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Public Rental Housing and Long-Term Settlement Intention of the Migrants in China: The Mediating Effect of Identity

Cuicui Du [1], Wenlong Lou [1,*], Yuhua Qiao [2] and Yongchao Zhang [3]

[1] School of Public Management, Yanshan University, Qinhuangdao 066000, China; zwshen@stumail.ysu.edu.cn
[2] Political Science Department, Missouri State University, Springfield, MO 65897, USA; yuhuaqiao@missouristate.edu
[3] China Center for Land Policy Research, Nanjing Agricultural University, Nanjing 210000, China; 2016209023@njau.edu.cn
* Correspondence: louwenlong@ysu.edu.cn

Abstract: The urban settlement of migrants and their families is an important aspect of new urbanization. Affordable housing, a key measure to improve their living conditions, can advance their urbanization goals. Based on the China Migrants Dynamic Survey (CMDS) data and land transaction data of cities, this study employs a complementary log–log model to estimate the effect of public rental housing (PRH) on the long-term settlement intention (LTSI) of migrants and delves into the intrinsic effect mechanism through the mediating effect. The results show that: (1) Living in PRH can significantly improve the LTSI of migrants who rent. A series of robustness tests and endogeneity tests support the validity of this conclusion; (2) The visualization of a heterogeneity analysis shows that PRH has a greater influence on the LTSI of first-generation migrants and urban–urban migrants. As the city class of the destination decreases, the effect of PRH gradually diminishes; (3) A mechanism analysis suggests that a sense of identity plays a mediating role in PRH affecting the LTSI of the migrants, particularly in first-tier cities. This paper enriches the literature related to the field of housing security programs, provides policy references for enhancing the LTSI of the migrants, and promotes the development of urbanization.

Keywords: public rental housing; migrants; long-term settlement intention; identity; city class

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1. Introduction

Over the past four decades, China has made great achievements in its urbanization efforts, with migrants as the key drivers. According to census data, the number of migrants increased from 6.57 million in 1982 to 376 million in 2020. As China enters the national 14th Five-Year Plan period (2021–2025), accelerating the settlement of migrants has become a vital task to enhance the overall quality of new urbanization. The LTSI of migrants in a destination city is a crucial indicator to capture and explore the current situation and development trend of urbanization of migrants [1]. It is also an important driving force for economic growth and modernization. Therefore, exploring effective strategies to improve the LTSI of this substantial group is an important research topic.

Scholars have extensively studied the various factors affecting the settlement intention of migrants from different levels (e.g., individual, family, area, etc.) and different dimensional aspects (e.g., natural, social, economic, policy, etc.). With the reform of China's household registration system, the constraints of the system are gradually weakening, and housing is becoming an increasingly important factor affecting migrants in urban settlement [2–4]. Housing, being one of the fundamental necessities of life alongside clothing, food, and transportation, holds great significance in China, where the traditional concept of "living in peace and working in contentment (anju leye) has long been upheld. For migrants, whether they first arrive in the city in search of a "sojourning" place or take root in the city to find a "settling" place, they must deal with housing-related issues. Compared

with informal housing options (employer-provided housing, urban villages, borrowed housing, etc.), living in formal housing (renting or purchasing commercial houses) can facilitate migrant settlement in cities [5]. Among all housing options, homeownership undoubtedly exerts the most significant influence on migrants' intentions to settle down [6,7], and housing purchases have also become a sign of migrant settlement in the city [3,8].

However, after the market-oriented reform of urban housing in China went into effect, the price of commercial housing has continued to rise substantially, especially in mega-cities and first-tier cities where the rate of increase is even more alarming. The rapidly rising housing prices exert a strong "crowding-out" effect on the entry of migrants into cities [9]. Housing prices have become a screening mechanism for population migration [10].

The housing problem of low- and middle-income groups cannot be solely solved by the market. Housing security programs provided by the Chinese government are an important component of the housing system and complement the market in allocating housing units [11]. The program essentially represents a form of financial subsidy, divided into supply-side and demand-side subsidies. While the former allows the government to directly intervene in manipulating housing supply, the latter provides financial subsidies to housing demanders. China's existing housing security is mainly based on supply-side subsidies and supplemented by demand-side subsidies. Supply-side subsidies are also known as in-kind subsidies, and demand-side subsidies are also known as monetary subsidies. Affordable housing is the main form of in-kind subsidies and largely consists of two categories: purchase-type affordable housing (e.g., economical and comfortable housing, price-capped housing, shantytown housing, and shared ownership housing), and rental-type affordable housing (e.g., low-rent housing, PRH, government-subsidized rental housing, etc.).

According to research, while existing affordable housing measures cannot cover all migrants, they can divert the demand for commercial housing. This effectively reduces the price of commercial housing and, to a certain extent, eases the pressure on migrants to purchase housing [12]. Affordable housing has a significant positive effect on the settlement intention of second-generation rural–urban migrants [13] and increases the likelihood that the children of migrants will move in with them [14]. However, these studies have not classified the effects of affordable housing by housing types. Some scholars have found that PRH provided by local governments hinders long-distance migration of the labor force [15,16]. As a result, the effect of affordable housing in promoting settlement intention of migrants may be limited to purchase-type affordable housing.

In other words, it remains unclear whether rental-type affordable housing can improve the settlement intention of migrants. Additionally, despite lower housing prices in small- and medium-sized cities and towns, migrants still show a tendency to cluster in large cities [17]. The explanation for this is that rent prices are still within the affordability range for migrants, and the increase in the rent-to-income ratio continues to exert a substantial positive influence on migrants' intention to settle in the city or has not yet shown a negative impact [18].

PRH refers to affordable housing with limited construction standards and rent levels, designated for persons who meet specific criteria. These people include urban low-to-middle-income families facing housing difficulties, urban newly employed workers without housing, and migrants with stable employment in urban areas. The practical significance of this is to help the "sandwich class" (the sandwich class is a synonym for incapable homebuyers outside the housing security and housing market) to solve the housing problem, while its broader significance reflects a shift in the national security system toward addressing the needs of "non-low-income groups". This shift acknowledges that these non-traditional low-income groups also require government support. The development of PRH helps alleviate the structural supply shortages in the housing rental market. By increasing the supply of rental housing to meet the diverse needs of various income groups, it can promote the stable and healthy development of the real estate market.

Therefore, the research objectives of this study are

(1) Investigate the impact of PRH as a representative of rental-type affordable housing on the LTSI of migrants.
(2) Examine whether the effect of PRH on LTSI exhibits heterogeneity at the individual and city levels.
(3) Conduct an in-depth exploration into the underlying mechanisms through which PRH influences LTSI, aiming to identify the path logic of this impact.

To achieve the research objectives, this paper uses the data from the China Migrants Dynamic Survey (CMDS) and land transaction data of cities, with an emphasis on PRH, to empirically test their effect on the LTSI of migrants, and further analyze the heterogeneity and the intrinsic mechanism of this effect. In comparison to previous research, this work makes the following contributions: (1) The research perspective is novel. We separate out purchase-type affordable housing with property rights, focus on rental-type affordable housing, and explore the causal effect between PRH and the LTSI of the migrants. This provides a complete chain of evidence for the empirical study of housing security and the settlement intention of the migrants; (2) The empirical analysis is rigorous. We use a series of robustness tests and endogeneity tests to support the validity of the conclusion. The robustness tests include using 2014 and 2016 data, replacing estimation models, screening samples, and combining macro-city variables. The endogeneity tests include the propensity score matching (PSM) method, Oster boundary value analysis, and the instrumental variable (IV) method; (3) We undertake heterogeneity analysis. Considering the differences of individuals and cities, we discuss the effect of PRH on the LTSI of migrants from the aspects of generation, household registration, and the city class in detail; (4) The effect mechanism is explored. Based on the mediating effect model, from the identity perspective, we analyze the underlying logic of the impact of PRH on the LTSI of migrants.

2. Theoretical Analysis and Research Hypotheses

The concept of housing security originated from the theory of welfare economics proposed by Pigou in the 1920s. Pigou advocated for government intervention to redistribute social wealth by taxing high-income individuals and providing unemployment subsidies and social assistance to low-income individuals, aiming to narrow the wealth gap, promote social justice, and improve social welfare. In 1925, the American scholar Burges proposed the feature of "filtering" in housing [19], elucidating the lifecycle and stratification of housing. That is, housing is passed on and filtered by consumers of different income levels within its lifecycle. This concept provides an important theoretical foundation for the design of housing security policies.

China's housing security system has been continuously developed and promoted since the housing reform policy of 1998. However, the primary beneficiaries are urban residents, and rural–urban migrants are at a disadvantage in the city [20]. Housing support projects, such as PRH, often have strict eligibility restrictions [21,22], with only skilled workers or talented young people being included in the coverage [23,24]. Compared to rent subsidies, PRH programs are more exclusive [25]. As a result, for migrants who are not yet able to afford commercial housing, PRH provides an important transitional housing option at below-market rental prices, facilitating their transition from temporary migration to long-term settlement in the city. In the meantime, public housing not only can foster growth of the local economy but also serves as a vital policy tool for promoting urbanization [26].

The PRH plan, China's largest and most adaptable form of public housing, was founded in 2008. Different from other affordable housing programs that are accessible only to local residence hukou, PRH is the first formal rental-type affordable housing option for migrants, with the advantages of low cost and stable leasing present [26]. In principle, PRH can serve as proof that the migrants have formal and stable residence, providing them with an opportunity to apply for permanent settlement in the city. In a way, residing in PRH can alleviate the economic, service, and even household registration barriers migrants face in

urban living [6,27]. After renting for several years, migrants are even permitted in certain cities to buy their PRH at a reduced cost [28].

