



## **UCPH Working Paper**

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### **Does House Price Affect the Fertility Plan of the Migrants?**

Empirical analysis based on China Migrants Dynamic Survey 2018

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# Does House Price Affect the Fertility Plans of the Migrants?

Empirical analysis based on China Migrants Dynamic Survey 2018

**Abstract:** This paper uses data from the 2018 China Migrant Dynamic Survey to estimate the impact of house prices on the fertility plans of the migrant population, with the sample consisting of 45,355 married female migrants aged 16-50. The results show that the higher house prices in the inflow cities, the less likelihood female migrants have fertility plans; when the housing pressure of the migrants is low, their fertility plans are less affected by house prices; the sensitivity of the migrant population's fertility plans to house prices is also influenced by the moderating effect of infrastructure development; the fertility plans of female migrants with larger family size, higher education level and younger age are more sensitive to house prices.

**Keywords:** Migrant; House Price; Fertility; China

## 1 Introduction

Human capital is an important position in the process of economic development [Gennaioli et al., 2013]. In recent years, the stock and increment of human capital in China has gradually shown a tendency to be insufficient, and the average age of the working population is 38.8 years old, with a significant aging phenomenon [CUFE, 2021]. During the period, China's total fertility rate was between 1.5 and 1.6, significantly lower than the level of generation replacement needed to achieve population stability [Yang et al., 2022]. One of the reasons for this phenomenon is China's long-standing family planning policy [Wang et al., 2017]. In 2021, China's natural population growth rate is only 0.34 per 1,000 and is expected to enter negative growth in 2022 [NBS, 2021b]. At the same time, China's expanding economy and market size still have high labor demand [Wu and Zhang, 2020]. The potential structural imbalance of human resource supply arising from low fertility rate and high labor demand in China is a matter of concern.

The migrant population is an important part of China's labor supply. Since the reform and opening up of China resolved the institutional barriers to population mobility, the size of the migrant population has been expanding, reaching 375.82 million by 2020, an increase of 69.73% in 10 years [Cai, 2018, NBS, 2021a]. China's rural outflow population provides an important human resource for urban development and plays a huge role in the urbanization process [Zhang and Song, 2003]. Therefore, improving the fertility intention of the migrant population, alleviating the structural imbalance of human resource supply, and providing a stable labor supply for economic development are important conditions for promoting China's sustained economic growth.

There are special policy and cultural contexts for exploring the fertility intentions of China's mi-

grant population from the perspective of house prices. Due to China's long-standing dualistic urban-rural household registration system, migrant populations are often unable to receive local medical and educational resources from the inflowing cities, making social integration difficult from an institutional perspective [Hao and Tang, 2015]. China's household registration is highly tied to housing, and high house prices make it impossible for migrant laborers to settle down and obtain household registration in the inflowing cities, which also affects their willingness to have children [Wang, 2006]. Moreover, traditional Chinese culture views housing as a necessity for marriage and children [Liu et al., 2020].

Based on the above background, this paper constructs the house prices to household income ratio as the core explanatory variable using dynamic monitoring data of the migrant population in China, and empirically examines the impact of urban house prices on the fertility plans of the migrant population. The empirical results show that the higher the house prices in the inflow city, the lower the probability that the female migrants have a birth plan. The paper also demonstrates the moderating effect of infrastructure development in the inflow city on this mechanism, and that the probability of migrants having fertility plans is also influenced by housing pressure.

## **2 Review of the Literature**

### **2.1 Empirical Studies**

The study of human capital is an important part of neoclassical economics. Whether it is aimed at the micro level of increasing individual well-being and improving the family environment [Petch and Halford, 2008], or the macro perspective based on promoting the reproduction of human capital and thus the proper functioning of social institutions [Gough, 2017], the study of fertility plans has obvious significance.

Several studies have examined the factors affecting the fertility intention of the population from a multidimensional perspective. For example, [Kim and Yeo, 2019] found in a study of low fertility in Korea that socio-environmental factors can influence fertility plans through individual environmental factors. As another example, [Arai, 2007] argues for the indirect role of social relationships on fertility intentions through an empirical analysis of the potential impact of community on fertility intentions.

