Article

Tolerance for Housing Unaffordability of High-skilled Young Migrants: Evidence from Zhejiang province of China

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Abstract: A large number of studies have concluded that since housing pressure will affect the mobility of highly skilled young migrants (HSYM) in Chinese cities and regions, it is necessary to apply corresponding housing policies to adjust housing unaffordability for HYSM. This study uses a survey data conducted in China's Zhejiang Province of China, where specific policies have been implemented to attract talent and found that housing does crowds out the HSYM from a city, but the HSYM who have a master's degree or above or who work in government organizations or state-owned enterprises are more tolerant of housing unaffordability. The unmarried or those staying in the city for a long period are less tolerant of housing unaffordability. Meanwhile, there are the heterogeneous impacts of factors on the HSYM's tolerance for housing unaffordability across cities of different levels. Therefore, housing policies should highlight urban differences and intra-group differences and call for more housing land should be provided to attract the talents.

Keywords: housing unaffordability; migration; the high-skilled young migrants; land provision

1. Introduction

Since the commoditization reform of housing in China in 1998, housing prices have surged from 2,063 yuan per square in 1998 to 9,860 yuan in 2020. From 2010 to 2018, housing prices in major cities like Beijing, Guangzhou, and Shenzhen had an average annual growth rate of above 20%, triggering widespread relocation of young people to escape Beijing, Guangzhou, and Shanghai to avoid higher housing costs. At the same time, the increasing aging population and the decreasing birth rate poses a major threat to local governments' effort to promote the urban economy due to the lack of the human capital. Therefore, housing unaffordability becomes a significant urban issue for local governments to promote economy in the first-tier cities. In order to solve the problem of youth population loss, first-tier cities in China implemented preferential housing policies to attract highly skilled young migrants HSYM[1]. Compared with other countries that pay more attention on the equity of the housing unaffordability [1,2], local governments in China prefer to use HSYM housing subsidies and hukou preferential policies based on education and skill levels to attract talent to their areas [3].

This article on housing unaffordability is to answer the question of who has been crowded out by unaffordable housing prices in destination cities. Or who keeps migrating

[1] The "highly skilled young migrants" are those who have a college degree or a higher level of education because education has had an overwhelming effect on economic and political outcomes This article defines the group of HSYM as being under 35 years old in Zhejiang Province. They are not native residents of Zhejiang, but are employed in cities in that province.

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to these cities? Relevant studies have shown that housing unaffordability lessens the attractiveness of megacities for highly educated individuals [4-6]. Housing has become the biggest expenditure for HSYM and thus plays a determinant role in migration decisions [7]. As a household's primary expenditure, housing cost also plays a significant role in differences in the skill composition of workers across cities. Higher housing prices are more likely to crowd out low-skilled workers than high-skilled workers [8-9]. According to push-pull theory, whether laborers finally choose to flow in or out to a particular is a balanced result of a pulling force and a pushing force, and housing price is an essential factor [10-11]. Changes in urban housing costs breaks the urban spatial equilibrium and leads to a series of economic responses, like changes in employment, wages, urban facilities costs, and land prices [12]. In China, Chen et al. [13] attempt to answer how housing unaffordability determines the group of the migrants and their results show that the attractiveness of superstar cities has declined over time as housing becomes increasingly unaffordable. However, they fail to analyze the heterogeneity of HSYM and the relationship between the individual characteristics of the group and their housing unaffordability preferences.

This article draws the following conclusions. Firstly, empirical results show that housing unaffordability crowds out HSYM from a city. Secondly, the housing unaffordability of HYSM has group differences. HSYM who have a master's degree or above, or who work in government organizations or state-owned enterprises are more tolerant of housing unaffordability. However, unmarried or long-term city residents are less tolerant of housing unaffordability. Finally, the authors also find the heterogeneous impact of factors on the HSYM's tolerance for housing unaffordability across cities of different levels. This article makes the following contributions to the existing literature. Firstly, it contributes to the literature on housing unaffordability and location choice by investigating the factors influencing HSYM's tolerance for housing unaffordability [13]. Secondly, the authors have explored the heterogeneity of housing unaffordability and these heterogeneities in sub-provincial and prefecture-level cities. Thirdly, this article avoids the endogeneity issues caused by omitted variables when studying the relationship between housing unaffordability and cross-city location choice by studying the heterogeneous tolerance for housing unaffordability. In most studies on cross-city location choice, it is not easy to control all the variables that determine a city's amenities, as these, together with housing unaffordability, influence people's location choice. The omitted variables may cause endogeneity issues. Finally, the findings suggest that policy implications vary by city and group. The governments of cities that are more economically developed and higher political status should assign more land for building Shared Ownership Homes (SOH). At the same time, the SOH should be provided to unmarried HSYM who are long-term city residents.

The remainder of this article is structured as follows: Section 2 reviews housing policies introduced in major Chinese cities and the factors affecting housing unaffordability for HYSM; Section 3 describes how the index is built to measure housing unaffordability, and introduces the empirical model, details data sources, variables, and practical design. Section 4 presents the main empirical results. Section 5 concludes the whole study and provides policy implications.