Chongqing is one of the pioneering cities to vigorously pursue PRH. Studies of its early implementation found that substantially relaxed hukou and PRH policies may impede the permanent settlement of migrants who are socially and economically advantaged. However, PRH remained attractive to disadvantaged rural–urban migrants who are older and have less education [29]. Moreover, rural migrants residing in PRH exhibit a higher level of organization and purpose in their desire to settle in the city [30]. The odds ratio of rural–urban migrants' intention to settle with self-owned housing, PRH, and borrowed housing, taking rental housing as a benchmark, is 3.70 times, 1.93 times, and 1.82 times, respectively. There is a smaller odds ratio of employer-provided housing and shared rental housing [31]. For rural–urban migrants residing in PRH as opposed to those in other types of housing, the impact of housing support on their intention to settle in the city is stronger [4]. Gan and Yaaco indicated that residential satisfaction is an important factor in PRH affecting the LTSI of the migrants. Enhancing the satisfaction of living in PRH can greatly improve their willingness to stay and thus reduce relocation [32,33]. A key indicator of residential satisfaction is the spatial matching of PRH. If PRH is located far from urban areas, the migrants will face obstacles in terms of employment opportunities, commuting time, and transportation mobility [34]. In addition, the quantity and quality of PRH, as well as motivation toward PRH governance, are also three dimensions for assessing its effectiveness and satisfaction [35]. The construction of PRH relies on the area of land supplied. Wang found that an increase in land supply for affordable housing encourages the LTSI of the migrants [36].

Other factors also influence housing option choices. The life cycle theory reveals the cycle of five life trajectories: birth and growth, leaving the family, getting married, having children, and growing old. Each of these stages causes changes in the family structure, which results in different housing needs. In the meantime, the household registration attribute of migrants also determines, to some extent, the difficulty of obtaining PRH and settling in the city. Nationally, more than 80% of cities still maintain the requirement of non-agricultural hukou for residents to qualify for public housing programs [37]. In addition, the quantity and availability of PRH and the openness of its policies differ across city class, and the value of PRH to migrants varies in different cities. For migrants, Shanghai offers higher accessibility to PRH than Guangzhou, Beijing, and Shenzhen in first-tier cities. The new first- or second-tier cities such as Chongqing, Wuhan, Kunming, Lanzhou, and Xi'an provide equal opportunities of PRH to both the migrants and urban residents. In contrast, relative to locals, migrants have greater access to affordable housing in southern cities [37]. The positive agglomeration effect and the negative crowding effect associated with city class jointly determine the LTSI of the migrants. Factors involved include public services, housing prices, urban culture, urban environment, health conditions, and so on [38].

Hypothesis 1 (H1). *For migrants who rent, living in PRH can significantly enhance their LTSI in the city.*

Hypothesis 2 (H2). *There is a heterogeneous effect of PRH on the LTSI of the migrants in terms of individual characteristics (generation, household registration) and city class.*

"Migrant identity" is one of the main topics of study in several academic fields, including sociology, political science, and psychology. The concept of "identity" in academia is typically categorized into two interpretations: ontology and constructivism [39]. According to the former, identity is an individual's ontological awareness of his or her own uniqueness. It holds that personal characteristics such as heredity, personality, and cognitive capacity define the self's identity traits. This perspective focuses on an original identity that transcends time and space and is self-sustaining [40,41]. On the flip side, constructivism stresses the construction and process of identity in a sociological sense, contending that a

person's social identity is formed on the basis of their affiliation with the social group to which they belong. Social identity is the individual's perception of their social group, and a characteristic or attribute of human beings as a social existence and an understanding of who "we" and "they" are [42–44]. For the spatial migration of migrants, identity should be understood as the psychological process of perception, classification, construction, and legitimacy confirmation of self-identity under the influence of ontology and society, including the identity of urban citizens and urban areas, so as to obtain a sense of belonging and achieve urban integration [44–46].

In China, the unique urban–rural household registration system creates a situation where migrants face hukou discrimination, which puts them in an "identity enclave". This challenges their perception of place (the destination city) and identity, thereby reducing their LTSI [47]. Housing, as a symbol of social status, power, and wealth, is an essential source of identity expression for migrants in destination cities [48,49]. Residence in formal housing allows for greater social engagement in daily life, which can help with social integration and build a deeper sense of belonging, thus stimulating the settlement intention for migrants [5]. According to several academics, self-owned housing significantly contributes to the establishment of urban identity among rural–urban migrants [50]. Subsequently, some other scholars have investigated the relationship between affordable housing and the identity of migrants. Compared to migrants living in rental units in other communities, their counterparts residing in affordable housing communities show a significantly better degree of social integration [51]. Furthermore, living in PRH also significantly promotes the identity of rural–urban migrants [52]. Migrants gradually shifted from relying on kinship and village ties to actively seeking various strategies to build neighborhood networks and provide mutual support, thus fostering a sense of place attachment to their new location [53].

Hypothesis 3 (H3). *PRH significantly affects the LTSI of the migrants through identity. That is, identity plays a mediating role.*

The above research hypotheses constitute the theoretical pathway map of PRH, identity, and the LTSI of the migrants, as shown in Figure 1.

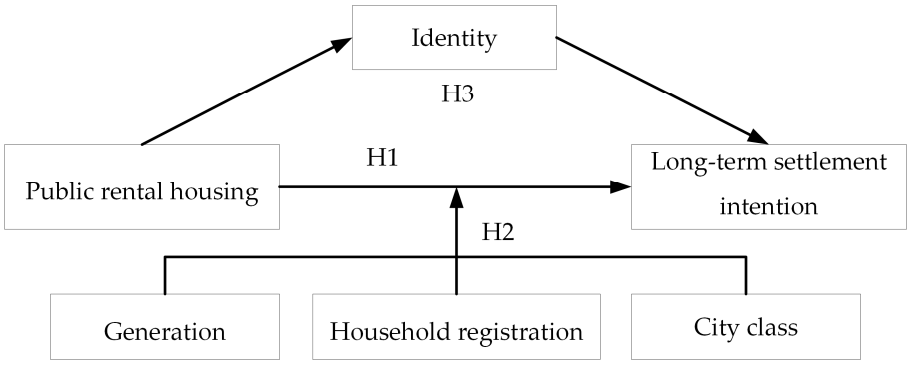


Figure 1. Theoretical pathway map of the effect of PRH on the LTSI of the migrants.

3. Data, Variables, and Methods

3.1. Data

The 2012–2018 China Migrants Dynamic Survey (CMDS) was used as the primary data source for this study. The National Health and Family Planning Commission conducts the CMDS on a yearly basis in 31 provinces (districts, cities) and the Xinjiang Production and Construction Corps of mainland China. The CMDS uses the national standard administrative division codes and unified institutional codes and collects samples through stratified sampling and the multi-stage probability proportional to size (PPS) sampling method. The study focused on migrants aged 15 and above who have been living in the

host city for more than one month and do not possess local hukou. The survey has been implemented since 2009 and is currently updated to 2018.

Notably, in the 2012–2018 CMDS data, the variable for LTSI for the migrants was not recorded in 2013, and the housing attribute variable was not recorded in 2015 and 2018. The 2012 CMDS data only included low-rent housing under affordable housing and did not account for PRH, which does not maintain consistency with the scope of this study (in China, there are differences between low-rent housing and PRH. The beneficiaries of low-rent housing primarily consist of urban low-income families facing housing difficulties. In contrast, PRH eligibility is not restricted by region or household registration and is mainly aimed at middle- and low-income groups, including newly employed workers and migrants. It should be noted that since 2014, PRH and low-rent housing have been merged and collectively referred to as PRH. Therefore, the statistical data from 2012 is not very meaningful for this study). Furthermore, among the remaining data from 2014, 2016, and 2017 that fit into the research content, only the 2017 data (Questionnaire A) provided relatively specific measurements of the mediator variable (identity) required for this study. Moreover, compared to the 2014 and 2016 data, the 2017 data offered the most comprehensive statistics on control variables such as demographic characteristics, household characteristics, socio-economic characteristics, social security, and social networks. Therefore, our research primarily relies on the 2017 data, with the 2014 and 2016 data used for robustness checks. We excluded the group of migrants with homeownership and processed the missing and invalid values in the variables, resulting in a total of 56,289 valid samples in 2017, 103,143 in 2014, and 78,249 in 2016 (as stated in the analysis in the introduction, the positive impact of ownership and affordable housing on the LTSI of migrants has been confirmed by most scholars. And the purchase of housing itself also signifies the LTSI in destination cities. However, the purchase-type affordable housing also belongs to the category of ownership housing. The effect of rental-type affordable housing in the group of renting migrants is not yet known when the rent price is still within the acceptable range. This is the reason for selecting the sample of migrants without homeownership, and it also defines the research objective of this study).

Additionally, to account for the distinct economic levels and population sizes among different cities, city-level data such as per capita gross domestic product (GDP), the share of the tertiary industry, and the resident population were matched with the CMDS data to create a new dataset. These data were sourced from the China City Statistical Yearbook and the National Bureau of Statistics. Section 3.2 shows the 2017 CMDS data information. In addition, for robustness testing, we employed city-level data of the ratio of the land supply area for PRH to the total land supply area (ratio of PRH) to replace the housing micro variables of migrants in the 2017 CMDS data. The city-level data were acquired from the China Land Market Network (CLMN), an information platform managed by the Ministry of Land and Resources. The CLMN encompasses a wealth of data regarding all facets of land supply in China.

3.2. Variables

3.2.1. Dependent Variable—Long-Term Settlement Intention (LTSI)

In the CMDS survey questionnaire, responses to the question "How long do you anticipate staying in the local city if you intend to remain there?" included "1–2, 3–5, 6–10, more than 10 years, settling down, undecided". Referring to existing research [54,55], we defined the migrants who answered more than 5 years and settling down as 1, representing that they have LTSI (that is, they chose one of the three options of "6–10 years", "more than 10 years", and "settling down"). Migrants who chose the remaining options (that is, 1–2 years, 3–5 years, and undecided) were defined as 0, indicating that they do not have LTSI in the local area. In the sample of this paper, there are 23,827 migrants with LTSI, accounting for 42.33%.