It is worth noting that many scholars believe that high house prices affect people's willingness to have children. Such as [Dettling and Kearney, 2014] define fertility prices as housing costs and argue that the real estate market has a more direct effect on fertility plans. [Lino, 2002] find a significant negative relationship between house prices and fertility intentions, suggesting that housing costs are the largest expense of raising children, and high house prices are overwhelming many families, resulting in negative fertility behavior.

In the studies on the effect of house prices on the migrant population in China, [Liu et al., 2020] confirmed the negative effect of high house prices on fertility among the household population in China using census data. [Clark et al., 2020] analyzed the negative relationship between house prices and fertility in

China using data from the China Household Finance Survey and using land premiums as an instrumental variable for house prices, and group tests were conducted for different levels of cities.

## 2.2 Theoretical Studies

Regarding the mechanism of the effect of house prices on the fertility plans of the migrant population, the existing studies focus on both the willingness to integrate and the financial ability.

On the one hand, the high or low house prices are related to the strength of the social integration intention of the migrant population. When house prices are higher, the migrants' willingness to integrate socially decreases and the likelihood of having fertility plans subsequently decreases.

According to [Entzinger and Biezeveld, 2003], social integration includes psychological integration, cultural integration, economic integration, and political integration. house prices as specific quantification of property rights are an important indicator of the migrant population's integration into the society of the place of migration in many ways, which in turn affects the willingness to stay. Since the migration of the migrant population is a short-term decision-making behavior [Du et al., 2014], lowering the threshold of ownership of their property rights is a key initiative to promote long-term residence of the migrant population and thus increase the likelihood of having children. High house prices mean that it is more difficult for the migrant population to integrate subjectively into the local area, and accordingly, their willingness to have children decreases.

On the other hand, house prices are also a test of the economic capacity of migrant populations. In China, housing is highly tied to household registration. The series of thresholds imposed by the household registration system makes the migrant population relatively less able to afford house prices and leads to a greater reluctance to bear the various costs arising from childbearing. The direction of population movement is mainly from rural to urban areas [Lewis et al., 1954]. However, under the influence of China's dual economic structure between urban and rural areas and the household registration system, the migrants are not only disadvantaged in the job market but also suffer from financial constraints and a lack of public protection. For example, it is more difficult for migrants with the same endowments to obtain permanent jobs than local residents. The household registration system provides a natural barrier to entry into the job market, and self-employment is the rational choice for this group to deal with employment discrimination as opposed to wage employment [Banerjee, 1983, Roberts, 2001, Song and Appleton, 2008]. However, the precariousness of self-employment reduces their ability to take economic risks, making them reluctant to make plans to have children.

In addition, [Oates, 1969] highlights the role of public services in the utility model of population migration, arguing that a good social security system reduces expenditure in a number of ways. As the migrants do not benefit from the range of social security that comes with a household registration system, they have higher security expenditures relative to the local population, further reducing the ability to bear the potential economic risks associated with childbearing.

## **2.3 Contribution of this Article**

Comparing the existing studies, this paper has three main contributions. First, this paper fills the gap in the effect of house prices on the fertility issues of the migrant population. Although there are relevant articles that empirically demonstrate the effect of house prices on fertility intentions, there is a lack of research on the migrant population group. This paper fills this gap by using China Migrants Dynamic Survey data with a larger sample size to empirically analyze the migrant population group.

Second, while most studies on the impact of high house prices use the average urban house prices as an indicator, this paper uses the average household income of the migrant population and the average urban house prices together to construct the house prices to income ratio as the core explanatory variable. This core explanatory variable takes into account the economic income profile of the migrant population and can more robustly identify the impact of house prices on the fertility plan of the migrant population.

Third, in terms of mechanism analysis, this paper analyzes in detail the moderating effect of infrastructure construction in inflow cities on the mechanism of house prices-fertility plans, and also finds that the effect of house prices on the fertility intentions of the migrant population is influenced by their property ownership, delves into the mechanism of the effect of high house prices on the behavior of the migrant population.