2. Background

China's major cities began to "compete for talent" from 2017 onwards, with many cities introducing policies to attract urban talent, such as Chengdu, Hangzhou, Chongqing, Wuhan, Xi'an, Tianjin, Nanjing, Zhengzhou, and Changsha "New first-tier cities" have successively introduced new talent policies to attract college students and professional and technical personnel to settle down [14]. For example, the "Excellent Talent Residency Plan" in Beijing; the "Five-year Retention of One Million College Students" in Wuhan; the "Million Talent Plan" in Hainan; the "Haihe Talent" in Tianjin; and the "Innovative Talents Express Entry Policy" in Hong Kong, have been implemented to attract

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HSYM. The most commonly used policy tool in these plans is the household registration (*hukou*) system, and housing subsidies to the HSYM (see Appendix A).

Although research assessing housing unaffordability in the context of western, developed countries' housing policies has dominated, an increasing number of such studies are emerging from other countries [15-17]. Most of studies follow the framework of Roback [18], which describes factors such as income, housing cost, and amenities, that determine people's migration decisions. High housing prices that deter immigrants and lead to loss of human capital has always been heatedly discussed. Many studies argue that high housing prices directly lead to labor outflow [19] Monk [20], and Rabe et al. [7] conclude that relatively higher housing prices constrain cross-regional labor inflows, which is the main reason for labor shortages in the southeast regions of the UK. Brakman et al. [21] reach a similar conclusion with data from German sub-regions. Foote [22] points out that rising housing prices have a positive wealth effect for homeowners but a negative locking effect on labor migration decisions.

Furthermore, from a more micro perspective, housing is closely related to individual utility and urban social utility. Housing accessibility and affordability affects the urban choice of laborers by influencing family wealth, family consumption, children's education level, and personal salary level. The theory of spatial equilibrium holds that changes in productivity in the local labor market will lead to changes in employment, wage, and price levels, which will affect labor welfare [12]. The rise in house prices increases the cost of living, which leads to a decrease in real income, thus inhibiting consumption [23-24]. Housing can also affect parents' income and education level to achieve social inequality reproduction [25].

The HSYM is a specific labor group. Firstly, this group is distinct from the general labor group because they are in the early stage of their lifecycle. For young labor, housing preference and opportunities are highly related to life events like marriage, fertility, and job position shifts [26-27]. The timing of these events also restricts housing demand and affordability [26]. Secondly, the spatial sorting literature divides labor into either high skilled and the low skilled [9]. Regional differentials in human capital agglomeration, skill-based compensation, cost-of-living, amenities, and the like, will lead to cities of different sizes attracting labor with different skill levels; low-skill migrants are found to have little incentive to co-locate with high-skilled workers [9] The highly skilled worker can benefit marginally more from congested cities through learning and knowledge spillover, and thus more tolerant for high housing costs [28].

In recent years, with rising housing prices in China, housing also has investment value, which affects class mobility, especially for HYSM [29-30]. There is conflict between the expected social contribution of youth and their anxiety caused by housing overcrowding or high housing price in cities, which directly impacts their migration decisions. As a consequence, there are numerous studies on the relationship between housing and labor mobility in China. However, what makes the study of China China's is its special household registration (*hukou*) system[2], which distinguishes China's urban and rural areas. China's labor mobility research also includes rural-to-urban labor migration and interprovincial regional labor mobility research.

Rural-to-urban migrants are often characterized as labor with low education and low income, while interprovincial regional migrants usually have a relatively high level of education and culture, are high-skilled and a high income with a strong desire to live in the

[2] The *hukou* system was first set up in cities in 1951 and extended to rural areas in 1955. It is a household-based population management system, and it strictly controlled the population flow between regions. After reform and opening-up in China, the government began to gradually liberalize the free movement of the population but did not change the *hukou* system itself. Generally speaking, residents' *hukou* locations are determined by their place of birth or the location of their parent's *hukou*, which, in turn, directly determines where residents receive their social benefits, including education, medical insurance, and social security [31].

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city [32]. Gao investigated panel data from 35 large and medium-sized cities in China from 2000 to 2009, and found that rising housing prices in cities induce labor outflows, and this inhibition is reflected in rural labor [33]. This inhibition effect has not eliminated the continued inflow of population from other areas, and Fan et al. concluded that the new migrating population is mostly low-skilled labor, mainly living in low-cost housing, and residential transactions are not closely related [34]. However, with the rapid rise in prices in China's first-tier cities. High housing prices not only have spillover effects on low-skilled labor, but also make first-tier cities less attractive to high-skilled labor [13]. As the housing pressure on first-tier cities grows, the outflow trend becomes apparent due to the high cost of all economic activities caused by rising housing prices [11].

However, the impact of housing stress on housing choices is moderated by other factors, such as individual utility [35-36], and social utility [37-39]. Further analysis shows that there are group differences in the negative impact of housing affordability. For those who do not own their own homes, the high cost of living increases the probability of moving at some point. Wen [40] found that the effect of house prices on workers' willingness to stay in cities with different skills, incomes, mobility, and ages is heterogeneous. In addition, for the young, housing preference and opportunities are highly related to life events like marriage, fertility, and job position shifts [26-27].

The literature on labor mobility generally acknowledges a growing trend of concentration of population towards large cities and metropolitan areas [41-45]. Laborers make decisions to move to big cities for higher expected incomes and a better life, better jobs, high quality education, and abundant social environment; therefore, housing is a critical factor of individual and social utility [46]. These studies show that different cities have varied development opportunities for young people. Regional economic activities will also lead to cities of different sizes attracting labor with different skill levels [9]. Existing studies have shown that HSYM prefer to go to first-tier cities. Therefore, HSYM in different cities will tolerate different housing situations.

