probability of owning housing units.

In sum, different specifications and data samples in Table 2 suggest that compared to urban residents with local hukou, urban residents with rural hukou are between 14.5 and 21.1 percentage points less likely to own housing units in cities. All of these estimates are statistically significant. We must emphasize that this difference is not a result of rural migrants being younger, less educated, or having lower income, because we have properly controlled for those confounding factors.

5.2 Hukou and Household Wealth

We next examine the effect of hukou on net housing wealth and net total wealth by estimating equation (2).[9] Columns (1)-(3) in Table 3 present results for net housing wealth. In column (1), we do not control for parents' characteristics in order to have a larger sample. Column (1) shows that household heads with rural hukou on average have 187 thousand yuan less in net housing wealth than household heads with local urban hukou. Note in Table 1 that the average household head with a local urban hukou has 705 thousand yuan of net housing wealth, thus the 187 thousand yuan is a 26.5% difference. In column (2), we control for parents' characteristics, which makes no difference—household heads with rural hukou on average have 184 thousand yuan less in net housing wealth. Column (3) shows the IV estimation results, using the mother's hukou status as an instrumental variable for a household head's hukou status. This has significantly increased the magnitude of the difference; now we see that household heads with rural hukou on average have 310 thousand yuan less in net housing wealth. The increased estimate implies that the OLS estimate contains a substantial downward bias. As discussed above, rural migrants are a

[9] In our baseline regressions, we drop the top and bottom percentiles of net housing wealth and net total wealth (350 observations in total) to guard against extreme values. We obtain similar results if we keep these outliers.

special group of people and they might have unobserved individual characteristics (e.g., high innate ability) that bias the estimate of difference in housing wealth toward zero.

When we calculate net housing wealth in columns (1)-(3), we include housing units both in local cities and other places. For example, some household heads with rural hukou may have some housing properties back in their home villages. The value of these rural houses is included in the specifications of columns (1)-(3). We are also interested in knowing how the hukou system affects households' housing wealth accumulation in local cities. Thus, in column (4), we apply the same specification as in column (3) but only include housing units in local cities when we calculate net housing wealth. The magnitude of the coefficient on $RuralHukou$ becomes larger, suggesting that the hukou system mainly prevents household heads with rural hukou from accumulating large housing wealth in local cities.

Columns (5)-(7) report results from specifications parallel to columns (1)-(3) except we use net total wealth as the dependent variable. Besides housing wealth, a household's net total wealth includes non-housing wealth, such as business assets, farming assets, land, cars, other durable goods, and financial assets. In addition, a household may also have borrowed money for reasons other than home financing. We now take all of these into account to calculate net total wealth.

The estimated coefficient of $RuralHukou$ is still negative and statistically significant in columns (5)-(7). However, these estimates are smaller in magnitude than the corresponding estimates in columns (1)-(3). That is, urban residents with rural hukou have less net total wealth than residents with local urban hukou, but the difference is smaller compared to the difference in net housing wealth. For example, while the IV estimate in column (3) shows rural hukou holders have 310 thousand yuan less in net housing wealth, the IV estimate in column (7) indicates that they have 213 thousand yuan less in net total wealth. In fact, when we use non-housing wealth as the dependent variable in a set of regressions similar to column (3), we find that $RuralHukou$ has a positive and statistically significant (at the 10% level) coefficient, confirming that urban residents with rural hukou tend to have more non-housing assets. Moreover, when we replace the dependent variable with each type of non-housing assets, we find that urban residents with rural hukou have more farming assets, land, and small business assets, which makes perfect sense. Since the value of non-housing assets has not appreciated as fast as urban housing prices, urban residents with

rural hukou end up with less in total wealth. Lastly, we see that the estimation of the coefficient of $RuralHukou$ in columns (5)-(7) is less precise, especially when parents' characteristics are included as extra controls. When parents recognized that their children's hukou status has put them in a disadvantageous position in the housing market, the parents might have tried to compensate their children through income transfers. This may explain why controlling for parents' characteristics reduces the explanatory power of hukou status in the net total wealth regressions.

The coefficients of other variables have the expected signs. For example, columns (3) and (7) show that age has a non-linear relationship with net housing wealth and net total wealth. On average, married people have 184 thousand yuan more in net housing wealth and 256 thousand yuan more in net total wealth than unmarried people. Additionally, one more year of education increases net housing wealth by 25.7 thousand yuan and increases net total wealth by 42.1 thousand yuan. Lastly, as expected, household total income has a positive and significant impact on net housing wealth and net total wealth.