## **3 Data Sources and Variables**

### **3.1 Data Sources**

This study uses data from the 2018 China Migrants Dynamic Survey (CMDS). The survey was conducted by the National Health Commission of China and adopted the stratified, multi-stage, large-scale PPS sampling method, covering 31 provinces (municipalities and autonomous regions) in mainland China. The average age of the sample used in this paper is 16-50 years old, and the sample size was 45,593 (married female migrant population). The data relating to urban control variables are obtained from the statistical yearbooks of various cities.

### **3.2 Variable Selection**

The dependent variable of this paper is the fertility plans of the sample, which is estimated using the CMDS questionnaire "Do you plan to have children in the near future?". The core explanatory variable in this paper is the relative house prices, which is the ratio of the house prices in the sample inflow area to the sample average monthly household income. Household income is measured by the CMDS questionnaire "What is your total monthly household income", which is a clearer indicator of the difficulty of access to urban property rights for the migrant population than the relative house prices constructed from urban per capita disposable income.

Table 1: Variable description

Variables	Description
fertility	Planing to have children = 1, No = 0
hp	Inflow city house prices/sample household income
job	Civil service career = 2, Other units = 1, Unemployed = 0
health	Unhealthy=1, Fair=2, Fairly healthy=3, Healthy=4
age	Actual age of sample (year)
family	Number of family members
edu	Years of education
hukou	Non-agricultural household = 1, Agricultural household = 0
tgdp	Share of tertiary sector in total GDP. (%)
green	Percentage of green space in the city (%)
book	Book collection per capita
teacher	Number of primary school teachers per 10,000 population
medical	Number of physicians per 10,000 population

The control variables in this paper include urban control variables and individual control variables. In existing empirical studies of fertility, indicators such as years of schooling, family size, age, employment, and health status usually appear as demographic control variables. In addition to the above variables, this paper also chooses hukou as a control variable, based on the unique context of China's dualistic urban-rural household registration policy. This paper selects industrial structure, urban green space, education and health care resources as control variables for the flow of migrant population into cities. Detailed descriptions of the variables are given in Table 1.

### 3.3 Descriptive Statistics

The results of the descriptive statistics are reported in Table 2. As can be seen from the table, women with fertility plans for approximately 12% of the total sample. The mean value of the core explanatory variable "relative house prices" is 1.635, and its economic significance is that the average household income of the respondents needs 1.6 months to buy one square meter of property. In the hypothesis of this paper, high house prices significantly reduce the fertility intentions of the female migrant population. The average household size of the sample is 3.479, and the smaller household size is related to the long-standing family planning policy in China. The average years of education of the sample are around 10 years, and the average age is about 34 years. The majority of the respondents were in agricultural hukou, a dualistic household registration system that divided Chinese citizens into agricultural hukou and non-agricultural hukou until 2015, and the large differences in the rights and benefits attached to the two types of hukou have had a profound impact on the regional labor endowment allocation in China.



Table 2: Descriptive statistics results

	(1)	(2)	(3)	(4)	(5)
Variables	N	Mean	SD	Min	Max
fertility	45,355	0.120	0.325	0	1
hp	45,355	1.635	1.506	0.0169	140.6
job	45,355	0.747	0.557	0	2
health	45,355	1.118	0.359	1	4
age	45,355	34.70	7.436	16	50
family	45,355	3.479	0.878	2	11
edu	45,355	10.32	3.482	0	19
hukou	45,355	0.323	0.468	0	1
tgdp	45,355	55.00	11.59	26.54	80.98
green	45,355	41.81	3.465	23	93.81
book	45,355	1.607	1.510	0.0793	8.742
teacher	45,355	42.96	8.907	18.54	85.70
medical	45,355	64.64	21.62	19.69	128.2

## 4 Methodology

### 4.1 Research Hypothesis

This paper proposes the following hypotheses on the mechanism by which house prices affect the fertility intention of the migrant population.

**Hypothesis 1:** house prices in inflow cities are negatively related to the fertility intentions of the migrant population.

High house prices will not only bring huge economic pressure to the migrant population but also affect the social integration of the migrant population in the inflowing city, leading to a decrease in their fertility intentions. house prices, as a quantitative indicator of the difficulty of acquiring residential property rights, is an important indicator of whether the migrant population can be institutionally integrated into the place of migration. In China, housing ownership is linked to household registration and children's eligibility for schooling, medical insurance and other related social benefits. High house prices mean that it is more difficult for the migrant population to integrate economically and institutionally into the incoming region, leading to a decrease in fertility intentions.