3. Method

3.1. Data

The data used in this article are from a survey that was conducted by the Zhejiang Housing Provident Fund Center and the Zhejiang University of Technology in April 2018. The object of this survey was to investigate the permanent resident population aged 16 to 60 who have lived in urban areas for more than six months. They are not native residents but have been employed in cities in Zhejiang Province. The survey of this article covered the 24 counties (urban area) in 11 cities in Zhejiang Province, including Hangzhou, Ningbo, Wenzhou, Jiaxing, Huzhou, Shaoxing, Jinhua, Quzhou, Zhoushan, Taizhou, and Lishui. A detailed survey was conducted on group characteristics, housing conditions, housing needs, constraints to solving housing problems, and housing provident fund support measures, and a total of 10,337 valid survey samples were obtained. In the final analysis, this article took samples of individuals with a college degree or above and under the age of 35 as focus of this research object, and the analysis sample was 2724.

3.2 Variables

This article focuses on HSYM who are living in a city in Zhejiang Province during the survey period to investigate the factors that influence their tolerance for housing unaffordability. Table 1 shows each variable's statistic description. Will is the dependent variable which indicates the long-term residence intention of HSYM. The question measures their willingness to stay in the city, "How long do you plan to live/work in the city in the future?". This article considers those who choose to stay for over five more years as having willingness to live there long-term, and Will=1; otherwise, Will=0. Existing studies generally use five years as the standard for defining the long-term willingness to stay of the migrant population in China (Huang et al., 2020). Moreover, many policy designs in China use five years as the minimum threshold. For example, in many cities, including those in

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Zhejiang, the condition for young talent to buy new homes with price discounts is to hold and stay in the homes for at least five years before reselling.3.1. Subsection

Table 1. Statistical description of variables.

Variable	N	Mean	S.D.
Will (intend to stay =1)	2724	0.560	0.497
PIR	2724	10.180	12.113
PIR* PIR	2724	250.360	1,285
AP	2724	10,081	3,632
Demographic characteristics variables			
Age	2724	29.050	3.478
Gender (male=1)	2724	0.490	0.500
Edu (college and bachelor's degree=1)	2724	0.930	0.255
Unmarried	2724	0.440	0.497
Member	2724	2.410	1.766
Employment variables			
Occupation (government organizations and state-owned enterprises=1)	2724	0.250	0.433
Industry (labor-intensive industries =1)	2724	0.700	0.460
Migration history variables			
MM (migrates across urban areas=1)	2724	0.600	0.490
POS	2724	5.450	3.232
Housing condition variables			
HPF (having a housing provident fund =1)	2724	0.800	0.398
HOS (having housing ownership =1)	2724	0.440	0.497

This article defines housing unaffordability as the ability of households to purchase housing within their income levels [47] The authors measure the tolerance for housing unaffordability as the impact of housing unaffordability on an individual's willingness to migrate out of the city. In addition, although the housing price to income ratio (PIR) is commonly used to reflect the existence of a housing bubble from the perspectives of housing unaffordability and housing market sustainability [48], this article uses the PIR at individual level to measure housing unaffordability at the individual level. The housing price income ratio PIR is calculated as Equation (1). It is the ratio of the average housing price of the HSYM's city k (AP_k) to his/her annual household income after tax in the year before the survey (Income_i). The coefficient of PIR as well as that of PIR*PIR measures the HSYM's housing unaffordability. Housing unaffordability refers to the housing cost burden that a HSYM has to bear in the city.

$$\mathrm{PIR_i} = \frac{\mathrm{AP_k}}{\mathrm{Income_i}} \quad (1)$$

Non-housing-affordability factors are considered, which may influence the willingness of the HSYM reside in the city long-term. As argued by Yang et al. (2017), the impact of housing price on city choice by HSYM is heterogeneous in terms of individual, family, and economic characteristics, as well as life cycles, and occupations [49]. This article includes the four categories of variables which are specified and justified as follows (for the specific definitions, see Appendix B).

1) Demographic characteristics variables. Gender, age (Age), education level (Edu), marital status (Unmarried), and family population (Member) that influence migrants' resettlement decisions [50].

2) Employment variables. Different jobs in terms of enterprises' ownership status (Occupation) and industry type (Industry) and different labor skills will affect the migration of the HSYM between cities [30].

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3) Migration history variables. Migration history variables including the period of staying (POS) which is the number of years the HSYM's family has been staying in the city and mobility mode (MM) which reveals whether the HSYM had moved from another urban area to the current city or had moved from a rural area to the current city.

4) Housing condition variables. It is a vector of variables, including access to a housing provident fund (HPF) and homeownership status (HOS).

This article will also consider the heterogeneity intolerance for housing unaffordability across cities of different economic scales and political hierarchy levels. The authors group the 11 cities in Zhejiang Province into two categories, sub-provincial and prefecture-level cities, respectively. Hangzhou and Ningbo are sub-provincial cities, and the other cities are prefecture-level cities.