Overall, as predicted by our theoretical model, we find that urban residents with rural hukou have less net housing wealth and less net total wealth than those with local urban hukou, after controlling for a set of individual and household-level characteristics. We have also performed ancillary analysis to corroborate these results. We find that even when urban residents with rural hukou bought some housing properties in cities, those properties tend to be located further away from the city center and in lower-quality communities. Such housing properties naturally will have slower price growth. Indeed when we directly examine housing capital gains, we find that urban residents with rural hukou have had 286 thousand yuan less in housing capital gains (column (1) of Table 4), which explains why they have much lower housing wealth. One might argue that urban residents with rural hukou may be inept investors and as a result not able to take full advantage of the booming urban housing market. In a similar regression, we examine stock capital gains and fail to find any evidence that rural hukou holders perform worse as investors in financial markets (column (2) of Table 4).

5.3 Heterogeneity Analyses

5.3.1 Heterogeneity across different tiers of cities

Fang et al. (2016) find that between 2003 and 2013, the annual growth rate of housing prices in the third-tier Chinese cities was 7.9%, while this number was 10.5% and 13.1% in the second- and first-tier cities, respectively. We suspect that in cities with higher housing price growth rates, homeowners will accumulate greater housing wealth and total wealth, and therefore the housing wealth inequality between rural and local urban hukou holders will be larger in the first- and second-tier cities.

We test this hypothesis by estimating equation (2) separately for these two groups of cities, and the results are in Table 5. To conserve space, we present the 2SLS results only. We use the same city tier classification as Fang et al. (2016). Out of 163 cities in our sample, 37 cities are first- or second-tier cities. In these cities, household heads with rural hukou on average have 458 thousand yuan less in net housing wealth and 349 thousand yuan less in net total wealth than comparable household heads with local urban hukou (see columns (1)-(2) of Table 5). The magnitude of either effect is substantially larger than the corresponding coefficient estimated for the whole sample of cities in Table 3. We also examine the difference in housing capital gains and find that household heads with rural hukou have 409 thousand yuan less than those with local urban hukou (column (3)). Columns (4)-(6) present results from the same set of regressions using other cities in lower tiers. The difference is striking. In these other cities, residents with rural and local urban hukou show no statistically significant differences in net housing wealth or net total wealth, holding other factors constant. Therefore, our baseline results in Table 3 are entirely driven by the differences observed in the first- and second-tier cities.

5.3.2 Heterogeneity across cities with different degrees of hukou restriction

Hukou policy is highly localized and each city has its own rules. In the past two decades, many cities started to grant local urban hukou to qualified rural migrants on the grounds of family reunion, business investment, tax payment, housing purchases, and employment status. However, the regulations vary a great deal across cities, with some cities having much more stringent rules than others. Analyzing hukou policy documents in 120 Chinese cities, Zhang et al. (2019) quantify the difficulty of migrants to obtain local urban hukou for each city and construct a hukou registration stringency index. We use a version of their index that is based on local hukou regulations in the period from 2000 to 2013. It ranges from 0.133 (for Fangchenggang City in

Guangxi) to 2.496 (for Beijing), with a higher value indicating more stringent restriction and thus more difficulty for migrants to obtain local urban hukou. In cities with more stringent regulations, we expect that the net housing wealth and net total wealth differences between rural and urban hukou holders are larger.

In Table 6, we re-estimate equation (2) after adding an interaction term between hukou status and the hukou stringency index. In addition to instrumenting for the dummy variable $RuralHukou$, we also instrument this interaction term using the interaction between a household head's mother's hukou status and the hukou stringency index. As expected, the coefficient of the interaction term is always negative and statistically significant, implying that the differences in net housing wealth, net total wealth, and housing capital gains between rural and local urban hukou holders all increase with the stringency of hukou restrictions. A simple calculation shows that the average differences in net housing wealth, net total wealth, and housing capital gains between rural and local urban hukou holders in Beijing (with the maximum stringency index value of 2.496) are 749, 776, and 743 thousand yuan higher than those in a city with the median value of hukou stringency index (0.531), respectively. The coefficient of the rural hukou dummy is never statistically significant, suggesting that in cities with the least stringent hukou restrictions, rural migrants fare equally well as residents with local urban hukou.

