Journal of Rural Studies 107 (2024) 103244

Contents lists available at ScienceDirect

Journal of Rural Studies

journal homepage: www.elsevier.com/locate/jrurstud

Wealth or health? Haze pollution, intergenerational migration experience and settlement intentions of rural migrant workers

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ARTICLE INFO

JEL classification:
JEL code: R23
J61
E24

Keywords:
Haze pollution
Rural migrant workers
Migration experience
Perception of pollution
Settlement intention in cities

ABSTRACT

This study employs the haze data and micro-level data from China Migrant Data Survey to examine the relations of haze pollution, intergenerational migration experience and settlement intentions of rural migrant workers. We identify that there is an inverted-U relationship between haze pollution on rural migrant workers' settlement intention; the threshold for this inverted U-shaped relationship is 31; migrants are more likely to settle while haze pollution grows below the threshold; but they are more likely to leave while haze pollution increases above the threshold. Further, this study finds that intergenerational migration experience increases individual's perception of haze pollution. The results show that the impact of haze pollution on settlement intention of first-time rural migrant workers and those whose parents do not have migration experience is not significant. But the inverted U-shape effect remains significant for individuals with multiple migration experience and those whose parents have migration experience. Finally, compared to migration experience of father, that of mother exerts a more significant impact on individual's perception of haze.

1. Introduction

As the world's second largest economy, China is undergoing rapid urbanization where huge numbers of rural migrant workers moving to urban areas. According to the results of China's seventh national population census in 2020, the size of the nation's migrant had reached 376 million, accounting for 26.67 per cent of the country's total population, an increase of 70.14 per cent compared with 2010. Of these 376 million people, 331 million have migrated to cities, of which 249 million, or 76.8 per cent, are rural migrants. During the decades of urbanization, China is faced with a series of environmental problems. Haze pollution is one of them. According to the latest data released by China's Ministry of Ecology and Environment in 2023, in the 339 prefectures and cities above, the average concentration of PM2.5 was 29 μg/m3, which is yet a far cry from the 5 μg/m3 safe value recognized by the WHO. Haze has been classified as Group 1 (i.e., carcinogenic to humans) of cancer-causing substance by International Agency for Research on Cancer (IARC) under the WHO. China is far from the only victim of haze pollution. Air pollution, including haze pollution, is a key issue to urbanization globally (Baklanov et al., 2016; Jing Chen et al., 2018; Dong et al., 2020; Salameh et al., 2015).

The irregular occurrence of haze pollution and its unprecedented intensity have undermined not only production but also physical and psychological health of the residents (Jing Chen et al., 2018; Levinson, 2012). The number of patients diagnosed with diseases caused by haze has skyrocketed (M. Liu et al., 2017), which hinders the livability of its vicinity to some extent. Hunt and Mueller (2004) and Chen and Wang (2019) suggest that, apart from the potential economic benefits of urban destination, rural migrant workers take the livability of destination into account while deciding whether to settle. In this sense, haze pollution might impact the settlement intention of rural migrant workers in urban areas.

Despite a burgeoning body of literature focusing on the impact of haze pollution on livability, only a few researchers examine such impact in terms of rural migrant workers, and none have focused on the role of haze perception (Jia et al., 2021; Z. Liu and Yu, 2020; C. Zhang et al., 2022). However, the impact of haze pollution as a special by-product of urban development on the settlement intention of rural migrant workers may vary greatly depending on the perception of haze pollution. For instead, tourism and home purchase are popular topics in this field (Y.