3.2.2. Independent Variable—Public Rental Housing (PRH)

In the CMDS survey questionnaire, responses to the question "What is your current housing type?" included "self-owned commercial housing (SOCH), self-owned affordable housing (SOIH), self-owned small property rights housing (SOSPRH), self-built housing (SBH), public rental housing (PRH), whole rental housing (WRH), shared rental housing (SRH), borrowed housing (BH), employer-provided housing (EPH), employment places (EP), other informal housing (OIH)". According to the research objectives of this study, we focused only on examining the impact of rental-type affordable housing on the LTSI of migrants without home ownership. Therefore, we eliminated the samples that chose SOCH, SOIH, SOSPRH, or SBH (with home ownership). Migrants who chose PRH were then defined as 1 and those who chose the remaining housing types, including WRH, SRH, BH, EPH, EP, and OIH were defined as 0. In our sample, there are 771 migrants living in PRH, accounting for 1.37%.

3.2.3. Mediator Variable—Identity

Drawing on prior research [56] and incorporating the objectives of this study, the identity of the migrants was measured according to the respondents' evaluation of the subjective identity and social inclusion of citizens and cities in the questionnaire. As shown in Table 1, a total of eight questions are included, each of which is an ordinal variable. We assigned scores based on the degree of agreement with questions A-G. Questions A to D and H are positively evaluated, with scores ranging from 1 to 4, where 1 represents "totally disagree" and 4 represents "totally agree". Questions E to G are negatively evaluated, with the scoring order reversed, ranging from 4 to 1. The eight indicators have mean values of 3.40, 3.36, 3.33, 3.24, 3.06, 2.36, 3.04, and 2.89, and we used the equal weight average method to obtain the identity index of the migrants, with a final mean value of 3.08.

Table 1. Measurement indicators of the identity of the migrants.

Measurement Indicators	Value of Indicators	Mean
A I enjoy the city/place where I currently live	1 Totally disagree 2 Disagree 3 Generally Agree 4 Totally Agree	3.40
B I am concerned about the changes in the city/place where I currently live		3.36
C I am eager to assimilate into the locals and become one of them		3.33
D I sense the willingness from the locals to embrace me as one of them		3.24
E I sense that the locals despise the outsiders		3.06
F It holds greater significance for me to follow the traditions and customs of my hometown		2.36
G My health habits differ greatly from those of local citizens		3.04
H I now consider myself a member of the locals		2.89

3.2.4. Control Variables

Existing research has found many factors affecting the LTSI of migrants [2,57–59]. Drawing upon these findings, we also controlled for a rich set of individual characteristic variables, including gender, age, education, hukou, fertility status, income, health record (representing the level of local public services), social security, migration years, migration range, social interaction, and work unit. The city is the spatial field for the survival and development of migrants, and city characteristics are important macro factors that determine the cost of living and quality of life of migrants. Therefore, per capita gross domestic product (GDP), the share of tertiary industry, and population sizes were selected as city-level variables to be included in the model. In addition, we included the area fixed effect to control for policy variability across areas (provinces/cities). The definition of variables and descriptive statistical analysis are presented in Table 2.

Table 2. Definition of variables and descriptive statistical analysis.

Variable	Variable Name	Definition	Mean	SD
Dependent variable	LTSI	Whether the migrants have long-term settlement intention in the destination city: 1 = yes; 0 = no	0.423	0.494
Independent variable	PRH	Whether the migrants live in public rental housing in the destination city: 1 = yes; 0 = no	0.014	0.116
Mediator variable	Identity	The sense of identity of the migrants in the destination city (Constructed by questionnaire indicators)	3.085	0.399
Individual characteristic variables	Gender	1 = male; 0 = female	0.576	0.494
	Age	Age of the migrants in log (year)	3.605	0.234
	Square of age	Square of the log of the age of migrants (year)	13.051	1.694
	Education	Years of education (years): 0 = no education; 6 = primary school; 9 = junior high school; 12 = senior high school or technical school; 15 = college; 16 = undergraduate (Bachelor degree); 19 = postgraduate	9.815	3.076
	Income	Monthly household income of the migrants in log (RMB)	8.764	0.682
	Hukou	Whether the migrants are agricultural household registration: 1 = yes; 0 = no	0.817	0.387
	Fertility status	Whether the migrants have children: 1 = yes; 0 = no	0.934	0.249
	Health record	Whether the migrants have the resident health record in the destination city: 1 = yes; 0 = no	0.288	0.453
	Social security	Whether the migrants have a social security card in the destination city: 1 = yes; 0 = no	0.505	0.500
	Migration years	Length of residence in destination city (year)	6.827	5.714
	Migration range	The distance between the destination city and hometown: 1 = cross-province; 2 = cross-city within province; 3 = cross-county within city	1.596	0.729
	Social interaction	The social network, that is, the closest friend in the destination city: 1 = almost no; 2 = non-native (hometown people or outsiders), 3 = native	2.034	0.705
	Work unit	1 = governmental department and organization (GDO)/public institution (PI)/state-owned enterprise (SOE)/state holding enterprise (HE); 2 = self-employed business (SEB), 3 = private enterprise (PE); 0 = otherwise	2.676	0.890
City characteristic variables	Per capita GDP	Per capita GDP in log in the municipal districts of the destination city (RMB)	11.448	0.408
	Tertiary industry	The share of tertiary industry to GDP in the destination city	57.237	11.167
	Population	Resident population (residing for more than six months) in log in the destination city	6.510	0.813
	Square of population	Square of the log of the resident population in the destination city	43.044	10.292

3.3. Methods

3.3.1. Baseline Model—Complementary Log–Log Model (Clog–Log Model)

The LTSI (Y) of the migrants is a binary discrete variable, so the two-point distribution probability model for Y is considered as shown in Equation (1). It can be seen from the above that the percentage of migrants living in PRH is only 1.37%. In the binary choices model, the probability of "housing type is PRH (X) = 1" is very small, which means that access to PRH for the migrants is a "rare event". Even with large samples, there is still a possibility of bias in the estimation results of the logit model and probit model, which is called "rare event bias". Therefore, we used the asymmetric "extreme value distribution"

to obtain the Clog–log model for correction, and the probability of occurrence of the event is shown in Equation (2).

$$LTSI_i(Y_i) = \alpha + \beta PRH_i(X_i) + \gamma Z_i + \theta Area_i + \varepsilon_i,\ Y_i = \begin{cases} 1, Y_i > 0 \\ 0, Y_i \le 0 \end{cases} \quad (1)$$

$$p = P(LTSI_i = 1|PRH_i) = F(PRH_i, \beta) = 1 - exp\left\{-e^{x'\beta}\right\} \quad (2)$$

where $LTSI_i$ denotes the long-term settlement intention of the ith migrant, PRH_i denotes whether the ith migrant lives in public rental housing, Z_i indicates control variables, $Area_i$ represents a regional dummy variable, α, β, γ, and θ denote the parameters to be estimated, ε_i denotes s error term, and $x'\beta = \ln[-\ln(1-p)]$. The reason it is called the "complementary log–log model" is that in Equation (2), $x'\beta = \ln[-\ln(1-p)]$. This means that if we take the complement (complementary, i.e., $1-p$) of the occurrence probability p, and then take the logarithm twice (with one being negative, since $\log(1-p) < 0$), we obtain $x'\beta$.

Probit and logit estimations are equally applicable to the binary choices model. The normal distribution associated with the probit model and the logistic distribution associated with the logit model are both symmetric about the origin. Therefore, in both models, the probability of the event (p) tends to 1 at the same rate as it tends to 0. On the other side, since the extreme value distribution is left-skewed, in the Clog–log model, the speed at which p approaches 1 is faster than the speed at which it approaches 0. This precisely corresponds to the case of rare events. That is, the Clog–log model has a distinct advantage in capturing asymmetric distribution characteristics and is more sensitive in handling low-probability events. Consequently, it effectively corrects the biases induced by rare events. The distribution functions of the probit, logit, and Clog–log models are shown in Figure 2 [60].

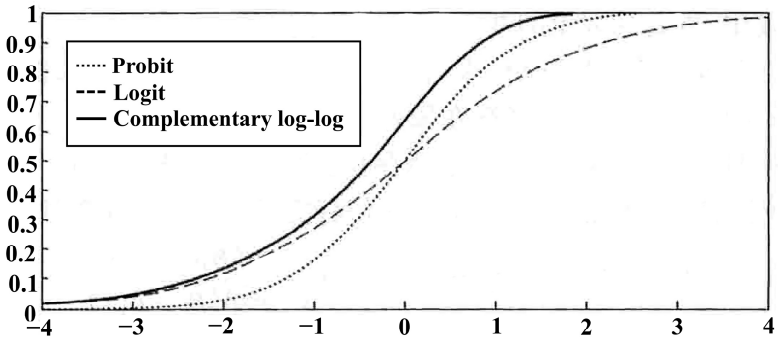


Figure 2. Comparison of cumulative distribution functions for probit, logit, and Clog–log models.

3.3.2. Correcting Selection Bias—Propensity Score Matching (PSM)

Whether the migrants reside in PRH may not fulfill random sampling, but rather be the result of "self-selection". In other words, there are systematic differences of the migrants in the initial conditions (the migrants' own endowments, including age, education, etc.) other than "PRH". In this case, the treatment group and the control group are not comparable, and directly conducting regression analysis may lead to selection bias. Therefore, we used the PSM proposed by Rosenbaum and Rubin [61] to construct a counterfactual framework for correction so as to obtain the net effect of PRH on the LTSI of the migrants. Due to the low proportion of the migrants living in PRH in the sample, PSM can be used to identify the control group with the closest "characteristics" to the treatment group (the migrants living in PRH), thus achieving a similar effect to random experiments.