**Hypothesis 2:** The sensitivity of migrant fertility plans to house prices is influenced by the availability of infrastructure in inflow cities.

The preference of the migrant population for local property rights depends on the economic environment and infrastructure development of the inflowing area. When making fertility decisions, the migrant population will consider the impact of local medical and educational resources on the future life of their

children. This is also reflected in their willingness to have children, i.e., there is an interaction effect between the construction of infrastructure services on the willingness to have children and the sensitivity to house prices.

**Hypothesis 3:** The sensitivity of fertility intentions to house prices is influenced by the amount of housing pressure on the migrants.

High house prices imposes a huge financial burden on the migrant population. The huge financial pressure of housing expenses on the migrant population will squeeze their ability to bear various costs arising from childbirth and affect their fertility intention, but this mechanism is affected by the housing pressure of the migrant population. That is, the fertility intention of the migrant population with housing pressure is vulnerable to house prices, and the fertility intention of the migrant population without housing pressure is not necessarily sensitive to house prices.

Among them, hypothesis 1 can be proved by the results of the baseline regression. For hypothesis 2, this paper examines the possible moderating effects by using the interaction term between infrastructure variables and house prices.

To address hypothesis 3, this paper regresses all samples in groups according to housing pressure status. The CMDS questionnaire does not contain questions about the housing pressure status of housing for the migrant population, and this paper uses the sample household housing expenditure as a proxy variable for housing pressure status - the group with zero household housing expenditure is regressed in a separate group to examine The effect of migrant population housing pressure on the mechanism of action is examined.

## 4.2 Baseline Model

In this paper, the explanatory variable "fertility plan of the sample" is a dummy variable, and the models available include Linear probability model(LPM), Logit model, and Probit model. In this paper, we choose to use the Probit model for the empirical analysis, while reporting the estimation results of the Logit model for robustness testing. To prevent potential masking effects from affecting the estimation results, stepwise regression results of the model are reported in this paper. The basic expression for the Probit model is.

$$Pr(T_{ij} = 1 | hp, X) = F(hp, \beta_1) = \frac{\exp(\beta_0 + \beta_1 hp_{ij} + \beta X + \varepsilon_{ij,t})}{1 + \exp(\beta_0 + \beta_1 hp_{ij} + \beta X + \varepsilon_{ij,t})} \quad (1)$$

In equation (2),  $T_{ij}$  is the plan of the migrant population to have children is a binary variable. If the migrants  $i$  have plans to give birth in the  $j$  inflow city, the value is 1, otherwise it is 0.  $Pr(T_{ij} = 1 | hi, X)$  is the probability that the migrant population  $i$  has the plan to give birth in the inflow city  $j$ .  $F$  is the cumulative distribution function of the standard normal.  $hp$  is house prices to income ratio,  $X$  are other control variables,  $\varepsilon_{ij,t}$  and are random disturbance terms.

## 4.3 Robustness Analysis

### 4.3.1 Instrumental variable (IV)

The fertility intentions of the sample are influenced not only by house prices in the inflow area, but also by other potentially influential factors. The paper screens variables at the variable selection stage, but it is still difficult to control for all potential influencing factors. At the same time, high fertility intentions of the migrant population in a given region may increase house prices, thus creating a two-way causality problem that affects the unbiased assumption of the estimation, i.e. house prices may be an endogenous variable. Hence, there is a need to find instrumental variables.

Research on instrumental variables for house prices is well established. Common instrumental variables include land development area [Peng and Du, 2016, Zhang et al., 2018], the product of long-term interest rate and land supply elasticity [Chaney et al., 2012] and land concession price [Waxman et al., 2020]. In this paper, the lagged land concession price is chosen as the instrumental variable for house prices. Land concession prices directly affect house prices, which is consistent with the instrumental variable correlation hypothesis; at the same time, the migrant population does not actively consider addressing land concession prices in previous years when considering childbearing, which is consistent with the instrumental variable exogeneity hypothesis. In order to conform to the data structure of relative house prices, this paper constructs the ratio of lagged land prices to lagged disposable income per capita as an instrumental variable.