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https://doi.org/10.1016/j.jrurstud.2024.103244
Received 22 October 2022; Received in revised form 18 September 2023; Accepted 14 February 2024

Chen and Lee, 2020; Tao et al., 2019; Wang and Cai, 2021; Zou, 2019). For example, haze pollution affects the choice of tourism destination by urban residents (Cheng et al., 2015) and people's avoidance of haze pollution may even result in seasonality in tourism (A. Zhang et al., 2015). In addition, residents are willing to pay a premium for better air quality (Li et al., 2021) and the air quality is partially reflected in the housing price (R. Liu et al., 2018). Therefore, it is reasonable to argue that haze pollution may impacts migrants' settlement decision-making. However, the mechanism and implication of rural immigrants' settlement intention are different from those of urban tourist or home buyers. First, different from tourists or home buyers, rural migrant workers are job hunters who move to urban area in the pursuit of wage. Second, different from tourists (whose residence is temporary) and home buyers (whose residence is perpetual), rural migrant workers might choose between short- and long-term residence. Third, rural migrant workers constitute urbanization, whose settlement intention determines the process of urbanization.

To fill these gaps in the literature, this paper attempts to address how the haze pollution of urban destination affects the settlement intention of rural migrant workers. Furthermore, considering the disparity of air quality between their origin and destination, we take the perception of haze pollution into account and examine how migration experience (of rural migrant workers per se and of their parents) affects the relationship between haze pollution and their settlement intention. Specifically, this study matches the city-level haze data in China from the database of Earth Observing System Data and Information System (EOSDIS) by the U.S. National Aeronautics and Space Administration (NASA), with that of China Migrants Dynamic Survey (CMDS) conducted by the National Health Committee of China in 2016. Following this, the logit model is employed, combined with abundant city-level characteristics data from *China City Statistical Yearbook (2017)* to examine the relations of haze pollution, intergenerational migration experience and settlement intentions of rural migrant workers.

The possible contributions of this paper are summarized as follows: First, we loosen the complete information assumption in traditional migration model, introduce a new factor "direct or indirect migration experience" into the model, and demonstrate that migration experience of individual per se and intergenerational migration experience will increase their perception of haze pollution, and prompt rural migrant workers to consider more comprehensively when making a settlement decision. Second, based on the city-level haze data of China from EOSDIS of NASA and data from CMDS cover a wide range at a high accuracy, we identify the relations of haze pollution, intergenerational migration experience and settlement intentions of rural migrant workers. We find an inverted U-shape relation between haze pollution of destination city and the settlement intention of rural migrant workers, and migration experiences play an important role in this relationship. The findings offer new and well-established evidence for research on the settlement intention of rural migrant workers. Last, this study solves multiple forms of endogeneity by extended regression models (ERMs). Air flow coefficient is adopted as an instrumental variable to mitigate the endogeneity, such as variable omission, measurement bias, reverse causality, and variable selection bias. Besides, the findings of this paper serve as the reference for local governments' policymaking in promoting, through enhancing haze pollution abatement, settlement and citizenization, of rural migrant workers in destination cities.

The rest of the paper is structured as follows. Section 2 presents literature review and develops hypotheses. Section 3 elaborates on data and offers descriptive statistics. Section 4 conducts empirical analysis, exhibits relevant results, and performs robustness analysis, endogeneity analysis and further analysis. Section 5 concludes with a summary review and relevant policy suggestions.

2. Related Literature and Hypothesis Development.

1.1. Existing research on the relationship between environment and migration

Environment as well as air quality has been proposed as a determinant of migration for decades (Greenwood, 1985; Knapp and Gravest, 1989; Speare, 1974; Wolpert, 1966). Poor environment pushes residents to escape while good environment attracts migrants (Hunter et al., 2015). Tiebout's framework (1956) is widely used when analyzing how environmental amenity affects human migration. For example, Banzhaf and Walsh (2008) show that people (the wealthy in particular) tend to move closer to the community with better environmental amenity. The important role of environment in migration is supported by empirical studies in the U.S. (Glaeser and Gottlieb, 2009; Hsieh and Liu, 1983; Mueser and Graves, 1995; Partridge, 2010; Partridge and Rickman, 2003). However, empirical studies in Europe draw inconsistent conclusions. Some studies denies the importance of amenity (including environmental amenity) when compared to economic determinants (Arntz, 2010; Garretsen and Marlet, 2017; Niedomysl and Hansen, 2010) while others show the importance (Faggian and Royuela, 2010).