The analysis steps of the counterfactual framework are as follows: First, estimate the propensity score (p-score). As comprehensively as possible, factors that affect the LTSI of the migrants should be incorporated into the probability prediction model (PSM needs

to satisfy the ignorability assumption, also known as the unconfoundedness assumption. This means that there are no unmeasured "confounder variables" that affect the dependent variable. Even if there are omitted variables, they are not correlated with the dependent variable, implying that there is no omitted variable bias. This is a strong exogeneity condition, which typically requires a rich set of covariates to enhance the likelihood that the "selection on observables" holds. Therefore, other endogeneity tests are needed to address the limitations imposed by this assumption). The logit model is then used to calculate the p-score for the migrants obtaining PRH. Next, perform PSM, which includes the common support assumption, balance test, and selection of matching methods. The balance test requires that after matching, the variables achieve data balancing between the treatment group and the control group. The null hypothesis is that the distribution of x_i is relatively uniform between the two groups after matching. The common support assumption requires an overlapping region of p-scores between the treatment and control group, which is also the prerequisite for matching. If the above test and assumption are not met, it may be necessary to change the matching method. Finally, calculate the average treatment effect on the treated (ATT). Based on the matched sample, compare the average difference in the LTSI of the migrants between the treatment group and the control group. This provides the cause-and-effect relationship coefficient between the PRH and the LTSI of the migrants, which is the ATT. As shown in Equation (3), $\mathrm{P(X_i)}$ refers to the p-score, $\mathrm{D_i} = \{0,1\}$ indicates whether the ith migrant entered the treatment group, and $\mathrm{Y_{1i}}$ and $\mathrm{Y_{0i}}$ denote the estimation results of the treatment group and the control group.

$$\tau_{ATT}^{PSM} = E\{E[(Y_{1i} - Y_{0i})|D_i = 1],\ P(X_i)\} \quad (3)$$

3.3.3. Endogeneity Testing Model

In addition to selection bias, endogeneity issues such as omitted variables, reverse causality, and measurement errors arise when the independent variables are correlated with the error term. Therefore, we conducted further examination using an Oster boundary value analysis and the IV method. Oster boundary value analysis is primarily used to test for omitted variable bias. The IV method can simultaneously address the three endogeneity issues mentioned above. Its principle is to find a variable (IV) that is correlated with the endogenous independent variable but uncorrelated with the error term (or dependent variable), thereby yielding consistent estimates for the regression model.

(1) Omitted Variables Bias—Oster Boundary Value Analysis

We used a boundary value analysis proposed by Oster [62] to examine potential omitted factors and their impacts on the regression outcomes. Oster proved that when the regression model has unobservable omitted variables, the estimator $\beta^* = \beta^*(\mathrm{R_{max}}, \delta)$ can be employed to obtain a consistent estimate of the true coefficient of the independent variable. $\mathrm{R_{max}}$ represents the maximum goodness-of-fit of the regression equation when all omitted variables are observable. $\widetilde{\mathrm{R}}$ denotes the goodness-of-fit of the actual regression equation, typically setting $\mathrm{R_{max}}$ to be 1.3 times $\widetilde{\mathrm{R}}$; δ is selection proportionality, which defines the ratio of the interpretability of observable variables to that of unobservable variables on the dependent variable. When $\delta = 1$, the observable and unobservable variables are equally important and affect β in the same direction.

Specifically, we used two methods to test whether the regression results of this study are significantly changed by omitted variables: (1) We calculated the value of β^*. If β^* falls within the 95% confidence interval of the estimated parameters, it suggests that the estimated effect of PRH on the LTSI of the migrants is relatively robust and less affected by omitted variables. (2) We calculated the value of δ for $\beta^* = 0$. Only when the interpretability of the unobservable variables on the LTSI of the migrants is δ times that of the current control variables, will the estimated effect of PRH on the LTSI of the migrants change significantly. If $\delta > 1$, the results are considered to pass the robustness test.

(2) Instrumental Variable (IV) Method

Due to both the dependent variable (LTSI) and independent variable (PRH) being binary discrete variables, IV methods such as the two-stage least squares (2SLS) and IV-Probit model are no longer effective [63,64]. The 2SLS method is suitable when both the endogenous independent variable and the dependent variable are continuous, while the IV-Probit model is appropriate when the endogenous independent variable is continuous and the dependent variable is binary discrete. Therefore, we employed the bivariate probit model (biprobit model) proposed by Sajaia [64] and the conditional mixed process (CMP) proposed by Roodman [65] for regression analysis. The biprobit model is well-suited for the type of variables in this study, whereas the CMP is not constrained by variable types. For the validity of the CMP, what matters is that the system of equations is recursive, regardless of whether the model itself is recursive. At present, these two methods are well known and frequently applied in academia [66,67].

Both the biprobit model and the CMP are two-stage regressions. In the first stage, we searched for an appropriate IV for the independent variable and validated their correlation. The IV is incorporated into the baseline model for regression analysis in the second stage. The endogeneity of the independent variable was assessed using an endogeneity test statistic. If the endogeneity test parameter is significantly different from 0, it indicates the presence of endogeneity issues in the baseline model. In such cases, the biprobit model and the CMP both produce better estimation results than the baseline model. Conversely, the estimation results of the baseline model are considered more reliable.

In studies at the micro individual level, it is a common method to use the independent variables at a higher level, such as the district/county level or the community level as IV in the field of economics [68]. That is, the average level of PRH in the district/county where the migrant is located other than himself/herself. However, some scholars have suggested that this method, although it can solve the omitted variables bias, is not an effective way to address the reverse causality [69,70]. Therefore, we selected the interaction term between "the average level of PRH in the district/county where the migrant is located other than himself/herself" and "the land supply area for PRH in the city where the migrant is located (2014–2016)" as the IV for PRH. We believe that whether the migrant lives in PRH is affected by the IV, indicating a correlation between them. Furthermore, the IV does not directly affect the LTSI of the migrant, but if it does, the effect is indirect through the nature of individual housing, which confirms that the IV satisfies the exogeneity.

3.3.4. Mediating Effect Model

Mediation effect research aims to investigate how the independent variable (X) influences the dependent variable (Y) through the mediator variable (M). Stepwise regression (this method is proposed by Baron and Kenny, also known as the BK test) [71], Sobel test [72] and the bootstrap test [73] are traditional methods for testing the mediating effect. The test of the coefficient product (i.e., testing H0 : $\tau\varphi = 0$) is central to the mediating effect test. The BK test serves as an indirect test of the coefficient product by sequentially testing $\tau \neq 0$ and $\varphi \neq 0$, from which we can infer $\tau\varphi \neq 0$. The Sobel test and the bootstrap test provide direct tests of H0 : $\tau\varphi = 0$. Nonetheless, these methods are mainly applicable to the mediating effect model of continuous variables. In our study, both the LTSI (Y) and the PRH (X) are binary discrete and the mediator variable (M) of identity is continuous, and none of the above methods are suitable. Therefore, we employed the Karlson–Holm–Breen (KHB) method [74], which is not restricted by variable types and can identify the mediating effect in the nonlinear model. Formulas (1), (4), and (5) are the equations of the mediating effect, where $Identity_i$ is the mediator variable denoting the identity of the ith migrant.

$$LTSI_i(Y_i) = \alpha + \beta PRH_i(X_i) + \gamma Z_i + \theta Area_i + \varepsilon_i \quad (4)$$

$$Identity_i(M_i) = \alpha + \tau PRH_i(X_i) + \gamma Z_i + \theta Area_i + \varepsilon_i \quad (5)$$

$$LTSI_i(Y_i) = \alpha + \beta\prime PRH_i(X_i) + \varphi Identity_i(M_i) + \gamma Z_i + \theta Area_i + \varepsilon_i \quad (6)$$

In addition, a major controversy about the traditional mediating effect model is that it does not consider the endogeneity of the independent variable to the mediator variable. To address this concern, we draw upon Jiang's [75] reflection and suggestion on the mediating effect in causal inference research. He emphasizes a greater focus on the causal mechanism argumentation between PRH and the identity of the migrants beyond the baseline regression (Equation (4)), also known as the two-step method. And the relationship between migration identity and LTSI should be direct and obvious. This provides a more comprehensive validation of the mediating path of identity.

4. Results

4.1. Housing Type and LTSI of the Migrants

Based on the CMDS data from 2012 to 2018, we conducted a comparative analysis of the LTSI of the migrants under different housing types. As shown in Figure 3, the migrants with property housing such as SOCH, SOIH, and SBH exhibit a higher LTSI, aligning with existing research findings. Migrants living in PRH rank second in terms of the proportion desiring long-term settlement, followed by those in other types of housing. In other words, statistical analysis shows that PRH plays a non-negligible role in the urban settlement of migrants. However, this result requires rigorous empirical validation. Therefore, the following analysis explores in depth the effect of PRH on the LTSI of migrants and its mechanism.

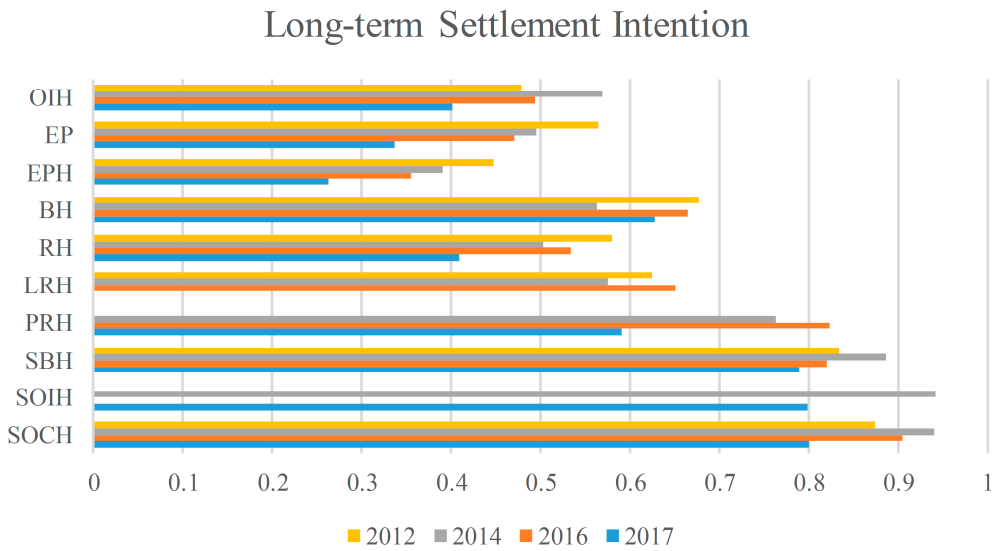


Figure 3. The difference of LTSI of migrants under different housing types (BH represents renting private housing, including WRH and SRH, LRH represents low-rent housing, and the rest is consistent with the above description).