3.3. Empirical design

Given that willingness to reside long-term is the dependent variable and a dummy variable, the authors built a Binary Logistic model as Equation (2):

$$\begin{aligned} Logit(Will_i) = {} & Con + \alpha_1 PIR_i + \alpha_2 PIR_i * PIR_i + \beta_1 Gender_i + \beta_2 Gender_i * PIR_i + \gamma_1 Edu_i \\ & + \gamma_2 Edu_i * PIR_i + \delta_1 Unmarried_i + \delta_2 Unmarried_i * PIR_i \\ & + \mu_1 Occupation_i + \mu_2 Occupation_i * PIR_i + \vartheta_1 Industry_i + \vartheta_2 Industry_i \\ & * PIR_i + \rho_1 MM_i + \rho_2 MM_i * PIR_i + \sigma_1 POS_i + \sigma_2 POS_i * PIR_i + \tau_1 HPF_i \\ & + \tau_2 HPF_i * PIR_i + \varphi_1 Age_i + \omega_1 Member_i + City + \epsilon_i \end{aligned} \quad (2)$$

α_1 and α_2 are coefficients of PIR_i and $PIR_i * PIR_i$. The two coefficients measure the tolerance for housing unaffordability by HSYM. This article includes the interaction terms between PIR_i and the eight categories of variables ($Gender_i * PIR_i$, $Edu_i * PIR_i$, $Unmarried_i * PIR_i$, $Occupation_i * PIR_i$, $Industry_i * PIR_i$, $MM_i * PIR_i$, $POS_i * PIR_i$, $HPF_i * PIR_i$), and their coefficients (β_2, γ_2, δ_2, μ_2, ϑ_2, ρ_2, σ_2 and τ_2) measure the adjustment effects of the eight categories of variables on the HSYM's tolerance for housing unaffordability. Age_i and $Member_i$ are two continuous variables. City indicates the city fixed effect, Con represents the constant term and is ϵ_i the error.

4. Results

This section details three features of empirical results. In 4.1., this article demonstrates that housing unaffordability, education level, industry type, marital status, mobility mode, period of stay, and home ownership all significantly impact the HSYM's willingness to reside in a city long term. In 4.2., this article discusses the factors that affect the HSYM's tolerance for housing unaffordability. In 4.3., this article demonstrates heterogeneous effects across cities regarding the HSYM's tolerance for housing unaffordability.

4.1. Factors that affect long-term residence willingness of the HSYM

In Table 2, the dependent variable is long-term residence willingness (**Will**). Column (1) shows that the coefficient of the housing unaffordability (**PIR**) is -0.628 and the significance is at the 1% level, which means the higher the **PIR** is, the lower the willingness of an HSYM to settle down in the city for an extended period. The coefficient of **PIR** $*$ **PIR** is 0.0412 and significant at the 5% level, which indicates that the reduction in long-term residence willingness is associated with the increase in **PIR**, but that higher **PIR** will lead to an increase in long-term residence willingness.

In Column (2), the authors further control demographic characters and their interaction terms with **PIR**. From Column (3) to Column (5), this article adds in the categories of variables one by one, including employment factors, migration history, housing condition, as well as their interaction with **PIR**. The result shows that the coefficients of most variables are consistent across the columns and the Pseudo R2 in Column (5) reaches 0.1661. Thus, the results in Column (5) are robust. As shown in Column (5), the coefficient

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of housing unaffordability (**PIR**) is -0.806 and is significant at the 1% level and the coefficient of **PIR** ∗ **PIR** is not significant.

The coefficient of education level (**Edu**) is 0.446 and is significant at the 10% level, indicating that the long-term residence willingness of the HSYM with a master's degree or above is 56.21% ($e^{0.446}$-1) higher than that of the HSYM with a college or bachelor's degree. This is consistent with the findings of Li and Xie (2020). This indicates that the sample cities are more attractive to highly skilled young migrants. The coefficient of marital status (**Unmarried**) is -0.457 and is significant at the 1% level. This indicates unmarried HSYM's long-term residence willingness is 36.7% (1-$e^{-0.457}$) lower than the married or the divorced, given other variables controlled. Without family burden, unmarried people tend to be more mobile and able to pursue better opportunities across cities.

In terms of employment factors, the long-term residence willingness of the HSYM working in labor-intensive industries (**Industry**) is 29.56% ($e^{0.259}$-1), higher than those working in non-labor-intensive industries. This can probably be explained by the fact that labor-intensive industries are quite similar across cities. Migrating to another city does not improve the HSYM's welfare.

The coefficient of mobility mode (**MM**) is -0.302 and is significant at the 10% level, which means that the long-term residence willingness of the HSYM who have moved from another urban area to the current city is 26.07% (1-$e^{-0.302}$), lower than the HSYM who are from rural areas. This indicates that the urban-born HSYM are more mobile than the rural-born.

The period of staying (**POS**) is 0.302 and is significant at the1% level, which means that the longer the HSYM have been staying in a city, the more likely he/she will be willing to live in that city long-term. Homeownership (**HOS**) also influences long-term residence willingness significantly. Its coefficient is 1.008 and is significant at the 1% level, which means owning a home in the city is associated with long-term residence willingness higher by 174.01% ($e^{1.008}$-1), with other variables controlled. That can explain if people own a home in a city or if they had been staying there for a longer time, they may have a deeper attachment to the city.