The role of environmental amenity is emphasized with in recent years. For example, positive correlation between pollution and emigration is found with evident from OECD countries (X. Xu and Sylwester, 2016). A survey conducted in Ostrava, Czech Republic, a city with the most polluted air in Europe, suggests that both environmental quality and the subjective perception of environmental amenity exert a significant effect on migration intentions. Moreover, such effect differs across categories of pollution and across demographics (Balcar and Šulák, 2021). Similarly, Germani et al. (2021) investigate the relationship between migration and air pollution emissions in Italy and find that increased awareness of environmental risks is influential in migration decisions.

Notably, the above-mentioned literature on environment's role in migration are basically focused on the urban areas in advanced economies with striking evidence from better-educated professionals (Balcar and Šulák, 2021; X. Xu and Sylwester, 2016). Nevertheless, despite the great body of literature, few evidence from rural migrant workers or from developing economies. To the contrary, when it comes to the effect of environment in rural-urban migration, particularly in the context of developing economies, relative studies tend to take environment as a disturbance (e.g., climate change, weather disasters) rather than the amenity. Evidences from India (Sedova and Kalkuhl, 2020), Cambodia (Nguyen et al., 2015), Sub-Saharan Africa (Call and Gray, 2020; Ruyssen and Rayp, 2014), Mexico (Nawrotzki et al., 2015, 2016, 2017) and Ecuador (Gray and Bilsborrow, 2013) indicate environment-drive rural migrant workers to urban areas as "climate refugees". Such studies are focused on the agriculture in developing economies but pay less attention on the industrial sector and urbanization in these regions. And the few studies that have examined this effect from the perspective of migrant workers have not focused on the role of haze perception (Jia et al., 2021; Z. Liu and Yu, 2020; C. Zhang et al., 2022). But as a particular by-product of urban development,[1] the impact of haze pollution on rural migrant workers' settlement intentions may vary considerably depending on the direct and indirect perception of pollution.

In summary, the literature suggests that haze pollution may influence migration decisions. However, how the haze pollution and the perception of pollution (migration experience of rural migrant workers per se and of their parents) affects rural migrant workers' settlement in urban areas, especially in a context of developing economy, is yet to be

[1] A plenty of evidence proves that haze derives, to a large extent, from human activities. For instance, unavoidable vehicle exhaust emission, household waste, burning of fuel, such as coal, in production and daily life are vital factors causing haze. As a result, the impact of haze and its abatement has become a key topic in cities, large cities in particular.

further studied. This paper notices that the haze pollution and rural migrant workers to urban areas are notable phenomena in China, which reflects the rapid industrialization and urbanization taking place in emerging markets like China. Therefore, this paper is to study how the haze pollution and migration experience exert an impact on rural migrant workers' settlement intention in the urban destination.

1.2. Mechanisms and hypothesis development

1.2.1. Rural migrant workers to urban areas: wage as the main driver

An extensive literature suggests that comparatively higher wage in the urban area motivates migrants from rural areas (Leng, 2022; Mincer, 1996). Lewis (1954) constructs a dual sector model to explain the migration from rural to urban areas. Agricultural sector, dominating the rural areas, suffers from low productivity and high unemployment; while, in contrast, industrial sector, dominating the urban areas, enjoys high productivity and low unemployment. Consequently, the latter offers a higher wage level. Therefore, a significant wage gap exists between the rural and urban areas, which attracts labor moving from agricultural sector in rural areas to industrial sector in urban areas until the gap diminishes gradually (Lewis, 1954). Population growth (Jorgenson, 1961) and balanced growth of dual sector (Ranis and Fei, 1961) are introduced in the dual sector model. Further, the wage gap between rural and urban areas is determined by the unemployment of urban areas (Todaro, 1969). Recent evidence shows that larger cities, due to the spillover in terms of learning and sharing, offer rural migrant workers higher wages (Pan et al., 2016). Thus, an increasing number of rural migrant workers are surging into metropolises in pursuit of higher wage.