4.2. Baseline Regression Results

As shown in Table 3, the estimated results of Clog–log model regression are presented in columns (1)–(3). Column (1) controls only the independent variable and individual characteristic variables, column (2) adds city characteristic variables, and column (3) further includes the area fixed effect into the model. Overall, after sequentially including the variables, the χ^2 values all pass the significance test, the direction and significance level of the effect of PRH on the LTSI of the migrants remain unchanged, and the effect coefficient gradually increases, which indicates that the estimation results of the Clog–log model are highly robust. These findings confirm that migrants living in PRH significantly improve their LTSI, thus verifying Hypothesis 1.

Table 3. Baseline regression results—Clog–log model.

Variable	Clog–Log Model		
	(1)	**(2)**	**(3)**
PRH	0.479 ***	0.556 ***	0.599 ***
	(9.40)	(10.64)	(11.14)
Gender	0.018	0.026 *	0.024 *
	(1.30)	(1.91)	(1.71)
Age	7.100 ***	7.028 ***	6.100 ***
	(8.16)	(8.10)	(7.01)
Square of age	−0.992 ***	−0.982 ***	−0.847 ***
	(−8.23)	(−8.17)	(−7.03)
Education	0.059 ***	0.055 ***	0.053 ***
	(21.60)	(20.05)	(19.03)
Income	0.244 ***	0.206 ***	0.252 ***
	(14.71)	(12.21)	(14.16)
Hukou	−0.189 ***	−0.180 ***	−0.137 ***
	(−11.00)	(−10.45)	(−7.53)
Fertility status	0.072 **	0.105 ***	0.100 ***
	(2.57)	(3.71)	(3.50)
Health record	0.081 ***	0.108 ***	0.099 ***
	(5.55)	(7.31)	(6.43)
Social security	0.037 ***	0.033 **	0.049 ***
	(2.61)	(2.31)	(3.33)
Migration years	0.042 ***	0.040 ***	0.039 ***
	(35.59)	(33.95)	(31.88)
Migration range (cross-province)	0.286 ***	0.331 ***	0.281 ***
Cross-city within province	(18.65)	(20.98)	(15.64)
Cross-county within city	0.250 ***	0.380 ***	0.370 ***
	(12.17)	(17.64)	(15.88)
Social interaction (almost no)	0.059 ***	0.050 ***	0.052 ***
Non-native	(3.31)	(2.83)	(2.93)
Native	0.318 ***	0.343 ***	0.312 ***
	(16.54)	(17.73)	(15.95)
Work_unit (GDO/PI/SOE/HE)	−0.203 ***	−0.177 ***	−0.149 ***
SEB	(−7.27)	(−6.35)	(−5.27)
PE	−0.290 ***	−0.291 ***	−0.247 ***
	(−10.16)	(−10.19)	(−8.57)
Otherwise	−0.174 ***	−0.175 ***	−0.161 ***
	(−5.95)	(−5.98)	(−5.47)
Per capita GDP		0.191 ***	0.256 ***
		(10.00)	(10.21)
Tertiary industry		0.012 ***	0.010 ***
		(16.92)	(9.28)
Population		−0.195 **	0.375 **
		(−2.51)	(2.22)
Square of population		0.014 **	−0.034 **
		(2.29)	(−2.39)
Area	No	No	Yes
χ^2	4141.69 ***	4706.98 ***	5477.83 ***
Observations	56,289	56,289	56,289

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ (the following table is the same).

For control variables, both individual and city characteristic variables significantly affect the LTSI of the migrants. The findings in column (3) indicate that men exhibit a stronger LTSI, which may be attributed to social roles and expectations. Age has a

significant inverted U-shaped effect on the LTSI of the migrants; as age increases, the LTSI of the migrants initially rises and then declines, which is also in line with the situation in reality. The migrants with a higher education level, higher income level, urban hukou, and children are more likely to stay in the current city. Migrants who possess resident health records and social security cards prefer to stay at their destination. Furthermore, longer years of migration and a smaller range of migration significantly increase the tendency to stay. Increased interaction with locals positively influences migrants' desire to stay in the city. The migrants working in GDO, PI, SOE, and HE have a stronger willingness to stay compared to those in other work units. Among the city characteristic variables, the higher the per capita GDP and the greater the proportion of the tertiary industry in the destination city, the stronger the LTSI of the migrants. Additionally, there is also a significant inverted U-shaped effect of resident population sizes on the migrants, that is, they are more willing to settle in cities with moderate population sizes. Overall, these estimation results are largely in line with those of the earlier research in this field [1–6,9,11,13,14,18,31,57,58,76].

4.3. Robustness Checks

4.3.1. Using CMDS Data from Other Years

Based on the above explanation of the applicability of the CMDS data, we conducted a longitudinal analysis of the research findings using data from 2014 and 2016. Due to variations in questionnaire statistics, the variable selection for 2014 and 2016 differs slightly from that of 2017. The first is the PRH. In 2014 and 2016, the housing attribute variable counted two types of rental-type affordable housing: low-rent housing and PRH. Due to the small sample size, we merged these into PRH. The second one is social security. In 2014 and 2016, the variable "whether one possesses the social security card" was not recorded. We used "whether one has insurance" as a substitute. The third is social interaction, which was not counted in 2014 and 2016, so it is not included in the model. As can be seen in Table 4, overall, the conclusion that PRH significantly promotes the LTSI has temporal continuity, ensuring the generalizability of the research results.

Table 4. Estimated results of 2014 and 2016 CMDS data.

Variable	2014 Year			2016 Year		
	(1)	(2)	(3)	(4)	(5)	(6)
PRH	0.692 ***	0.668 ***	0.624 ***	0.766 ***	0.767 ***	0.757 ***
	(10.51)	(10.09)	(9.36)	(13.79)	(13.40)	(12.91)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	No	Yes	Yes	No	Yes	Yes
Area	No	No	Yes	No	No	Yes
χ^2	6978.25 ***	7432.22 ***	8484.66 ***	5908.26 ***	6476.99 ***	7349.57 ***
Observations	103,143	103,143	103,143	78,249	78,249	78,249

Note: *** $p < 0.01$.

4.3.2. Replacing the Test Model—Logit Model and Probit Model

For binary regression with a categorical dependent variable, the logit model and probit model can also be used. The main difference lies in the distribution functions they assume, with the stochastic disturbance term ε of the former following a standard logistic distribution, whereas the latter follows a standard normal distribution. Chen [60] pointed out that the marginal effect, pseudo R^2, and the correct prediction ratio of the logit model are almost identical to those of the probit model, suggesting that they can be considered basically equivalent. Therefore, the logit model and probit model are used to test the robustness of the Clog–log estimation findings. Consistent with the Clog–log regression, individual characteristic variables, city characteristic variables and the area fixed effect are successively included, as shown in Table 5. We compared this with Table 3 and observed that the regression results of the three models are basically the same, indicating

that the empirical results of PRH significantly enhancing the LTSI of the migrants are robust and reliable.

Table 5. Estimated results of logit model and probit model.

Variable	Logit Model			Probit Model		
	(1)	(2)	(3)	(4)	(5)	(6)
PRH	0.695 ***	0.805 ***	0.848 ***	0.420 ***	0.488 ***	0.515 ***
	(8.88)	(10.01)	(10.34)	(8.79)	(9.98)	(10.28)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	No	Yes	Yes	No	Yes	Yes
Area	No	No	Yes	No	No	Yes
χ^2	3687.60 ***	4181.42 ***	4864.45 ***	3822.94 ***	4384.45 ***	5141.40 ***
Pseudo R^2	0.0575	0.0639	0.0760	0.0567	0.0634	0.0754
Observations	56,289	56,289	56,289	56,289	56,289	56,289

Note: *** $p < 0.01$.

4.3.3. Adjusting the Sample

We further adjusted the sample to test the effect of PRH on LTSI. Clog–log regression was conducted on 80% random samples, samples aged 20–60 years, and samples with a per capita monthly income of 2500–5000 (¥). Specifically, we excluded migrants under the age of 20, as they are likely to be in a stage of schooling or high mobility. Similarly, migrants over the age of 60 may prefer to settle in a fixed place due to factors such as reduced labor force and physical health issues associated with aging [77]. The selection range of per capita monthly income was determined by the quartile values of this variable in the sample of this study. It can be seen from Table 6 that the regression results remain consistent with the above analysis findings, indicating the robustness of the research conclusions.

Table 6. Estimated results of adjusted sample.

Variable	Clog–Log Model		
	(1)	(2)	(3)
	80% Sample	Aged 20–60 Years	Per Capita Monthly Income of 2500–5000 (¥)
PRH	0.628 ***	0.598 ***	0.624 ***
	(10.26)	(11.03)	(8.91)
Individual characteristics	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes
Area	Yes	Yes	Yes
χ^2	4437.68 ***	5453.35 ***	3216.47 ***
Observations	45,031	55,600	32,673

Note: *** $p < 0.01$.

4.3.4. Replacing the Independent Variable

We collected land transaction data of cities from the CLMN for the years 2014–2016. Specifically, we focused on the land supply area for PRH and the total land supply area for the previous two years (294 cities in 2015–2016) and the previous three years (313 cities in 2014–2016). The ratio of PRH was matched with the CMDS2017 data as the independent variable to explore its impact on the LTSI of the migrants. As shown in Table 7, both the ratio of PRH in the previous two years and the previous three years significantly promoted the LTSI of the migrants, which further validates the research conclusion.

Table 7. Estimated results of replaced independent variable.