Table 2. HSYM's Willingness to Reside in a City Long Term and Factors Influencing Their Tolerance for Housing Unaffordability**.**

	Will				
	(1)	(2)	(3)	(4)	(5)
PIR	-0.628***	-0.473	-0.726**	-0.927***	-0.806***
	(0.169)	(0.326)	(0.329)	(0.304)	(0.304)
PIR* PIR	0.0412**	0.0148	0.014	0.006	-0.021
	(0.020)	(0.022)	(0.030)	(0.035)	(0.037)
Age		0.207***	0.209***	0.035	0.002
		(0.058)	(0.060)	(0.053)	(0.039)
Gender		-0.043	-0.057*	0.0017	0.056
		(0.033)	(0.031)	(0.035)	(0.053)
Gender*PIR		0.055	-0.058	-0.058	-0.132
		(0.149)	(0.135)	(0.153)	(0.136)
Edu		0.362*	0.603***	0.410**	0.446*
		(0.196)	(0.219)	(0.201)	(0.250)
Edu*PIR		0.195	0.473**	0.544***	0.524***
		(0.211)	(0.186)	(0.178)	(0.182)
Unmarried		-0.557***	-0.578***	-0.559***	-0.457***
		(0.112)	(0.109)	(0.128)	(0.116)
Unmarried*PIR		-0.126	-0.179**	-0.302***	-0.340***
		(0.097)	(0.086)	(0.098)	(0.115)
Member		0.239***	0.246***	0.181***	0.087
		(0.054)	(0.058)	(0.053)	(0.055)
Occupation			0.348***	0.367**	0.215

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			(0.133)	(0.145)	(0.155)
Occupation *PIR			0.579***	0.600***	0.545***
			(0.142)	(0.139)	(0.120)
Industry			0.294*	0.303**	0.259*
			(0.157)	(0.129)	(0.138)
Industry*PIR			-0.142	-0.067	0.0152
			(0.154)	(0.137)	(0.104)
MM				-0.429**	-0.302*
				(0.188)	(0.161)
MM*PIR				0.166	0.121
				(0.113)	(0.116)
POS				0.354***	0.302***
				(0.116)	(0.110)
POS*PIR				-0.234**	-0.274**
				(0.093)	(0.109)
HPF					0.485
					(0.320)
HPF*PIR					0.132
					(0.304)
HOS					1.008***
					(0.149)
HOS*PIR					0.180
					(0.230)
City Fixed Effect	Yes	Yes	Yes	Yes	Yes
Con	0.516***	0.575***	0.181	0.613*	-0.457
	(0.006)	(0.192)	(0.270)	(0.317)	(0.525)
Observations	2,724	2,724	2,724	2,724	2,723
Pseudo R2	0.058	0.102	0.113	0.135	0.166

Notes: Standard errors are clustered at city level, and they are presented in parentheses under the coefficients; *** p<0.01, ** p<0.05, * p<0.1. The results in this table is based on respondents from all sample cities.

4.2. Factors that have adjustment effects on tolerance for housing unaffordability

4.2.1. Demographic characteristics

As shown in Column (5) of Table 2, the coefficient of the interaction term between PIR and Gender is not significant at 1%, which means tolerance for housing unaffordability does not make use of gender differences. The coefficient of the interaction term between PIR and Edu is 0.524 and is a significant at the 1% level. It means the HSYM having a master's degree or above has a higher tolerance for housing unaffordability than those with bachelor or college degrees. This is mainly because HSYM with higher education levels have more sophisticated knowledge and better learning skills, making them benefit more from knowledge spillover through a higher level of agglomeration in a city with higher housing prices. This results in their higher tolerance for the current housing unaffordability. The coefficient of the interaction term Unmarried*PIR is -0.340 and is significant at 1%, which indicates that the unmarried have a lower tolerance for housing unaffordability. The unmarried are more mobile than the married, and are more flexible to migrate and find a city that can give them better welfare (lower housing burden, higher income, better amenities).

4.2.2. Employment

The coefficient of the interaction term Occupation*PIR is 0.545 and is significant at 1%. This indicates that HSYM working in government organizations and state-owned enterprises have a higher tolerance for housing unaffordability than the HSYM working in non-government organizations and non-state-owned enterprises. This can be explained by the difference in occupation stability between the two types of enterprises. In China,

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jobs in government organizations and state-owned enterprises are tenured, and HSYM working in these organizations are less likely worried about unemployment. They are regularly paid and can often get a generous bonus. In this way, they have less pressure and face lower income risk than those in private organizations and can significantly tolerate housing unaffordability. Differently, the interaction term between the tolerance for housing unaffordability (PIR) and industry type (Industry) is not significant. It means the industry type (Industry) of HSYM did not have a significant effect on the tolerance for housing unaffordability.

4.2.3. Migration history and housing condition

In Column (5) of Table 2, the interaction term between the mobility mode and tolerance for housing unaffordability (MM*PIR) is not significant. However, the interaction term between the period of staying and tolerance for housing unaffordability (POS*PIR) is -0.274 and is significant at the 5% level. It indicates that a longer period of staying reduces the tolerance for housing unaffordability, which can be explained by the fact that if HSYM's income cannot keep up with the city's economic development and rising housing prices, they cannot afford to buy a home in the city while they reside there. They lose their patience and hope to own a home in the city and thus have a lower tolerance for housing unaffordability. The coefficient of HPF* PIR and HOS*PIR for the HSYM are not significant. This means the owning a home (HOS) and having housing provident find do not affect HSYM's tolerance for housing unaffordability. This may because that the housing loan policy in the province as a whole has caused similar housing pressures for both homeowners and renters and the housing policy subsidies are insufficient.

In summary, this article finds the HSYM who have a master's degree or above or who work in government organizations or state-owned enterprises are more tolerant of housing unaffordability. However, the unmarried or those staying in the city for a long period are less tolerant of housing unaffordability.