5.3.3 Heterogeneity across age groups

In Table 7, we examine the effect of hukou on household wealth by household head age groups. Our analysis sample includes all household heads aged between 20 and 60. We now divide them into two groups—below and above 40 years old—and re-estimate equation (2) separately for the two subsamples. Results in columns (1)-(3) show that for younger household heads, rural hukou holders on average have 573 thousand yuan less in net housing wealth, 462 thousand yuan less in net total wealth, and 426 thousand yuan less in housing capital gains. All of these are significantly larger in magnitude than the differences estimated using the full data sample. Given these, it is not surprising to see in columns (4)-(6) that for older household heads, the differences in all three outcome variables between rural and local urban hukou holders are much smaller. For one outcome, net total wealth, residents with rural hukou do not show a statistically significant disadvantage among the older cohorts.

Further analysis reveals that in the younger cohorts, a larger share of the rural hukou holders are migrants from other prefectures: Among the younger household heads with rural hukou in cities, 52.42% are household heads with local rural hukou and 47.58% are rural migrants from other prefectures; in contrast, among older rural migrants, these shares are 82.23% and 17.77%, respectively. Since hukou policy is usually more discriminatory against migrants from other prefectures than local rural hukou holders, this may explain the larger differences among younger cohorts.[10]

5.3.4 Heterogeneity over wealth distribution: quantile regression results

We have thus far compared the difference in average wealth between rural and local urban hukou holders. Next we estimate quantile regressions to examine how the difference in wealth varies across the wealth distribution. We report the results in Figure 2.

Panel A of Figure 2 shows that household heads with rural and local urban hukou have the same amount of net housing wealth at the lower end of the distribution; the difference steadily increases with the quantile level and stabilizes after the median; above the median value of net housing wealth, household heads with local urban hukou always have about 125 thousand yuan less in housing wealth than household heads with local urban hukou. Quantile regression results for net total wealth are shown in panel B. Same as in panel A, rural and local urban hukou holders have the same amount of wealth at the lower end of the distribution; that is, the poor in cities are equally poor, regardless of their hukou status. What is different from panel A is that now the effects display a U-shape over the distribution of net total wealth. At the higher end of the distribution, there is no difference in net total wealth either. The rich in cities are also equally rich, regardless of their hukou status. This seems to confirm the casual observation that the wealthiest rural hukou holders, who are usually factory or mine owners, almost always end up living in cities. The largest difference lies between the 35th and 70th percentiles, where household heads with local urban hukou have over 100 thousand yuan less in net total wealth than those with local urban hukou.

[10] In a set of regressions not reported here, we distinguish between household heads with local rural hukou and rural migrants from other prefectures. We find that household heads with local rural hukou fare almost equally well as residents with local urban hukou in terms of homeownership rate, net housing wealth, net total wealth, and housing capital gains; in contrast, migrants from other prefectures have much worse outcomes along all of these dimensions.

6 Conclusions

Hukou, an important institutional feature of mainland China, affects individual lives in many ways. This paper shows that the difference in hukou status leads to a difference in homeownership rates among urban residents, which creates significant wealth inequality in urban China in the context of two decades of rapid housing price appreciation.

We build a tenure choice model to show that rural hukou holders have lower homeownership rates in cities because they face more uncertainty, higher mortgage interest rates, and have less access to low-cost housing. Using the 2013 CHFS data, we find household heads with rural hukou are about 20 percentage points less likely to own housing units in cities than household heads with local urban hukou. For identification, we use the household head's mother's hukou status as an instrumental variable. We show that household heads with rural hukou on average have 310 thousand yuan less in net housing wealth and 213 thousand yuan less in net total wealth than household heads with local urban hukou, all other things equal. The average housing capital gains of household heads with rural hukou is 286 thousand yuan lower than that of household heads with local urban hukou. Moreover, we find that these differences are much larger in the first- and second-tier cities, in cities with more stringent hukou restrictions, and among younger cohorts.

This study enriches our understanding of the socio-economic consequences of the hukou system. Unlike most of the existing literature, which focuses on how hukou affects individuals through education and labor market outcomes, we expand the literature by examining the impact of hukou on behaviors and outcomes in the housing market.