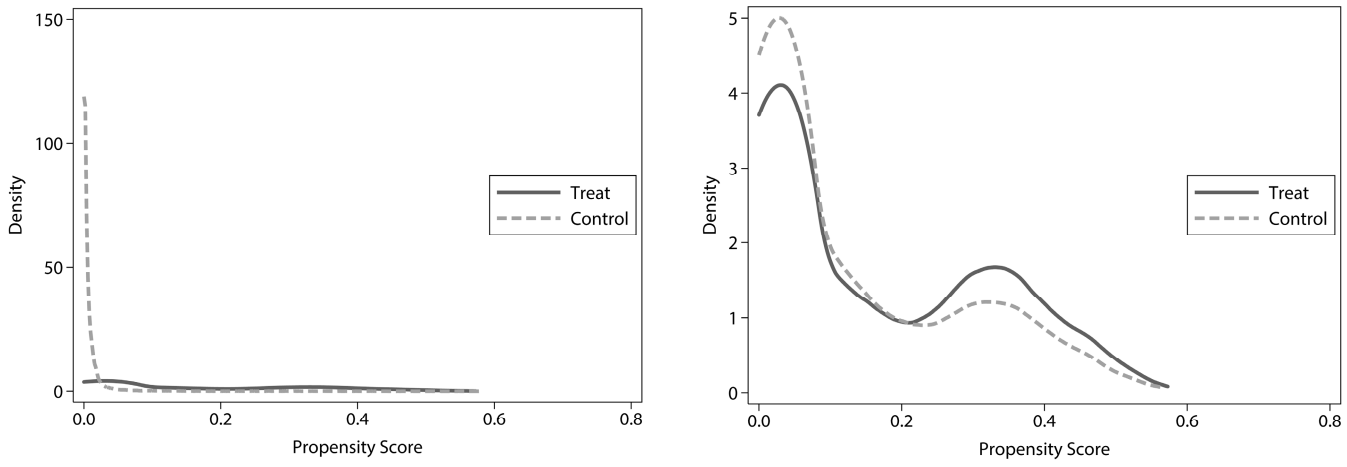
Variable	Clog–Log Model		Logit Model		Probit Model	
	2015–2016	**2014–2016**	**2015–2016**	**2014–2016**	**2015–2016**	**2014–2016**
Ratio of PRH	0.024 ***	0.021 **	0.029 **	0.024 **	0.017 **	0.014 *
	(2.86)	(2.42)	(2.58)	(1.98)	(2.50)	(1.88)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Area	Yes	Yes	Yes	Yes	Yes	Yes
χ^2/F	4867.02 ***	5251.78 ***	4326.59 ***	4677.12 ***	4558.89 ***	4943.60 ***
Pseudo R^2	—	—	0.0729	0.0744	0.0723	0.0738
Observations	51,979	55,096	51,979	55,096	51,979	55,096

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.4. Endogeneity Discussion Results

4.4.1. Correcting Selection Bias—PSM

The PSM method was employed to correct for the self-selection bias of the "residence in PRH" of the migrants to mitigate the endogeneity issues in the sample estimation. To ensure that the mean square error (MSE) was minimized, we used the four-nearest neighbor matching method for PSM. The results after matching can be interpreted from Table 8. On the one hand, the standardized deviations (%bias) of most covariates are greatly reduced, with the absolute values of the %bias for all covariates falling below 10%. On the other hand, the *t*-test indicates that there are no longer significant differences in all covariates at the 1% statistical level. Consequently, we fail to reject the null hypothesis that the distribution is relatively uniform between the two groups of migrants in the matched sample. This suggests that there are no systematic differences between the two groups and that they have similar characteristics. That is, it passes the balance test. Moreover, in this study, the kernel density function is used to assess the satisfaction of the common support hypothesis. As depicted in Figure 4, the propensity score kernel density plot of the pre-matched samples displays obvious deviation, whereas the kernel density curve fitting of the post-matched samples is extremely good, indicating a strong matching effect and adherence to the common support hypothesis. Overall, these findings show that the PSM method effectively reduces the distribution discrepancies between the two groups of samples, indicating a successful matching process.



(**a**) (**b**)

Figure 4. (**a**) Kernel density distributions before matching; (**b**) kernel density distributions after matching.

Table 8. Balance test results.

Variable	Unmatched Matched	Mean		%Bias	%Reduct |Bias|	t	$p > \|t\|$
		Treated	Control				
Gender	U	0.511	0.577	−13.3	82.9	−3.70	0.000
	M	0.511	0.500	2.3		0.45	0.656
Age	U	3.617	3.605	5.3	92.5	1.45	0.148
	M	3.617	3.618	−0.4		−0.08	0.937
Square of age	U	13.135	13.049	5.1	91.1	1.39	0.164
	M	13.135	13.142	−0.5		−0.09	0.928
Education	U	10.388	9.808	18.0	77.1	5.20	0.000
	M	10.388	10.521	−4.1		−0.78	0.434
Income	U	8.552	8.769	−35.6	93.6	−8.75	0.000
	M	8.552	8.539	2.3		0.25	0.806
Hukou	U	0.743	0.818	−18.3	79.3	−5.37	0.000
	M	0.743	0.728	3.8		0.69	0.489
Fertility status	U	0.899	0.934	−12.9	55.2	−3.94	0.000
	M	0.899	0.883	5.8		1.00	0.317
Health record	U	0.276	0.288	−2.6	80.4	−0.71	0.480
	M	0.276	0.274	0.5		0.10	0.921
Social security	U	0.790	0.502	63.1	97.2	15.90	0.000
	M	0.790	0.798	−1.8		−0.39	0.694
Migration years	U	5.955	6.842	−15.4	92.6	−4.28	0.000
	M	5.955	6.020	−1.1		−0.23	0.815
Migration range	U	0.538	0.303	49.1	97.0	14.12	0.000
Cross-city	M	0.538	0.545	−1.5		−0.28	0.779
Cross-county	U	0.148	0.144	1.1	11.1	0.32	0.753
	M	0.148	0.151	−1.0		−0.20	0.844
Social interaction	U	0.406	0.505	−19.9	95.4	−5.45	0.000
Non-native	M	0.406	0.411	−0.9		−0.18	0.856
Native	U	0.350	0.264	18.8	80.5	5.39	0.000
	M	0.350	0.367	−3.7		−0.69	0.490
Work_unit	U	0.198	0.439	−53.5	94.8	−13.42	0.000
SEB	M	0.198	0.211	−2.8		−0.61	0.539
PE	U	0.401	0.275	26.8	96.4	7.74	0.000
	M	0.401	0.396	1.0		0.18	0.856
Otherwise	U	0.275	0.228	10.8	81.2	3.06	0.002
	M	0.275	0.266	2.0		0.39	0.669
Per capita GDP	U	11.272	11.452	−48.6	97.5	−12.21	0.000
	M	11.272	11.268	1.2		0.26	0.791
Tertiary industry	U	51.808	57.312	−50.8	99.1	−13.61	0.000
	M	51.808	51.859	−0.5		−0.10	0.923
Population	U	6.813	6.510	28.7	77.0	10.32	0.000
	M	6.813	6.883	−6.6		−1.10	0.272
Square of population	U	48.004	43.022	37.0	82.1	13.39	0.000
	M	48.004	48.894	−6.6		−1.09	0.274
Area	M			|a| < 10			>0.1

After conducting the matching validity test, we used four matching methods to assess the ATT values of the samples of migrants residing in PRH and those who are not. These methods are k-nearest neighbor matching, radius matching, kernel matching, and local linear regression matching. As shown in Table 9, the ATT results indicate a significant positive influence at the 1% statistical level of PRH on the LTSI of the migrants in the case of mitigating standardized bias. Specifically, the maximum value and minimum value of the ATT are 0.194 and 0.185, corresponding to local linear regression matching and four-nearest neighbor matching. While there are modest differences in ATT values among various matching methods, it is sufficient to demonstrate that PRH has a significant effect in promoting LTSI for the migrants [78].

Table 9. Estimation results of the PSM method.

Matching Method	Match	Treated	Control	ATT	SD	T
	before	0.601	0.421	0.180 ***	0.018	10.03
1-nearest neighbor	after	0.601	0.410	0.191 ***	0.027	7.02
4-nearest neighbor	after	0.601	0.416	0.185 ***	0.022	8.41
Radius matching (radius = 0.05)	after	0.601	0.410	0.191 ***	0.027	7.02
Kernel matching	after	0.601	0.409	0.192 ***	0.020	9.77
Local linear regression matching	after	0.601	0.407	0.194 ***	0.027	7.14

Note: *** $p < 0.01$.

4.4.2. Oster Boundary Value Analysis

The Oster test is primarily suitable for cases where the dependent variable is continuous [62]. Therefore, in this section, the LTSI of the migrants is treated as a continuous variable and OLS regression is employed. The results for the two methods mentioned above are presented in Table 10: (1) when $R_{max} = 1.3\widetilde{R}$ and $\delta = 1$, the value of β^* is calculated to be 0.1882, which falls within the 95% confidence interval of the estimated parameters for the impact of PRH on the LTSI of the migrants; (2) when $R_{max} = 1.3\widetilde{R}$ and $\beta^* = 0$, the value of δ is calculated to be 46.88, which is significantly greater than the critical value of one. Considering that this study has made extensive efforts to control for various factors affecting the LTSI of the migrants, it is highly unlikely to find an omitted variable set that is dozens of times more important than the current control variable set. In summary, the results pass the robustness test, indicating that omitted variables are unlikely to cause interference. Therefore, even with omitted variables present, the conclusion that PRH significantly enhances the LTSI of migrants remains unchanged.

Table 10. Omitted variables bias—Oster boundary value analysis.

Test Method	Evaluation Criteria	Actual Results	Pass or Not
(1) Parameter β	$\beta^*(R_{max}, \delta) \in [0.1527, 0.2236]$	0.1882	Yes
(2) Parameter δ	$\delta > 1$	46.88	Yes

4.4.3. Instrumental Variable Regression

Table 11 displays the regression findings based on the biprobit model and the CMP. The first stage estimation results in columns (1) and (3), indicating that the IV significantly improves migrants' access to PRH, suggesting the IV satisfies the correlation. The second stage estimation results in columns (2) and (4), demonstrating that migrants living in PRH significantly enhances their LTSI, which is consistent with previous findings. This implies that the positive effect of PRH on the LTSI of the migrants is robust, further supporting Hypothesis 1.