### 4.3.2 Propensity Score Matching

Although the base model in this paper controls for personal characteristics and regional factors, the fact that the fertility plans of individual female migrants are not necessarily randomly determined, e.g. those with higher economic and social status are usually more likely to stay in the local area and thus have higher fertility intentions, leads to the fact that when estimating the effect of house prices on the fertility plans of the sample, direct use of a binary choice model may lead to serious sample bias due to This leads to the possibility that direct use of a dichotomous choice model may lead to serious sample bias due to 'self-selection'. Therefore, this paper matches the untreated sample with the treated sample based on PSM to balance the data so that the personal characteristics of the matched treated group (above-median house prices to income ratio group) and the control group (below-median house prices to income ratio group) remain the same and statistical differences are reduced.

The first step was to estimate the propensity score  $P(X)$  for each female migrants fertility plan through logit regression, expressed as:

$$P(X_i) = Pr(Move_i = 1 | X_i) \quad (2)$$

Where  $X$  is a set of factors affecting female migrants' fertility plan, also known as matching vari-

ables. The average treatment effect on the treated (ATT) is calculated by matching the treatment and control groups according to the common support region of the propensity score, followed by the corresponding matching method, and the expression is :

$$ATT = E(Y_i^T - Y_i^C | Move_i = 1) = E(Y_i^T | Move_i = 1) - E(Y_i^C | Move_i = 1) \quad (3)$$

The ATT is designed to compare the difference in fertility plans between high and low housing pressure migrants who are equally likely to have fertility plans, and to derive a specific effect of house prices on the fertility plans of migrant populations.

## 5 Results and Discussion

### 5.1 Baseline Regression

Table 3 shows the results of the baseline regression. Models (1) to (5) are the stepwise regression results of the Probit model. Model (1) shows that, conditional on the exclusion of control variables, the coefficient of the house prices to income ratio on fertility intentions is -0.0437, which is significant at the 1% level, indicating that there is a significant negative relationship between higher house prices and the fertility plans of the migrants. The higher the house prices to household income ratio in the inflow cities, the lower the probability of having a fertility plan among the migrants. Model (5) includes city and individual control variables, along with provincial fixed effects. The coefficient increases slightly (-0.0522) compared to the results without including the control variables.

The Logit model has similar estimation results, there is a significant negative relationship between high house prices and the fertility plans of the migrant population. Model (6) shows a regression coefficient of -0.0858 for the house prices to income ratio on fertility intentions when no other control variables are included. Model (7) includes urban and individual control variables, with a slight increase in the coefficient (-0.0927). The economic significance is that for every doubling of the house prices to income ratio in the inflow area, the probability of having a fertility plan among the migrant population will decrease by 9.27%.

High house prices can put enormous financial pressure on migrants, while home ownership is a necessary condition for childbearing in Chinese culture. Higher house prices to income ratios makes it difficult for the migrant population to obtain housing ownership and the various social security entitlements represented by household registration in the city to which they move, leading to a decline in their fertility intentions.