Appendix: Proof of the Proposition

To simplify notation, we define $P_1 = P\lambda - L - R$ and $P_2 = P(1+\theta) - L(1+\delta)$. We assume $P_1 > 0$ (i.e., one cannot borrow more than what is needed to finance the housing purchase) and $E(P_2) > 0$ (i.e., there is an expected gain from owning housing properties because otherwise the housing and mortgage markets would not exist). The consumer's optimization problem can be rewritten as follows:

$$\max_{h_I, s} (1-\pi)U(y_H - P_1 h_I - s - R, h_c = 1) + \pi U(y_L - P_1 h_I - s - R, h_c = 1) + E[V((1+r)s + P_2 h_I)] .$$

The first-order conditions are given by:

$$[h_I]: -(1-\pi)U_H' P_1 - \pi U_L' P_1 + E[V' P_2] = 0$$

$$[s]: -(1-\pi)U_H' - \pi U_L' + E[V'(1+r)] = 0$$

where U_H' is the consumer' marginal utility from the numeraire good when income is y_H and U_L' is the consumer' marginal utility when income is y_L.

Combining the two first-order conditions, we obtain $E[V'(P_2 - P_1(1+r))] = 0$. Since $V' > 0$ and $P_1(1+r) > 0$, it follows that $E(V'P_2) > 0$. Recall that $W = (1+r)s + P_2 h_I$. This implies that $E\left[\frac{\partial V(W)}{\partial h_I}\right] = E(V'P_2) > 0$. Given that $V(W)$ is an increasing function, we know $\frac{\partial E(W)}{\partial h_I} > 0$. That is, when a consumer's optimal level of investment in housing is higher, her expected wealth is higher. Intuitively, this is easy to understand. A dollar saved in period 1 can be either put in savings to earn a fixed rate of return r or invested in housing. If in optimal conditions a consumer invests an extra dollar in housing, it must be true that she expects to have more wealth by doing so. Therefore, if anything increases a consumer's optimal level of housing investment, it also increases her expected wealth.

Proof of (1):

From the first-order conditions, the comparative statics result for π is given by the following equation:

$$\frac{\partial h_I}{\partial \pi} = -\frac{1}{D}(1+r)(U_L' - U_H')E[V''(P_2 - P_1(1+r))]$$

where $D = [(1-\pi)U_H'' + \pi U_L'']E[V''(P_1(1+r) - P_2)^2] + E(V''P_2^2)E[V''(1+r)^2] - E^2[V''P_2(1+r)]$ is the determinant of the Hessian matrix. We assume that the second-order conditions hold, so $D > 0$. Since $U'' < 0$ and $y_L < y_H$, $(U_L' - U_H')$ is also positive. Thus, $\frac{\partial h_I}{\partial \pi}$ has the opposite sign as the expectation term $E[V''(P_2 - P_1(1+r))]$.

Note that the expectation is over the random variable θ (housing price appreciation rate). Following Henderson and Ioannides (1983), we define the coefficient of absolute risk aversion $A = -\frac{V''}{V'}$ and let $\bar{A}$ be the value of A when θ makes $P_2 - P_1(1+r) = 0$. From the first-order condition, we know $E[V'(P_2 - P_1(1+r))] = 0$. We can rewrite it as $E\left[V''\left(P_2 - P_1(1+r)\right)\right] = -E\left[V'A\left(P_2 - P_1(1+r)\right)\right] = E[V'(\bar{A} - A)(P_2 - P_1(1+r))]$. Under the assumption that the coefficient of absolute risk aversion A is decreasing with wealth W, whenever $P_2 - P_1(1+r) > 0$, $\bar{A} - A > 0$; whenever $P_2 - P_1(1+r) < 0$, $\bar{A} - A < 0$. Thus, $E\left[V''\left(P_2 - P_1(1+r)\right)\right]$ is positive, which implies that $\frac{\partial h_I}{\partial \pi} < 0$. Given that $\frac{\partial E(W)}{\partial h_I} > 0$, it follows immediately that $\frac{\partial E(W)}{\partial \pi} < 0$.