4.3. Heterogeneity effects between sub-provincial cities and prefecture-level cities

The authors expect heterogeneous adjustment effects of factors on tolerance for housing unaffordability by HSYM across different economic and political hierarchy status cities. The 11 sample cities in Zhejiang Province are grouped into two categories. One is sub-provincial cities with higher economic development levels, higher agglomeration levels, and higher housing prices than the other category, prefecture-level cities. The results are provided in Table 3.

Table 3. Heterogeneity Effects across Cities in Terms of HSYM's Tolerance for Housing Unaffordability of High-skilled Young Migrants.

	Will	
	Sub-provincial Cities	**Prefecture-level Cities**
	(1)	(2)
PIR	-1.199	-0.377
	(0.957)	(0.342)
PIR* PIR	-0.043	-0.028
	(0.042)	(0.086)
Age	-0.079	0.062
	(0.051)	(0.069)
Gender	-0.008	0.064
	(0.028)	(0.064)
Gender*PIR	0.194	-0.443***
	(0.261)	(0.160)
Edu	1.061***	-0.053
	(0.003)	(0.103)
Edu*PIR	0.502*	0.370
	(0.277)	(0.388)

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Unmarried	-0.325***	-0.597***
	(0.110)	(0.146)
Unmarried*PIR	-0.535***	-0.315
	(0.075)	(0.227)
Member	0.013	0.115
	(0.121)	(0.087)
Occupation	0.451***	0.062
	(0.100)	(0.243)
Occupation *PIR	0.399*	0.588***
	(0.221)	(0.180)
Industry	0.138	0.279*
	(0.316)	(0.168)
Industry*PIR	-0.011	0.039
	(0.125)	(0.163)
MM	0.069***	-0.566***
	(0.027)	(0.107)
MM*PIR	-0.029	0.199
	(0.158)	(0.261)
POS	0.706***	0.145***
	(0.065)	(0.029)
POS*PIR	-0.602***	-0.100
	(0.032)	(0.098)
HPF	1.374***	0.268
	(0.077)	(0.390)
HPF*PIR	0.512	-0.054
	(0.494)	(0.435)
HOS	1.037***	0.908***
	(0.048)	(0.280)
HOS*PIR	0.728***	-0.290
	(0.209)	(0.490)
City Fixed Effect	Yes	Yes
Con	-1.971***	0.261
	(0.105)	(0.160)
Observations	1,040	1,683
Pseudo R2	0.205	0.175

Notes: Standard errors are clustered at the city level, and they are presented in parentheses under the coefficients; *** p<0.01, ** p<0.05, * p<0.1. Two sub-provincial cities include Hangzhou and Ningbo. Prefecture-level cities include Wenzhou, Shaoxing, Huzhou, Jiaxing, Jinhua, Quzhou, Taizhou, Lishui, and Zhoushan.

4.3.1. Heterogeneity in adjustment effects of demographic characteristics on tolerance for housing unaffordability

Comparing the results in Column (1) to that of Column (2) in Table 3, the results shows the heterogeneous adjustment effects of Gender, Edu, and Unmarried on tolerance for housing unaffordability of the HSYM. The interaction term Gender*PIR is not significant in Column (1) but is negative with 1% significance in Column (2). This means that in sub-provincial cities, there is no difference between the tolerance for housing unaffordability of male and female HSYM; but in prefecture-level cities, compared to female HSYM, male HSYM have less tolerance. This could be explained by the fact that male HSYM are more mobile. They would leave for more developed sub-provincial cities if they are unsatisfied with the life in a prefecture-level city with worse housing unaffordability.

The coefficients of interaction term Edu*PIR in the two columns show that the higher educated and the higher-skilled HSYM in sub-provincial cities have a higher tolerance for housing unaffordability to the relatively lower educated and lower-skilled. However, there is no difference between the two groups of HSYM in prefecture-level cities. This can be explained by the fact that sub-provincial cities are highly concentrated, with higher

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educated HSYM benefiting more from the knowledge spillover of agglomeration, which offsets more of the adverse effects of housing unaffordability. However, in the prefecture-level cities where there is a relatively lower level of agglomeration, the higher educated realize less knowledge spillover from the lower level of agglomeration.

The coefficients of the Unmarried*PIR in the two columns show that unmarried HSYM in the sub-provincial cities have a lower tolerance for housing unaffordability compared to the married. However, there is no difference between the two groups of HSYM in prefecture-level cities. The difference between the two groups of cities can be explained by the fact that the unmarried are more mobile and can easily choose to move from sub-provincial cities to prefecture-level cities to reduce their housing burden because the housing prices in the sub-provincial cities are much higher than in prefecture-level cities. However, for the HSYM in prefecture-level cities, moving across to other prefecture-level cities does not significantly help in reducing their housing burden.

4.3.2. Heterogeneity in adjustment effects of employment on tolerance for housing unaffordability

The coefficients of the interaction term Occupation*PIR in the two columns show that in sub-provincial cities (Column 1 in Table 3), the HSYM working in government organizations and state-owned enterprises have a slightly higher tolerance for housing unaffordability compared to that of HSYM in non-government organizations and non-state-owned enterprises, which indicates low adjustment effects of the Occupation. Similarly, in prefecture-level cities (Column 2 in Table 3), Occupation also has a significant moderating effect on housing unaffordability, and it is more significant than that in sub-provincial cities. The differences between the two groups of cities can be explained by the fact that government organizations and state-owned enterprises in prefecture-level cities where resources are limited provide far better benefits and stability to the HSYM compared to other (privately owned) enterprises. However, this advantage of government organizations and state-owned enterprises is minimized in sub-provincial cities where economic development is higher and social-economic resources are more available for privately-owned enterprises. As a result, enterprises of both ownership statuses can provide similar income and stability to HSYM in sub-provincial cities, and the enterprise owner does not have high adjustment effects on the HSYM's tolerance for housing unaffordability.