Table 3: Baseline results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Probit	Probit	Probit	Probit	Probit	Logit	Logit
hp	-0.0437*** (0.00728)	-0.0394*** (0.00906)	-0.0866*** (0.00951)	-0.0475*** (0.0109)	-0.0522*** (0.0118)	-0.0858*** (0.0142)	-0.0927*** (0.0203)
job		-0.0205 (0.0161)		-0.0270* (0.0162)	-0.0294* (0.0163)		-0.0521* (0.0295)
health		-0.0107 (0.0293)		-0.0139 (0.0294)	-0.0165 (0.0296)		-0.0437 (0.0553)
old		-0.0684*** (0.00140)		-0.0680*** (0.00141)	-0.0681*** (0.00143)		-0.119*** (0.00258)
family		-0.658*** (0.0173)		-0.673*** (0.0177)	-0.687*** (0.0181)		-1.400*** (0.0342)
edu		0.0376*** (0.00316)		0.0389*** (0.00330)	0.0393*** (0.00341)		0.0706*** (0.00597)
hukou		0.0410** (0.0195)		0.0398** (0.0196)	0.00973 (0.0217)		0.0690* (0.0357)
green			0.000645 (0.00230)	0.000200 (0.00276)	-0.000957 (0.00424)		0.00217 (0.00511)
book			0.00283 (0.00713)	-0.0125 (0.00828)	-0.0201 (0.0176)		-0.0244 (0.0153)
teacher			0.00394*** (0.000882)	0.0112*** (0.000999)	0.00778*** (0.00169)		0.0214*** (0.00183)
medical			-0.000128 (0.000468)	-0.00214*** (0.000561)	-0.0021** (0.000874)		-0.0038*** (0.00103)
tgdp			0.00840*** (0.00101)	0.00334*** (0.00119)	0.000931 (0.00171)		0.00542** (0.00220)
constant	-1.106*** (0.0137)	2.796*** (0.0924)	-1.696*** (0.104)	2.324*** (0.150)	2.452*** (0.217)	-1.857*** (0.0262)	4.623*** (0.276)
Urban variables	No	No	Yes	Yes	Yes	No	Yes
Individual variables	No	Yes	No	Yes	Yes	No	Yes
Fixed effects	No	No	No	No	Yes	No	No
<i>N</i>	45355	45355	45355	45355	45355	45355	45355
<i>Pseudo R</i> <sup>2</sup>	0.0013	0.1434	0.1867	0.2489	0.2860	0.0013	0.2576

Note: Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. The following table is the same.

Table 4: Instrumental variable regression results

	(8)	(9)
	IVprobit	First-Step Result
hp	-0.204**	-
	(0.0918)	-
IV	-	0.137***
	-	(0.00924)
Control variables	yes	yes
<i>N</i>	45355	45355
<i>Pseudo R</i> <sup>2</sup>	-	0.1866
Exogeneity Test (Wald)	$\chi^2 = 2.71$	P=0.0988
Weak Instrument Test (AR)	$\chi^2 = 4.48$	P=0.0343
Weak Instrument Test (Wald)	$\chi^2 = 4.42$	P=0.0355

## 5.2 Robustness Tests: IV and PSM

### 5.2.1 Instrumental variable

Table 4 depicts the prediction results after adding IV to the model. Compared to the results of the Probit model, the absolute value of the coefficient on ivprobit in model (9) increases somewhat, indicating that the underlying endogeneity problem tends to underestimate the effect of house prices on the intention to have children among the migrant population. The economic significance of this is that for every 100% increase in the house prices to income ratio in the inflow area, the probability of a female migrant population having a local fertility plan will decrease by 20.4%.

Endogeneity tests for the explanatory variables and weak instrumental variable tests for the instrumental variables are required before instrumental variable regressions can be conducted. Table 4 reports the results of the Wald Exogeneity Test and the AR, Wald Weak Instrument Test, demonstrating that the house prices to income ratio is endogenous (at a confidence level of 0.1), while IV does not have a weak instrumental variable problem (at a confidence level of 0.01).

### 5.2.2 Propensity Score Matching

The sample size of the data used in this paper is large, and to avoid endogeneity issues due to potential sample selection bias, we used propensity score matching for robustness testing. After passing the common support hypothesis test and the stationarity test, kernel density plots before and after using propensity score matching are reported in this paper (Figures 1 and 2). The quality of the data is significantly higher after matching compared to before matching.

In the PSM dummy variable setting, this paper chose to use the median grouping of house prices to income ratios, so that the PSM yielded lower ATT compared to the baseline regressions and instrumental variable regressions. Table 5 shows the results of the PSM estimation, with the average treatment effect