Proof of (2):

From the first-order conditions, the comparative statics result for λ is given by the following equation:

$$\frac{\partial h_I}{\partial \lambda} = \frac{1}{D}\{Ph_I[(1-\pi)U_H'' + \pi U_L'']E\left[V''\left(P_2 - P_1(1+r)\right)\right](1+r) + P[(1-\pi)U_H' + \pi U_L'][(1-\pi)U_H'' + \pi U_L''] + P[(1-\pi)U_H' + \pi U_L']E[V''(1+r)^2]\}.$$

We know that $D > 0$, $U' > 0$, $V' > 0$, $U'' < 0$, $V'' < 0$, $P > 0$, $r > 0$, and $1 > \pi > 0$. As proved above, under the assumption that the coefficient of absolute risk aversion $-\frac{V''}{V'}$ is decreasing with wealth W, $E\left[V''\left(P_2 - P_1(1+r)\right)\right] > 0$. Thus $\frac{\partial h_I}{\partial \lambda} < 0$. Again, given that $\frac{\partial E(W)}{\partial h_I} > 0$, it follows immediately that $\frac{\partial E(W)}{\partial \lambda} < 0$.

Proof of (3):

From the first-order conditions, the comparative statics result for δ is given by the following equation:

$$\frac{dh_I}{d\delta} = \frac{L}{D}\{[(1-\pi)U_H'' + \pi U_L'']E[V''h_I P_2 + V'] - [(1-\pi)U_H'' + \pi U_L'']E[V''h_I P_1(1+r)]$$
$$+ E(V''h_I P_2 + V')E[V''(1+r)^2] - (1+r)^2 E(V''h_I)E(V''P_2)\}.$$

We know that $D > 0$, $L > 0$, $U'' < 0$, $V'' < 0$, $h_I > 0$, $P_1 > 0$, $r > 0$, and $1 > \pi > 0$. A sufficient condition for the proposition ($\frac{dh_I}{d\delta} < 0$) to hold is $E[V''h_I P_2 + V'] \geq 0$. For $E[V''h_I P_2 + V'] \geq 0$ to hold, a sufficient condition is $V''h_I P_2 + V' \geq 0$, which means that the coefficient of absolute risk aversion $-\frac{V''}{V'}$ is smaller or equal to $\frac{1}{h_I P_2}$ for all possible values of θ. Thus under this condition $-\frac{V''}{V'} \leq \frac{1}{h_I P_2}$, we have $\frac{dh_I}{d\delta} < 0$. Again, given that $\frac{\partial E(W)}{\partial h_I} > 0$, it follows immediately that $\frac{\partial E(W)}{\partial \delta} < 0$.

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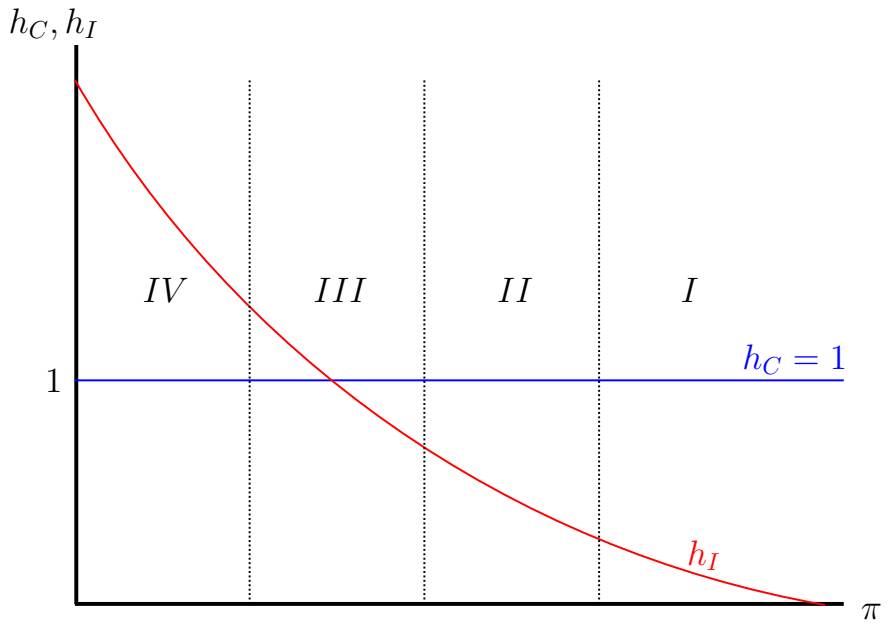
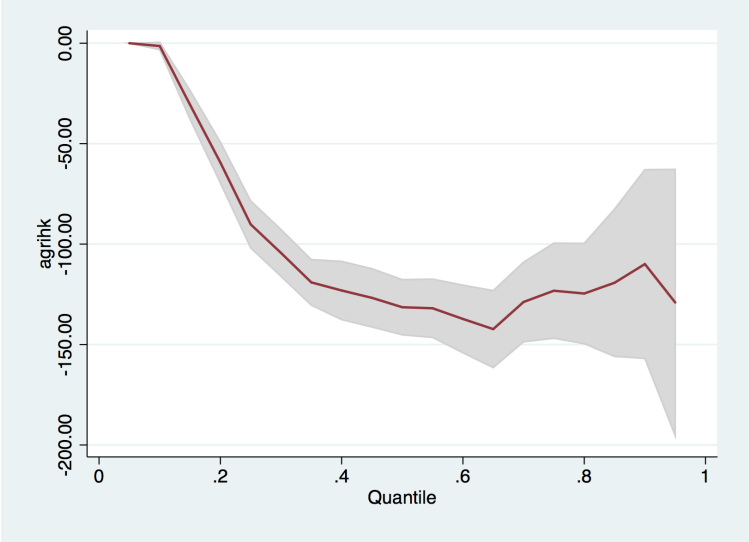
Figures and Tables