Besides the correlation, the results of the biprobit model and the CMP also report the endogeneity test parameters athrho and atanhrho_12. When the endogeneity test parameters are significant, it suggests that the baseline model exhibits endogeneity. As can be seen in Table 11, the PRH in this paper do have endogeneity problems, indicating that the estimation results of the biprobit model and the CMP are more reliable than the baseline model. Moreover, to further test the validity of the IV, we referred to the existing research [79], and employed the weak IV test method of the linear model to test the regression (1)–(4), as shown in Table 11. The findings demonstrate that the F-statistics of the first stage is much larger than 10, thus excluding the weak IV problem.

Table 11. Instrumental variable test.

Variable	Biprobit		CMP	
	The First Stage	The Second Stage	The First Stage	The Second Stage
	(1)	(2)	(3)	(4)
PRH		0.239 ***		0.275 ***
		(2.79)		(3.36)
IV	1.029 ***		1.029 ***	
	(26.86)		(33.05)	
athrho	0.142 ***			
	(3.34)			
atanhrho_12			0.127 ***	
			(3.02)	
Individual characteristics	Yes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes	Yes
Area	Yes	Yes	Yes	Yes
F-statistic of the first stage	1099.04			

Note: *** $p < 0.01$.

5. Further Discussion

5.1. Heterogeneity Analysis

Based on the baseline regression results mentioned above, we discovered that residing in PRH can significantly raise migrants' LTSI. However, the intragroup variations among the migrants are not taken into consideration by these results, which merely show the average influence on the LTSI. As a result, we examined the heterogeneity of the effect of PRH on the LTSI of the migrants from the viewpoints of generation, household registration, and the city class, and show the visualization results. Specifically, according to the traditional definition, migrants are divided into two generations based on the 1980 birth year, with the first born before and the second born in and after that year; in accordance with the unique administrative system in China involving the urban–rural household registration system, the migrants whose hukou is an agricultural household are defined as rural–urban migrants, and the rest as urban–urban migrants; the city class is classified according to the 2017 China City Business Charm Ranking.

As seen in Figure 5, the solid dot represents the regression coefficients and the line segment indicates its 95% confidence interval. None of the 0 values (the yellow dashed line in Figure 5) intersect with the confidence interval of the regression results for the grouped samples. This indicates that PRH has a significant positive effect on the LTSI across different samples. Furthermore, from a generational standpoint, residing in PRH has a stronger effect on the LTSI of the first generation than it does on the second generation. This could be attributed to the fact that the second-generation migrants are still in the early stage of their careers and are uncertain about their future planning and settlement locations, resulting in a relatively lower demand for affordable housing. In addition, a considerable portion of the second-generation migrants are in the stage of first pregnancy or with school-age children. Considering the size and type restrictions of PRH and the educational needs of their children, they still prefer to choose rental housing or ownership housing through the market. For the first-generation migrants, who have clear career plans, a clear place of settlement, and a longer length of migration, owning affordable housing is an important way for them to integrate into and take root in the city when they are unable to afford commercial housing with property rights.

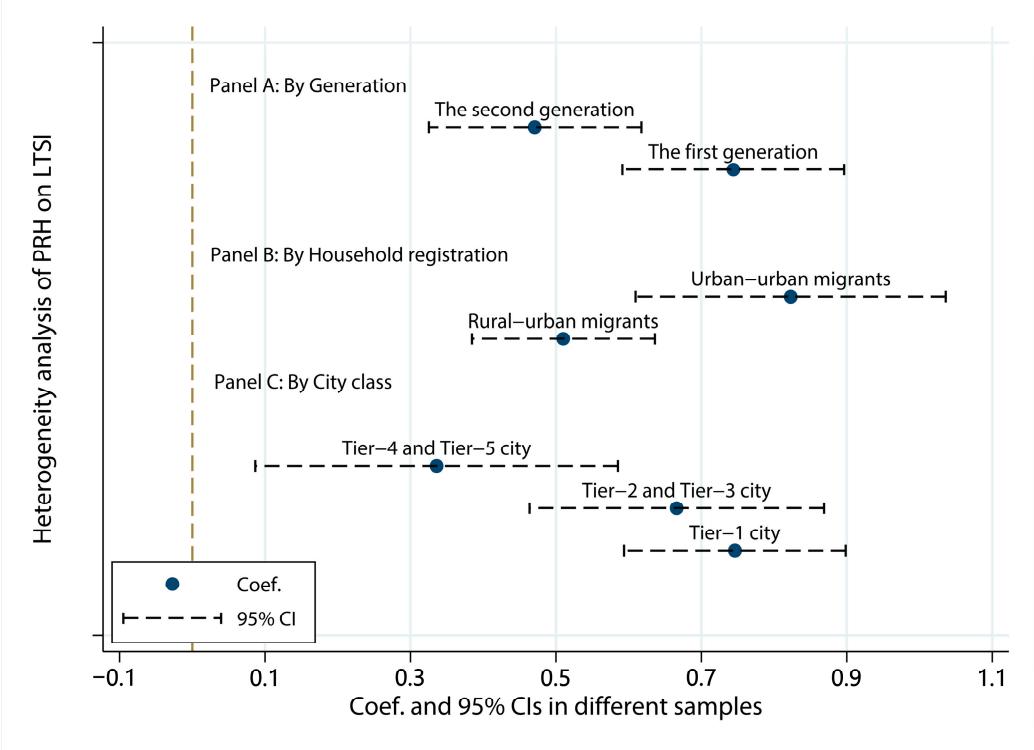


Figure 5. Visualization results of heterogeneity analysis.

In terms of household registration, migrants with non-agricultural hukou who reside in PRH in the destination city have a higher influence on their LTSI than those with agricultural hukou. This means that PRH is more effective in enhancing the LTSI of urban–urban migrants. The possible explanation for this outcome is that rural–urban migrants, even with access to affordable housing, still face significant challenges in adapting to high-pressure urban life. Additionally, the gulf in the household registration system also reduces the accessibility of public services.

For city class, with the decrease in city class, the impact of PRH on the LTSI of the migrants is gradually declining. This result is not hard to understand, as the city class is a symbol of the level of economic development, and the more economically developed a city is, the higher the housing prices and rents will be. Therefore, lower-cost PRH is the optimal choice of housing for migrants. However, for fourth- and fifth-tier cities, housing prices are still within the range of affordability; the migrants tend to prioritize the purchase of property rights housing, and the attractiveness of PRH is reduced.

5.2. Mediating Effect Analysis

Table 12 presents the regression results of the stepwise method to examine the mediating effect. It can be observed that, compared with other renting groups, living in PRH significantly enhances the migrants' sense of identity, and there is a significant positive correlation between identity and the LTSI of the migrants. However, it is still uncertain whether PRH affects the LTSI of the migrants by affecting their identity. To further investigate this, the KHB method mentioned above was employed to decompose the effect of PRH on the LTSI of migrants. As shown in Table 13, the test outcomes from the three models demonstrate that the mediating effect of the identity of the migrants is significantly positive, suggesting that identity serves as a significant pathway through which PRH affects the LTSI of the migrants. We can also conclude that both the total effect and the direct effect are significantly positive, indicating that PRH has a promoting effect on the LTSI. This finding further validates Hypothesis 1. Furthermore, the calculation of the ratio between the mediating effect and the total effect coefficient reveals that the proportion of

the mediating effect amounts to 30%. This implies that 30% of the effect of PRH on the LTSI of the migrants is achieved through the enhancement of their identity.

Table 12. Mediating effect results—stepwise regression.

Variable	Clog–Log Model		Logit Model		Probit Model	
	(1)	(2)	(3)	(4)	(5)	(6)
	Identity	LTSI	Identity	LTSI	Identity	LTSI
PRH	0.049 ***	0.569 ***	0.049 ***	0.829 ***	0.049 ***	0.497 ***
	(3.31)	(10.23)	(3.31)	(9.87)	(3.31)	(9.77)
Identity		0.774 ***		1.075 ***		0.654 ***
		(43.17)		(42.66)		(43.09)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Area	Yes	Yes	Yes	Yes	Yes	Yes
χ^2/F	134.39 ***	7128.09 ***	134.39 ***	6262.66 ***	134.39 ***	6733.49 ***
Pseudo R^2	0.1072	—	0.1072	0.1015	0.1072	0.1009
Observations	56,289	56,289	56,289	56,289	56,289	56,289

Note: *** $p < 0.01$.

Table 13. Mediating effect results—KHB method.

Mediator Variable	Clog–Log Model	Logit Model	Probit Model
Total effect	0.7761 ***	1.0784 ***	0.6556 ***
	(43.80)	(43.30)	(43.89)
Direct effect	0.7738 ***	1.0749 ***	0.6535 ***
	(43.66)	(43.16)	(43.76)
Mediating effect	0.0024 ***	0.0034 ***	0.0021 ***
	(3.22)	(3.20)	(3.20)

Note: *** $p < 0.01$.

Moreover, in reference to the two-step method proposed by Jiang [75] and considering the endogeneity of the independent variable to the mediator variable, the Oster test and IV method (CMP) are also used to focus on testing the impact of PRH on the identity of the migrants. As shown in Table 14, the results of the two parameters (β and δ) of the Oster test pass the validation, indicating that there are no important omitted variables in the effect of PRH on the identity of the migrants. Further, the CMP instrumental variable method was employed in regression analysis with the identity of the migrants as the dependent variable and PRH as the independent variable. The findings imply that although there is a significant positive correlation between the IV and PRH in the first stage, and PRH also significantly improves the identity of the migrants in the second stage, the parameter of atanhrho_12 fails to pass the significance test. This suggests that the findings from the baseline regression analyzing the influence of PRH on the identity of the migrants are more valuable (view the outcomes of Table 12's columns (1), (3), and (5)). In other words, the finding that PRH can help improve the identity of migrants is true and credible.