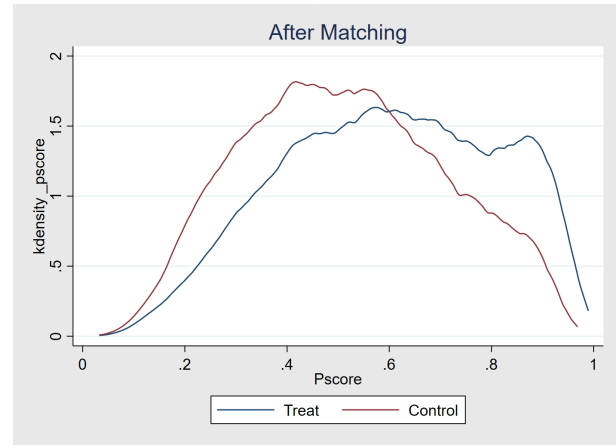
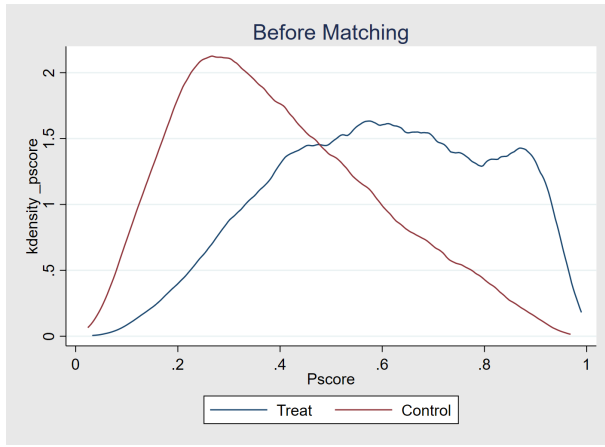


Figure 1: Before-matching kernel density graph

Figure 2: After-matching kernel density graph

Table 5: Propensity score matching results

Matching Status	1:1 Matching		1:2 Matching		Radius Matching		Nuclear Matching	
	ATT	t	ATT	t	ATT	t	ATT	t
Pre-match	-0.016***	-5.26	-0.016***	-5.26	-0.016***	-5.26	-0.016***	-5.26
Post-match	-0.025***	-4.08	-0.023***	-4.36	-0.022***	-4.25	-0.022***	-4.35

for the four matching methods being approximately -0.025 after matching the characteristics of the sample and significant at the 5% statistical level. This is the same conclusion as the Probit baseline regression results and the ivprobit regression results that there is a negative effect of high house prices on the fertility intentions of the migrant population. In summary, Hypothesis 1: "house prices in the inflow cities are negatively related to their fertility intentions" is confirmed.

## 5.3 Analysis of mechanisms

### 5.3.1 Moderating Effects of Infrastructure

The effect of relative house prices on the fertility plans of migrant populations is estimated above, but is the effect of house prices always direct? Table 6 reports the moderating effects of education, greening and health-related infrastructure on the relationship between house prices and the fertility decisions of migrant populations.

Models (10) to (15) report the regression results with and without control variables, respectively. In particular, models (10) and (11) are the results of the interaction between book collection per capita and house prices, models (12) and (13) are the results of the interaction between green space and house prices, and models (14) and (15) are the results of the interaction between the number of doctors per capita and house prices. These interaction terms are all significant at the 1% level, demonstrating that the level of infrastructure has a moderating effect on house prices affecting the fertility plans of the migrant population. The choice of local property rights by the migrant population is to some extent influenced by

Table 6: Moderating effects of infrastructure

	(10)	(11)	(12)	(13)	(14)	(15)
hp*book	-0.0046*** (0.0014)	-0.0108*** (0.0027)	- -	- -	- -	- -
hp*green	-	-	-0.0009*** (0.0002)	-0.001*** (0.0003)	-	-
hp*medical	-	-	-	-	-0.0003*** (0.0001)	-0.0007*** (0.0002)
Control variables	No	Yes	No	Yes	No	Yes
<i>N</i>	45355	45355	45355	45355	45355	45355
<i>Pseudo R</i> <sup>2</sup>	0.0031	0.2512	0.0054	0.2432	0.0071	0.2286

Table 7: The effect of housing stress

	(16)	(17)	(18)	(19)
	With housing expenses		Without housing expenses	
hp	-0.0258** (0.0115)	-0.0467** (0.0188)	-0.0514*** (0.00900)	-0.0503*** (0.0135)
Control variables	No	Yes	No	Yes
<i>N</i>	10965	10965	34390	34390
<i>Pseudo R</i> <sup>2</sup>	0.0007	0.2457	0.0016	0.2553

the local educational and medical environment, and hypothesis two is confirmed. The preference of the migrant population for local property rights also depends on the economic environment and infrastructural development of the incoming region. When making fertility decisions, migrant populations consider the impact of local health and education resources on the future lives of their children.