Figure 1. Housing tenure choice

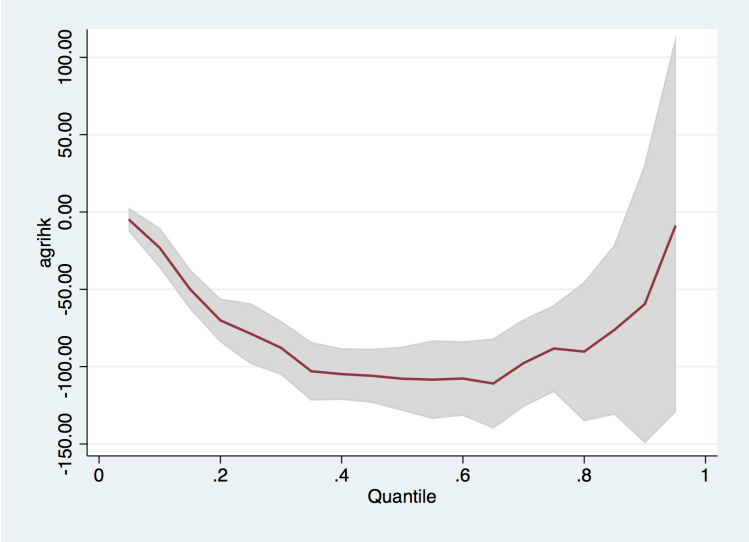


Notes: h_C and h_I represent housing consumption and housing investment demand, respectively. π represents the probability of being unemployed. Cases I-IV are the four different situations faced by consumers: Case I — renters; case II — renters who also invest in housing; case III — owner-occupiers with one housing unit; case IV — owner-occupiers with multiple housing units.

Figure 2. Hukou and household wealth: quantile regression results



A. Difference in net housing wealth



B. Difference in net total wealth

Notes: The solid line represents the estimated coefficients of the rural hukou dummy over the net (housing) wealth distribution. The shared area indicates the 95% confidence interval. Quantile regressions include the same set of controls as in Table 3.

Table 1. Summary statistics

	Urban Household Heads with Rural Hukou			Urban Household Heads with Local Urban Hukou			t-statistic Pr(|T| > |t|)
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	
Have at least one housing unit in local cities	4,470	0.700	0.458	7,617	0.865	0.342	t=22.399 p=0.000
Have more than one housing unit in local cities	4,470	0.147	0.354	7,617	0.197	0.397	t=6.903 p=0.000
Net housing wealth	4,402	330.986	526.942	7,469	705.474	868.808	t=25.925 p=0.000
Net total wealth	4,470	560.984	853.533	7,617	949.765	1113.168	t=20.134 p=0.000
Housing capital gains	4,263	157.530	400.758	7,327	428.046	667.420	t=24.060 p=0.000
Age of household head	4,470	41.777	10.396	7,617	45.209	9.540	t=18.465 p=0.000
Married	4,470	0.878	0.328	7,617	0.876	0.329	t=-0.231 p=0.817
Years of education	4,470	9.023	3.212	7,617	12.151	3.304	t=50.766 p=0.000
Work in government sector	4,470	0.039	0.193	7,617	0.219	0.414	t=27.401 p=0.000
Household income	4,470	56.519	112.162	7,617	84.311	129.688	t=11.944 p=0.000
Have access to Housing Provident Fund	4,470	0.047	0.211	7,617	0.366	0.482	t=42.004 p=0.000
Have access to low-cost housing	4,470	0.082	0.275	7,617	0.346	0.476	t=33.942 p=0.000