Indeed, it is necessary to clarify the relationship between identity and the LTSI of the migrants to establish the logical chain where PRH increases the LTSI of the migrants by enhancing their sense of identity. Numerous studies have confirmed that identity is an important factor affecting the LTSI [56,80]. The stronger the identity, the higher the LTSI. As a result, the logical chain of PRH → identity → LTSI is proved, and thus Hypothesis 3 is verified.

Table 14. Endogeneity test of PRH to identity.

Oster Boundary Value Analysis			
Test Method	**Evaluation Criteria**	**Actual Results**	**Pass or Not**
(1) Parameter β	$\beta^*(R_{max}, \delta) \in [0.0199, 0.0777]$	0.0488	Yes
(2) Parameter δ	$\delta > 1$	1.74	Yes
Instrumental variable test (CMP)			
Variable	The first stage		The second stage
PRH			0.065 ***
			(2.67)
IV	1.021 ***		
	(32.77)		
atanhrho_12		0.007	
		−0.219 ***	
		(0.836)	
		(−4.68)	
Individual characteristics	Yes		Yes
City characteristics	Yes		Yes
Area	Yes		Yes
F-statistic of the first stage		1099.04	

Note: *** $p < 0.01$.

From the above analysis, it is evident that PRH exhibits differences in policy, quantity, and value across cities of different classes. The heterogeneity analysis also shows that the lower the city class, the lesser the promotional effect of PRH on the LTSI of migrants. Therefore, we used the KHB method to further explore whether the mediating effect of identity varies across different city classes. The results, as displayed in Table 15, indicate that the mediating effect is only significant in first-tier cities, with a substantial 82% proportion. This suggests that the influence of PRH on LTSI is predominantly achieved through identity. In contrast, in other tiers of cities, identity does not have a mediating effect between PRH and LTSI. The reason is that under the influence of Chinese traditional concepts, if one has the ability to purchase housing, housing ownership remains the primary carrier of the identity for the migrants. Moreover, the decrease in city class implies that the housing affordability of the migrants is relatively stronger. Although this result may be subject to measurement errors due to city classification and sample size, it also reflects a phenomenon that PRH has a greater impact on the identity and LTSI of migrants in larger cities, echoing the previous findings.

Table 15. City class differences in the mediating effect of identity.

Mediator Variable	**Clog–Log Model**		
	Tier-1 City	**Tier-2 and Tier-3 City**	**Tier-4 and Tier-5 City**
Total effect	0.8263 ***	0.7814 ***	0.5985 ***
	(29.43)	(28.95)	(13.29)
Direct effect	0.8196 ***	0.7802 ***	0.5967 ***
	(29.18)	(28.91)	(13.25)
Mediating effect	0.0067 ***	0.0012	0.0018
	(3.85)	(1.25)	(1.42)

Note: *** $p < 0.01$.

6. Conclusions and Implications

In the scenario where the rent-to-income ratio in urban areas has not yet inhibited the migration of migrants, this study responds to the impact of rental-type affordable housing

(taking PRH as an example) on the LTSI of migrants and the intrinsic effect mechanism, focusing on the research subjects of the rental groups of migrants. The findings indicate that

(1) PRH has a significant effect on the LTSI of migrants.

Living in PRH significantly enhances the LTSI of migrants, and the conclusion still holds after conducting robustness tests and addressing potential endogeneity issues.

(2) The effect of PRH on the on the LTSI of migrants is heterogeneous at the individual and city levels.

The heterogeneity visualization demonstrates that the influence of PRH on the LTSI of the migrants varies in terms of generation, household registration, and city class. Specifically, the effect of PRH is more pronounced for first-generation migrants and urban–urban migrants. Additionally, as the city class of the destination decreases, the marginal effect of PRH on the urban settlement of the migrants diminishes, and the significance of PRH becomes increasingly important for first-tier and second-tier cities where the housing prices are higher.

(3) Identity as an inherent mechanism of PRH influences the LTSI of migrants.

A mechanism analysis, conducted using the KHB method and the latest two-step method, confirms that PRH can enhance the LTSI of migrants by improving their sense of identity. The mediating effect accounts for 30%, and it reaches as high as 82% in first-tier cities. To summarize, rental-type affordable housing also plays a key part in the urban settlement of migrants and assumes the important responsibility of solving the housing problem of the migrants.

Regarding the conclusion on the heterogeneity of city classes in the impact of PRH on LTSI, we expanded the analysis based on the existing literature and reality. The existing literature on PRH primarily focuses on first-tier or new first-tier cities. Whether it is the "red model" of Chongqing or the "white model" of Nanjing, both have effectively promoted local economic growth and addressed equity issues by providing PRH for the entire society [81]. The construction of PRH has greatly attracted enterprises to move in [82], and both low-cost housing and ample employment opportunities add to the advantages for migrants to settle in the city. In addition, for Shenzhen, as a first-tier city, the yearly supply may not be able to keep up with the growing list of applicants [83]. Our collection of relevant reports indicates that migrants believe PRH leaves a possibility for them to put down roots in Shenzhen, in contrast to unattainable commercial housing. However, in smaller cities such as fourth- and fifth-tier cities, the vacancy rates of affordable housing are relatively high. Overall, the above analyses support the finding that the diminishing effect of PRH correlate with decreasing city class, which is one of the more striking innovations of this study.

Within the framework of China's new urbanization construction, this paper provides concrete empirical evidence for PRH to promote the LTSI of migrants and enriches the research on the effect mechanism between the two from the perspective of identity. The research results have insightful implications for enhancing the urban settlement of migrants.

(1) Effectively increase the supply of PRH and expand its coverage.

In 2021, the "Opinions of the General Office of the State Council on Accelerating the Development of Government-subsidized Rental Housing" was issued, emphasizing the need to "accelerate the improvement of the housing security system with PRH, government-subsidized rental housing and shared ownership housing as the primary components". Professional operating organizations for PRH are encouraged to lease social idle stock housing for use as PRH. These housing options can then be included in PRH development and annual plans, complemented by supporting policies for PRH. In addition, drawing on the social capital financing approach, utilizing private capital participation can lead to converting old factory buildings into rental apartments. Furthermore, the government should reduce the application requirements and rent standards for PRH, incorporate

migrants, especially rural–urban migrants, into the PRH security system, and improve the efficiency of existing PRH usage to avoid unnecessary resource waste caused by long-term vacancies.

(2) Improve the quality and functionality of PRH and promote the equalization of public services.

Given the family-oriented migration of the migrants, high-quality PRH should be created through aspects such as the size and type of housing, supporting facilities, and the surrounding environment. Furthermore, municipalities should also strive to make PRH attractive for advantaged migrants and control the proportion of disadvantaged residents within such housing [29]. For example, they should aim to optimize the regional distribution of PRH by prioritizing areas with high employment concentrations, rapid housing demand growth, convenient public transportation, and proximity to industrial parks. This will help prevent PRH community construction from being excluded due to weaker economic functions. Currently, many urban welfare benefits, such as education and health care, are still attached to real estate. It is necessary to further improve the "equal rights for tenants and homeowners" policy to address the unfair distribution of urban public resources and services between tenants and homeowners, thereby promoting the urban settlement of migrants.

(3) Rationalize the allocation of supply and the formulation of access conditions of PRH.

For large cities such as first-tier and second-tier cities, it is important to prioritize investment in PRH while developing government-subsidized rental housing and shared ownership housing. For small- and medium-sized towns, it may be appropriate to reduce the down payment ratio of housing purchases, housing deed taxes, and loan taxes of middle- and low-income migrants, so that they can own self-owned housing and enhance their LTSI. In addition, municipal governments should establish a comprehensive evaluation system for PRH across various aspects, including housing security planning, resource allocation, precise distribution, security standards, entry and exit mechanisms, and review supervision. This system will assess the level of PRH security in each region, guiding cities to reasonably formulate access conditions, optimize support methods, and prioritize those with urgent needs.

(4) Strengthen the identity of migrants in the destination city.

Identity also plays a vital role in the LTSI of the migrants. In the social space, the allocation mode and mixed living mode are encouraged. That is, the PRH should be arranged in the living area of the local residents, rather than the construction of a separate centralized residential area. This approach can accelerate the establishment of social networks for migrants and facilitate their cultural adaptation, and then enhance their desire to remain in the city. Furthermore, organizing various social integration activities such as cultural events, entertainment, and fitness programs for both local residents and migrants, particularly rural–urban migrants, can be facilitated through government-purchased services and community-based initiatives. This can foster psychological integration and increase urban participation of migrants, and thus improve their sense of identity in urban communities. Furthermore, another goal should be to enhance humanistic care within the community. Humanistic care involves giving attention to people's living conditions. Care for the disadvantaged should be reflected not only in material assistance but also in spiritual support and rights protection.

It is worth noting that PRH is a kind of rental-type affordable housing under the background of China, and it is also a part of China's housing security policy. Although China's housing security policy has certain institutional peculiarities and may differ from other countries in terms of the means, measures, and intensity of implementation, it also follows general patterns and motives. Each country's housing security policies are designed to address housing market failures and their negative impact on economic and social development and social stability. They are adjusted in accordance with the government's

development strategies and financial constraints and are based on the development of the housing market (accessibility and affordability). In view of these commonalities, the experience and lessons of China's housing security can serve as a useful reference for the majority of developing countries and even developed countries.

Finally, we will discuss the limitations and future direction of this study. First, in line with the research objective of this article, we used the CMDS data to explore the causal relationship between PRH and the LTSI of migrants. The CMDS data is widely recognized for its scientific rigor, authority, and large sample characteristics within the academic community. However, it should be acknowledged that the CMDS data is cross-sectional and therefore, the limitations associated with using cross-sectional data for empirical analysis are unavoidable in this study. Second, on the basis of this study, exploring the differences between purchase-type affordable housing and rental-type affordable housing on the LTSI of migrants is our research direction in the future. Third, due to the limitations of the CMDS questionnaire, we were unable to perform more rigorous psychometric validation of identity and match it to the CMDS data. Therefore, it is inevitable that the operationalization of identity using subjective evaluations may introduce bias in this study.

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