### 5.3.2 The Effect of Housing Stress on Mechanism

In the hypothesis of this paper, house prices are negatively related to the fertility intentions of the migrant population. Another intuitive manifestation of this logic is that when the migrant population is not under housing pressure, their fertility plans will no longer be influenced or less influenced by house prices.

This hypothesis is analysed in this paper using sample housing expenditure as a proxy variable for housing stress. In the CMDS questionnaire, the sample's household housing expenditure consists mainly of rent and housing loans. The paper runs a subgroup regression on the sample based on whether the sample's housing expenditure is zero. Table 7 reports the results of the subgroup regressions, model (16) and model (17) for the group without housing stress, and model (18) and model (19) for the group with housing stress. The coefficients for the group with housing stress are significantly higher than those for the group without housing stress, demonstrating that the fertility plans of the migrant population with household housing expenditure are more likely to be influenced by house prices.



Table 8: Heterogeneity analysis

	(20)	(21)	(22)	(23)	(24)	(25)
	Family size		Education		Age	
hp	-0.0269** (0.0111)	-0.0562** (0.0241)	-0.0403*** (0.0129)	-0.0881*** (0.0214)	-0.0593*** (0.0148)	-0.0394*** (0.0140)
<i>N</i>	24530	20825	36126	9229	13189	32166
<i>Pseudo R</i> <sup>2</sup>	0.1240	0.1534	0.2387	0.1916	0.1826	0.1370
Differences	0.029		0.048		0.020	

## 5.4 Heterogeneity Analysis

To further understand the sensitivity of fertility intentions to house prices among the migrant population with different characteristics, this paper conducts a heterogeneity analysis of the sample. Table 8 reports the regression results based on household size, education level and age grouping of the sample.

Model (20) shows the regression results for the sample with household size less than or equal to 3 persons, and its regression coefficient is smaller than that of the sample with household size greater than 3 persons (model (21)). Reasons for the larger household size in the sample may include supporting the elderly or already having children, both of which place a burden on the household economy, and the willingness to have a second child is also significantly lower than that of the first child. The fertility plans of female migrants with larger families are therefore more sensitive to house prices.

Model (22) shows the regression results for the sample with no tertiary education, whose regression coefficients are smaller than those for the sample with tertiary education (model (23)). In general, highly educated female migrants tend to have higher income levels and lower fertility intentions, and willing to purchase their own housing. They are more affected by changes in house prices and have more sensitive fertility plans to house prices.

Model (24) shows the regression results for the sample aged less than 30 years, and its regression coefficient is larger than the results for the sample aged more than 30 years(model (25)). The risk of childbearing increases with female age, so when women are older, their fertility plans are not susceptible to house prices.

## 6 Conclusion

China's migrant population continues to expand in size, with fertility rates significantly lower than the level of generation replacement to achieve population stability, and the structural imbalance in human resource supply has attracted widespread attention. This paper uses Probit model to estimate the impact of house prices on the fertility plan of the migrant population based on data from the 2018 China Migrants Dynamic Survey. The results show that the higher house prices in the inflow area, the less likelihood female migrants have fertility plans; when the housing pressure of the migrants is low, their fertility

plans are less affected by house prices; the sensitivity of the migrant population's fertility plans to house prices is also influenced by the moderating effect of infrastructure development; the fertility plan of female migrants with larger family size, lower education level and higher age are more sensitive to house prices.

Despite the huge impact of the pandemic on China's economy, the country's expanding economy and market size still require a large labour force. The migrant population is a non-negligible group in China's labour endowment structure, and increasing the fertility intentions of the migrant population is an important measure to optimise China's labour force structure and mitigate ageing. According to the empirical results of this paper, the government can improve the fertility intentions of the migrant population by improving the housing policies of the migrant population and reducing housing costs; addressing the institutional barriers to the education of the children of the migrant population and guaranteeing the right to education for school-age children; deepening the reform of the household registration system and guaranteeing basic public service resources for the migrant population.

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