4.3.3. Heterogeneity in adjustment effects of migration history on tolerance for housing unaffordability

In Columns (1) and (2) in Table 3, the coefficients of POS*PIR show that in the sub-provincial cities (Column 1 in Table 3), the HSYM who been staying in the city for a longer period have a lower tolerance for housing unaffordability. However, the adjustment effect of POS is not significant in the prefecture-level cities. This different adjustment effects of POS between the two groups of cities can be explained by the fact that it is more challenging to climb up the housing ladder in sub-provincial cities where housing prices are much higher than in prefecture-level cities. It is difficult for HSYM in sub-provincial cities to match their income with housing price growth. They are then more likely to leave the area due to the increasing housing pressure. However, in prefecture-level cities, even if the housing pressure increases, the income level of the HSYM can keep up with the pace, and the overall consumer price level is much lower than that in sub-provincial cities.

4.3.4. Heterogeneity in adjustment effects of housing condition on tolerance for housing unaffordability

The results show that homeownership (HOS) has heterogeneous adjustment effects in cities of different economic and political hierarchy levels. In the sample of sub-provincial cities (Column 1 in Table3), the coefficient of the interaction term HOS*PIR is 0.728 and is significant at the 1% level, which indicates that owning a home for a HSYM in a

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sub-provincial city has a higher tolerance for housing unaffordability. In contrast, the coefficient of HOS*PIR for the HSYM in prefecture-level cities (Column 2 in Table 3) is not significant, which means that owning a home for a HSYM in a prefecture-level city does not generate higher tolerance for housing unaffordability. This heterogeneity effect can be explained that the cost of buying and renting a house is relatively lower, so it is easier to own a home in prefecture-level cities compared to sub-provincial cities where housing prices are much higher and owning a home creates a greater attachment for a HSYM to the local city. Thus, owning a home in sub-provincial cities raises the HSYM's willingness to stay in the city compared to HSYM who do not own a home. Although these homeowners still face high housing costs, they want to climb the housing ladder.

5. Conclusions and Implications

5.1. Conclusions

This article investigates the adjustment effects of factors on the impacts of housing unaffordability (PIR) on HSYM's long-term residence willingness to show how these factors influence HSYM's tolerance for housing unaffordability in a city. The authors have obtained the following three findings. Firstly, consistent with most existing studies [41-44], this article finds that housing unaffordability (PIR), demographic characteristics, employment factors, migration history, and housing condition factors, influence the long-term residence willingness of HSYM in a city.

Secondly, this article enriches existing housing unaffordability-related literature, and provides several new views on the adjustment effects of some non-housing-affordability factors on the HSYM's tolerance for housing unaffordability. Specifically, HSYM who have a master's degree or above or who work in government organizations or state-owned enterprises are more tolerant of housing unaffordability. However, the unmarried or those staying in the city for a long period are less tolerant of housing unaffordability.

Thirdly, the authors have demonstrated the heterogeneity effects across cities of different economic and political statuses regarding the adjustment effects of non-housing-affordability factors on HSYM's tolerance for housing unaffordability. The sub-provincial cities are more economically developed, have higher political hierarchy status, have more abundant social and economic resources but have higher housing prices than prefecture-level cities, which leads to the following heterogeneous adjustment effects. In sub-provincial cities, higher education and more stable jobs still had a positive effect on housing unaffordability, while being single and living for a long time had a negative effect, which is consistent with the overall conclusion. However, in prefecture-level cities, only employment had a significant effect on housing unaffordability. These results suggest that housing unaffordability for HYSM working in first-tier cities is more susceptible to other factors, while in prefecture-level cities, jobs is the single most important factor.

5.2. Policy implications

The existing international housing policies are mostly manifested in two aspects: one is to focus on low-skilled workers or low-income groups, and how to solve the housing problems of these groups [51]; the other is to use fiscal, financial, and other tools as a means of housing policy [31]. The research object of this article is highly skilled young migrants, and has not only found that housing unaffordability has an impact on housing willingness, but also that different HSYM groups have different levels of housing unaffordability. More importantly, different factors have different effects on housing unaffordability in different grades of cities. Therefore, this article advocates that housing policies should highlight urban differences and intra-group differences. Firstly, providing additional training and further education can alleviate the adverse effects of high housing prices. The authors find that the better educated (with a master's degree or above) have a higher tolerance for housing unaffordability than the less educated. This is because high housing prices (more housing unaffordability) are associated with a higher level of agglomeration with higher population density. The better educated can benefit more from

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knowledge spillover from the higher level of agglomeration in cities and thus raise their income.

Secondly, the government of cities with more economically developed and higher political hierarchy status should assign more land for building shared ownership homes (SOH). The SOH in China now is a widely acceptable housing property in many cities. For a SOH, the property right is shared with the private home buyer and the government, but the private home buyer has the full right to use the property, like renovating, for example. However, the purchasing price is lower and depends on the proportion of property rights the home buyer obtains. In this regard, the SOH provides homeownership (at least right of use) at a much lower cost to the home buyer. This article finds that homeownership has a positive adjustment effect on the tolerance for housing unaffordability in sub-provincial cities, but not in prefecture-level cities. Because sub-provincial cities with higher economic development and political hierarchy level have higher housing prices, it is challenging for a HSYM to own a home at the first instance and to plan a long-term stay. Thus, the SOH can well address this issue.