1.2.2. Determinants of settlement

Within the framework of push-pull theory (Lee, 1966), migration is a pursuit of better life. In the case of China, apart from higher wage level, urban areas provide a better quality of public service and thereby a higher standard of living (Au and Henderson, 2006; Bradshaw and Fraser, 1989; Li et al., 2021). Therefore, larger cities attract huge number of migrants from rural areas (Shen, 1995) as well as small towns (Ravenstein, 1885). An increasing number of determinants are introduced to migration model, including demographics of individual (Meng and Zhang, 2001; W. Xu et al., 2006) or household (Bjarnason and Thorlindsson, 2006), systemic factors (Cai, 2001; Wu, 2002), and psychological or social identity (Akerlof and Kranton, 2000; Lamont and Molnár, 2002).

We incorporate haze pollution levels into a migration analysis framework to explore the impact of haze pollution on the urban settlement intentions of migrant rural populations. Haze pollution, with detriment to local livability, might offset the economic benefits of urban areas (Ebenstein et al., 2015) and thereby the "urban halo" is dimmed when rural migrant workers take health into account. On one hand, Fig. 1 plots the haze pollution index (PM 2.5) of 311 prefecture-level cities in 2016 and city size (lncityp), where the degree of haze pollution is positively correlated to city size. On the other hand, evidence shows that migrants enjoy wage premium based on city size (Pan et al., 2016).

Thus, on one hand, people migrate from rural to urban areas in pursuit of higher wage. On the other hand, urban haze pollution makes the destination city less attractive as a dwelling place. Therefore, rural migrant workers face the trade-off between economic benefits (wages) and potential health losses (harm from haze pollution). To be specific, as long as the haze pollution is bearable, rural migrant workers will continue to settle in their destination city in pursuit of economic benefits; once the haze pollution becomes too severe to bear, rural migrant workers will decrease their settlement intention in their destination city to seek health. Therefore, we propose hypothesis 1.

Hypothesis 1. The settlement intention of rural migrant workers shows an inverted U-shape as haze pollution increases.

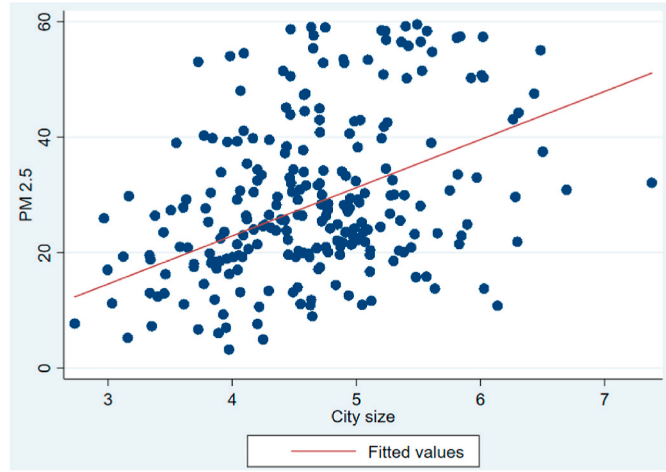

Fig. 1. Relation between haze pollution and city size.

1.2.3. Haze perception from experience

Under the assumption of "economic man", an individual has to obtain all the information about relevant elements to make a settlement decision, which is obviously arduous for an individual to achieve in a complex society. To solve this issue, Simon (1957) proposes "bounded rationality" hypothesis and believes that an individual is limited by their perception ability and other factors in decision-making, showcasing an incomplete rationality. Similarly, it is impossible for people to obtain all the information and analyze advantages and drawbacks in a completely rational manner concerning settlement decision-making to make the optimal settlement choice. Particularly, haze as a particular by-product of urban development in recent years. Rural migrant workers may be hold incomplete information while relocating to urban area.