Notes: For monetary variables, the unit is 1,000 yuan. The last column reports the t-statistic from the test for equal means and the associated p-value. Statistics for household heads with non-local urban hukou are not in the table. Their homeownership rate in local cities is 38.21%, and 15.52% of them have more than one housing unit in local cities. Their average net housing wealth, net total wealth, housing capital gains, and household income are 515,415 yuan, 884,248 yuan, 209,850 yuan, and 111,985 yuan, respectively. Their average age and education are 35.52 years and 13.37 years, respectively. Moreover, 64.57% of non-local urban hukou household heads are married; 9.37% of them have government-related jobs; and 35.58% of them have access to the Housing Provident Fund. Lastly, 13.9% of them have access to low-cost housing.

Table 2. Hukou and homeownership

	Dependent Variable: Whether owns at least one housing unit in local city					
	OLS	OLS	2SLS	Probit	Probit	Bivarite Probit
	(1)	(2)	(3)	(4)	(5)	(6)
Rural hukou	-0.155***	-0.171***	-0.211***	-0.145***	-0.165***	-0.194***
	(0.028)	(0.032)	(0.045)	(0.024)	(0.028)	(0.049)
Age	0.028***	0.031***	0.030***	0.019***	0.021***	0.019***
	(0.002)	(0.004)	(0.004)	(0.002)	(0.003)	(0.003)
Age squared	-0.0002***	-0.0003***	-0.0003***	-0.0002***	-0.0002***	-0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married	0.154***	0.154***	0.155***	0.145***	0.148***	0.140***
	(0.014)	(0.013)	(0.013)	(0.012)	(0.011)	(0.010)
Years of education	0.011***	0.009***	0.008***	0.011***	0.010***	0.008***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
In gov't sector	0.017*	0.015	0.011	0.032***	0.027**	0.022*
	(0.009)	(0.011)	(0.010)	(0.011)	(0.014)	(0.012)
Household income	0.0002***	0.0002***	0.0002***	0.0002***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)
Non-local urban hukou	-0.337***	-0.339***	-0.352***	-0.317***	-0.317***	-0.312***
	(0.028)	(0.037)	(0.040)	(0.026)	(0.033)	(0.036)
Constant	YES	YES	YES	YES	YES	YES
Parents' characteristics	NO	YES	YES	NO	YES	YES
City fixed effects	YES	YES	YES	YES	YES	YES
First-stage F test			863.858			
Observations	12,770	8,698	8,698	12,128	8,237	8,698
(Pseudo) R^2	0.247	0.275	0.274	0.226	0.247	---

Notes: Standard errors clustered at the city level are in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. Parents' characteristics include: father's years of education, mother's years of education, whether father has ever had a salaried job or owned a business, and whether mother has ever had a salaried job or owned a business. Coefficients for Probit and Bivariate Probit models are marginal effects.

Table 3. Hukou and household wealth

	Dependent Variable: Net housing wealth				Dependent Variable: Net total wealth		
	OLS	OLS	2SLS	2SLS	OLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rural hukou	-186.892***	-183.600***	-310.229***	-381.443***	-136.510**	-114.769*	-212.905*
	(49.963)	(54.741)	(94.882)	(111.633)	(56.279)	(65.236)	(110.792)
Age	24.800***	25.663***	20.806***	20.408***	39.734***	45.225***	41.470***
	(4.886)	(4.624)	(5.450)	(6.172)	(6.148)	(6.700)	(7.277)
Age squared	-0.205***	-0.186***	-0.146**	-0.137*	-0.391***	-0.409***	-0.378***
	(0.058)	(0.057)	(0.065)	(0.071)	(0.071)	(0.082)	(0.086)
Married	173.038***	182.083***	184.483***	175.532***	217.952***	254.336***	256.227***
	(32.457)	(31.248)	(31.496)	(31.285)	(37.489)	(39.060)	(39.274)
Years of education	34.627***	30.560***	25.664***	24.391***	51.702***	45.890***	42.095***
	(5.303)	(5.561)	(5.442)	(5.387)	(6.376)	(6.741)	(6.345)
In gov't sector	11.784	23.037	7.626	-2.212	-59.655*	-47.275	-59.169
	(27.438)	(29.091)	(31.666)	(33.671)	(31.418)	(36.006)	(36.983)
Household income	0.940***	0.806***	0.800***	0.672***	2.111***	1.828***	1.823***
	(0.149)	(0.159)	(0.155)	(0.147)	(0.189)	(0.216)	(0.213)
Non-local urban hukou	-308.741***	-324.157***	-365.506***	-555.957***	-249.595**	-252.435**	-284.456**
	(92.487)	(105.479)	(115.464)	(132.091)	(106.424)	(122.574)	(132.823)
Constant	YES	YES	YES	YES	YES	YES	YES
Parents' characteristics	NO	YES	YES	YES	NO	YES	YES
City fixed effects	YES	YES	YES	YES	YES	YES	YES
First-stage F test			876.784	876.784			863.9
Observations	12,549	8,556	8,556	8,556	12,770	8,698	8,698
R^2	0.344	0.345	0.342	0.334	0.317	0.307	0.306