Thirdly, the SOH should be provided to HSYM who have resided in the city for a longer period. This article finds that HSYM who have been staying in the sub-provincial-level city for a longer period have a lower tolerance for housing unaffordability. It is because it is difficult for HSYM in sub-provincial cities to keep their income up with housing price growth They are then more likely to choose to leave the city if they recognize that they can hardly afford a home there.

Furthermore, sub-provincial cities and prefecture-level cities should provide different housing assistance schemes according to the types of HSYM. The sub-provincial cities should focus on HSYM who have lower levels of education and inflow from rural areas. They either cannot earn higher income or lack monetary assistance from their families and are more sensitive to housing price growth, so. shared ownership homes that provide homeownership at lower prices should be more likely to favor them. Prefecture-level cities should focus on the male HSYM. Male HSYM in prefecture-level cities has a lower tolerance for housing unaffordability because they are under more economic pressure than women. After all, traditional gender concepts believe that the male HSYM are more mobile. Therefore, for prefecture-level cities, policies should be introduced to reduce residents' cost of living and other related burdens. The findings of this article show that the government of cities with higher housing prices should provide more land for SOH to the HSYM to keep them staying in the city. However, this argument deserves more extensive investigation, but this article does not have related data at this stage.

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Appendix A. Ten Cities' Talent Subsidy Policies in China

Cities	Conditions	Talent subsidy policies
Hangzhou	Fresh full-time university graduates with a bachelor's degree or above who have no house and do not enjoy other housing policies in Hangzhou; pay social security continuously for 6 months.	Each household will be paid 10,000 CNY a year for three years.

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Wuhan	Students from universities within three years of graduation who have Wuhan *Hukou* and have no self-owned housing in Wuhan.	Apply for a three-year college graduate rental housing.
Xi'an	Graduated students who are identified as E talents, have no house and do not enjoy housing policies in Xi'an.	300 CNY per month for a maximum of three years.
Nanjing	Full-time college graduates with bachelor's degree or above who have no house in Nanjing.	Rent subsidies: Doctor 2000 CNY per month; Master 800 CNY per month; Undergraduate (including senior engineering and above) 600 CNY per month.
Changsha	Under the age of 35, two years after graduation of bachelor's degree or above; have Changsha *Hukou*.	Rent and living allowance: Doctor 15,000 CNY per year; Master 10,000 CNY per year; Undergraduate CNY yuan per year.
Zhengzhou	Undergraduate who graduates from "Shuangyiliu" universities and master graduates under 35 years old; doctor of any age; have no house in Zhengzhou; have Zhengzhou *Hukou*.	Housing subsidies (don't have rent subsidies): Doctor: 100,000 CNY; Master: 50,000 CNY; Undergraduate: 20,000 CNY.
Qingdao	Bachelor's degree or above, and have Qingdao *Hukou*.	Rent subsidies: Doctor 1200 CNY per month; Master students 800 CNY per month; Undergraduates 500 CNY per month.
Hefei	Undergraduate who graduates within three years and master graduates under 35 years old; doctor of any age; have Hefei *Hukou*.	Rent subsidies: Doctor 20,000 CNY per year; Master15,000 CNY per year; Undergraduate10,000 CNY per year; Graduates of higher vocational colleges 6,000 CNY per year.
Shenyang	have Shenyang *Hukou* but origin not Shenyang; under 35 years old of undergraduate, master and doctor.	Rent subsidies: Doctor 1250 CNY per month; Master 850 CNY per month; Bachelor, technicians and above skilled talents 500 CNY per month.
Guangzhou	Local college graduates cannot apply.	Rent subsidies: Intermediate title of professional personnel, senior technicians and has a master's degree in 750 CNY per month; Bachelor's degree 500 CNY per month.

Appendix B. Variable Definitions

Variable	Definition

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Will	Long-term residence willingness. =1 if respondent intends to stay in the city for a long time, and there is no intention to relocate; =0 if respondent intends to stay in the city for a short time, that is, there is willingness to relocate.
PIR	The ratio of the average housing price to the respondent's annual household income in 2016.
PIR* PIR	The square of PIR.
AP	Average housing price in a city where the HSYM are living in.
Age	Age of the respondent, in years.
Gender	1=Male; 0=Female.
Edu	Education. 1= College and bachelor's degree; 0= Master's degree or above.
Unmarried	Marital status. 1= Unmarried; 0= Married or divorced.
Member	Number of other family members besides the household head.
Occupation	1= Government organizations and state-owned enterprises; 0= Non-government organizations and non-state-owned enterprises.
Industry	1= Labor-intensive industries; 0= Non-labor-intensive industries.
MM	Mobility mode. =1 if the respondent migrates across urban areas; =0 if the respondent migrates from rural to urban areas.
POS	Period of staying, the number of years the respondent's family has been living in the city.
HPF	Housing provident fund. 1= Having a housing provident fund; 0=not having a housing provident fund.
HOS	Housing ownership. =1 if the respondent is staying in a house owned by the respondent's family; =0 if the respondent is staying in a rented house.

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