Perception of haze pollution and the associated concerns are determined by three factors: psychological makeup, social characteristics, and the physical surrounding (Brody et al., 2004; Claeson et al., 2013; Coi et al., 2016). Among such, psychological makeup refers to awareness and self-efficacy. Awareness strengthen one's perception of haze pollution while self-efficacy is one's confidence in her ability of improve air quality (Cutter, 1981; Watson et al., 2013).

The word "haze" first appeared in weather report in June 2004. On February 29, 2012, the Ministry of Environmental Protection of China revised *Ambient Air Quality Standards* [(GB3095-2012)] by adding particulate matter (PM2.5) into the monitor indicator. It was not until then that the general public has become aware of haze pollution. Haze pollution is not a common sense in public during the past decade and the awareness of haze pollution is heterogeneous across different people. Therefore, there may be evident heterogeneity of the impact of haze pollution on migration decisions by different groups of rural migrant workers caused by direct and indirect perception variance in haze.

1.2.3.1. Direct perception of haze pollution. Direct experience is more likely to motivate stronger attitude (Fazio and Zanna, 1984) and to drive individuals to seek further indirect experience (e.g., second-hand information) to enrich their understanding (Fortner et al., 2000). Experience serves as a filter to evaluate risks like haze pollution and haze pollution victims are more likely to make decision in accordance with her physical perceptions (e.g., symptoms of asthma) (Bickerstaff and Walker, 1999). Abundant evidences show that people exposed more to air pollutants show stronger concerns about air quality (Brody et al., 2004; Coi et al., 2016; Cutter, 1981; Orru et al., 2018). In addition, interviews as well as a survey conducted by Whitmarsh (2008) in the south of England indicates that experience of haze pollution contributes to build up personal pro-environmental values (Whitmarsh, 2008).

On one hand, direct personal perception of haze pollution is disproportionately evident for those residing near the source of pollutants (Bickerstaff and Walker, 2001). On the other hand, urban areas suffer more from the haze pollution, especially the harmful particulates (e.g. PM2.5), due to industrialization (Duha et al., 2008) and urbanization. Compared with those who migrate from rural to urban areas for the first time, those who have migrated twice or more times are more likely to recognized the harm of haze pollution; i.e., the "experienced migrants" may be more sensitive to the harm of haze pollution. Therefore, we propose hypothesis 2.

Hypothesis 2. Compared with the migrants moving from rural to urban areas for the first time, rural migrant workers who have migrated to urban areas before may be more sensitive to the harm of haze and their settlement intention shows an inverted U shape as haze pollution increases. While the impact of haze pollution on the settlement intention of first-time rural migrant workers is not significant.

1.2.3.2. Indirect perception of haze pollution. People receive social perceptions cumulatively (Ho et al., 2020) and modify their awareness accordingly (Ho et al., 2019). Apart from personal experience (i.e., physical sense), perception of haze pollution is highly dependent on social and cultural context (Bickerstaff, 2004; Bickerstaff and Walker, 2001; Irwin et al., 1999; Macnaghten and Jacobs, 1997). For instance, Sheng (2017) points out that in addition to having a direct impact on children's urban settlement intentions, paternal migration experiences also have an indirect impact on children's urban settlement intentions through interactions with family endowments such as cultural capital and social capital. We echo the explanation in this study and argue that parents' migration experience affects their children's migration and settlement decision. Because the migration experience of parents offers information for their children, and increases their perception of haze pollution. Rural migrants whose parents have migration experience enjoy more information in a relative sense and they would consider more factors beyond economic incentive while making a settlement decision, including environmental issues like haze pollution. But for those whose parents do not have migration experience, the information they obtained is inadequate, leading them to ignore factors other than economic incentives in making a settlement decision.