Notes: Standard errors clustered at the city level are in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$. Parents' characteristics include: father's years of education, mother's years of education, whether father has ever had a salaried job or owned a business, and whether mother has ever had a salaried job or owned a business.

Table 4. Hukou and capital gains

	Housing capital gains	Stock capital gains
	2SLS	2SLS
	(1)	(2)
Rural hukou	-285.534***	56.880
	(86.266)	(38.247)
Other control variables	YES	YES
Parents' characteristics	YES	YES
City fixed effects	YES	YES
First stage F statistic	835.4	72.1
Observations	8,361	939
R^2	0.301	0.058

Notes: Other control variables are the same as in Table 3, but their coefficients are not reported here. Standard errors clustered at the city level are in parentheses. Column (2) is estimated using the 12.2% subsample of urban households who invested in stocks, which explains the much smaller sample size.
*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 5. Hukou and household wealth in different tiers of cities

	First- and second-tier cities			Other cities		
	Net housing wealth	Net total wealth	Housing capital gains	Net housing wealth	Net total wealth	Housing capital gains
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Rural hukou	-458.153***	-348.982**	-408.544***	-25.306	59.862	-38.969
	(126.691)	(142.766)	(117.239)	(58.363)	(113.461)	(38.816)
Other control variables	YES	YES	YES	YES	YES	YES
Parents' characteristics	YES	YES	YES	YES	YES	YES
City fixed effects	YES	YES	YES	YES	YES	YES
First stage F statistic	543.2	525.0	529.3	341.9	345.4	315.78
Observations	4,892	4,946	4,771	3,664	3,752	3,590
R^2	0.319	0.305	0.280	0.270	0.196	0.215

Notes: Other control variables are the same as in Table 3, but their coefficients are not reported here. Standard errors clustered at the city level are in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 6. Hukou and household wealth in cities with different degrees of hukou restriction

	Net housing wealth	Net total wealth	Housing capital gains
	2SLS	2SLS	2SLS
	(1)	(2)	(3)
Rural hukou	-1.565	129.072	30.531
	(103.607)	(134.662)	(75.011)
Rural hukou*Hukou	-381.414***	-394.692***	-378.170***
stringency index	(54.768)	(74.627)	(46.083)
Other control variables	YES	YES	YES
Parents' characteristics	YES	YES	YES
City fixed effects	YES	YES	YES
First stage F statistic	418.9	401.4	407.4
Observations	5,942	6,022	5,799
R^2	0.339	0.312	0.303

Notes: Other control variables are the same as in Table 3, but their coefficients are not reported here. Standard errors clustered at the city level are in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 7. Hukou and household wealth in different age groups

	Age≤40			Age>40		
	Net housing wealth	Net total wealth	Housing capital gains	Net housing wealth	Net total wealth	Housing capital gains
	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Rural hukou	-572.509***	-461.884**	-425.788***	-164.703**	-67.346	-200.307***
	(171.834)	(195.537)	(136.780)	(76.354)	(122.920)	(65.237)
Other control variables	YES	YES	YES	YES	YES	YES
Parents' characteristics	YES	YES	YES	YES	YES	YES
City fixed effects	YES	YES	YES	YES	YES	YES
First stage F statistic	548.0	547.4	526.2	375.5	389.0	358.4
Observations	3,296	3,339	3,218	5,260	5,359	5,143
R^2	0.339	0.354	0.248	0.362	0.311	0.341

Notes: Other control variables are the same as in Table 3, but their coefficients are not reported here. Standard errors clustered at the city level are in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.