Moreover, compared to migration experience of father, that of mother may have a greater impact on individual's perception of haze pollution. This may be related to the division of gender roles between parents in parenting. The masculinity of fathers and the femininity of mothers may lead to a different focus on the content of their children's rearing (Mckinney and Renk, 2008). Mothers place more emphasis on the physical and psychological dimensions of their children and the development of intimate relationships, whereas fathers are more concerned with the reality of their children's situation and the fulfilment of their jobs and goals (Russell, et al., 1998).

Based on this, we propose hypothesis 3.

Hypothesis 3. Compared with those whose parents have never migrated to urban areas, rural migrant workers whose parents, especially their mothers, have migrated to urban areas are more sensitive to the harm of haze and their settlement intention shows an inverted U shape as haze pollution increases. While the impact of haze pollution on the settlement intention of rural migrant workers whose parents do not have migration experience is not significant.

2. Identification strategy and data

We extract PM2.5 concentrations at city-level in China in 2016 from the database of Earth Observing System Data and Information System (EOSDIS) of US National Aeronautics and Space Administration (NASA).[2] The data of migrants are extracted from the 2016 China Migrants Dynamic Survey (CMDS). This survey, conducted by the China's National Population and Family Planning Commission,[3] covers all 32 provinces of China, including 433 cities and 8450 communities. The 2016 CMDS adopted a stratified three-stage probability proportionate to size (PPS) sampling, and the annual national data on migrants from each province in 2015 was considered as the basic sampling frame. The provincial sample size is divided into 7 categories: 10,000, 8,000, 7,000, 6,000, 5,000, 4,000, and 2000. The total sample size of the survey is about 169,000, involving about 450,000 family members of the migrants. In each selected community, 20 eligible individual migrants were selected randomly to participate in the survey. The questionnaires involved the following aspects: basic family members' status, mobility trend and settlement intention, employment characteristics, utilization of basic public health services, marriage and childbirth and family planning service management, etc. The sample is representative at the national and provincial levels.

The two databases are widely used in academy due to the reliability and scope of coverage (Chen and Wang, 2019; Ghanem and Zhang, 2014). Besides, the city-level data used in this paper are extracted from *China City Statistical Yearbook* of the corresponding year.

The dependent variable, "the settlement intention of rural migrant workers in the destination city", is a dummy variable. To be specific, $WTS = 1$ means that the rural migrant workers are willing to settle in the destination city. We assume that the residual is normally distributed. Equation (1) presents the econometric model.

$$Prob(WTS = 1) = \alpha + \beta_0 PM2.5 + \beta_1 x + \beta_2 y + \varepsilon \tag{1}$$

where $Prob(WTS = 1)$ denotes the probability of the rural migrant workers settles in the destination city. The independent variable $PM2.5$ denotes the intensity of haze pollution in the destination city. The control variables, x and y, are individual characteristics of migrants and regional features of destination city respectively (Hao and He, 2022); α is the constant term; β_0, β_1 and β_2 are coefficients to be estimated; ε is the random error, representing variables other than the key explanatory variable and control variable that may influence the dependent variable. Specifically, we control variables in two folds: A) individual characteristics of migrant, concerning monthly average salary of migrants, marriage status, gender, age, educational attainment, ethnicity, sector of employment, nature of employer, profession type, migration duration, migration distance, housing ownership in the destination city; and B) regional features of destination city, concerning regional feature of the destination city (eastern, central, or western China), contribution of the secondary industry to local GDP, scale of the destination city, and GDP per capita of the destination city. The definition of variables in detail is shown in Table 1.

After extracted from questionnaires of CMDS, data are adjusted for simplification in four folds to better examine the issue. First, respondents selected one among 20 options when attributing their employer to a certain industry. For instead, we divide the 20 industries into three categories (i.e., agriculture, manufacturing, and service) according to *National Economy Industry Classification* (*2017*) (GB/T 4754–2017). Second, we extract C-level of state-own organization and professional from the 19 categories of position in the questionnaire and

[2] p.m.2.5 (particulate matter with an aerodynamic equivalent diameter of less than or equal to 2.5 μm) is considered to be the "culprit" of haze pollution, which can penetrate the lungs. Existing studies have generally used PM2.5 as a measurement variable for haze pollution.

[3] China Migrants Dynamic Survey, https://www.chinaldrk.org.cn/.

Table 1
Descriptive statistics of key variables.

Type	Variable	Definition	Obs	Mean	Std.	Min	Max
Dependent variable	WTS	Dummy variable; taking 1 if respondent is willing to settle in the current destination city	93,804	0.8512857	0.3558086	0	1
Independent variable	Haze pollution	Continuous variable; PM2.5 concentrations	105,579	32.2267	16.71767	2.108247	80.38319
Control variable: Individual characteristics	Economic incentive	Continuous variable; ratio of respondent's income in the previous month over the average wage of her original province	124,635	0.0553218	0.0497709	−0.5850092	1.610511
	Married	Dummy variable; taking 1 if the respondent is married	136,918	0.820995	0.3833579	0	1
	Age	Continuous variable; natural number (year)	137,566	35.74838	9.676036	15	94
	Gender	Dummy variable; taking 1 when the respondent is female	137,566	0.4219575	0.4938736	0	1
	Rural	Dummy variable; taking 1 if the respondent is registered as "rural" in the *hukou* system	136,470	0.8561076	0.3509819	0	1
	Education	Category variable; taking 1 if respondent has never graduated from elementary school; 2 for diploma of elementary school; 3 for diploma of junior secondary school; 4 for diploma of senior or vocational secondary school; 5 for associate bachelor degree; 6 for bachelor degree; and 7 for master or higher degree	137,566	3.44024	1.080815	1	7
	Han ethnicity	Dummy variable; taking 1 if the respondent is of *Han* ethnicity	137,575	0.9235472	0.2657223	0	1
	Family size	Counting variable; number of family members living with the respondent in current destination city (respondent per se included)	137,566	2.503635	1.161992	1	10
	Position	Dummy variable; taking 1 if respondent is either C-level of state-owned organization or professional	137,575	0.0765764	0.2659191	0	1
	Self-employed	Dummy variable; taking 1 if the respondent is self-employed	137,610	0.0809607	0.2727757	0	1
	Service	Dummy variable; taking 1 if the respondent is working in service sector	137,575	0.7325604	0.4426252	0	1
	Manufacturing	Dummy variable; taking 1 if the respondent is working in manufacturing sector	137,575	0.2480901	0.431906	0	1
	SOE	Dummy variable; taking 1 if the respondent is working for a state-owned organization	137,575	0.0701508	0.255402	0	1
	Business	Dummy variable; taking 1 if the respondent is running her own business	137,575	0.1807814	0.3848384	0	1
	Home buyer	Dummy variable; taking 1 if the respondent owns her current housing in the destination city	93,801	0.3262758	0.4688521	0	1
	Migration frequency	Counting variable; how many times the respondent has migrated	137,565	1.366925	1.072457	1	40
	Migration scope	Category variable; 1 for migration across counties within the same prefecture; 2 for migration across prefectures within the same province; 3 for migration across provinces	137,429	2.34556	0.7439217	1	3
Control variable: Urban and regional characteristics	Eastern	Dummy variable; taking 1 if the destination city is located in Eastern China	137,575	0.4306524	0.4951694	0	1
	Central	Dummy variable; taking 1 if the destination city is located in Central China	137,575	0.1739633	0.3790793	0	1
	Population	Continuous variable; population of destination city (10,000 people)	125,621	445.0748	514.7983	16	2449
	GDP per capita	Continuous variable; annual GDP per capita of destination city (CNY)	122,777	92015.44	33712.47	4134	439321
	Industry development	Continuous variable; ratio of local manufacturing value over GDP of destination city	125,551	40.78261	10.69601	13.68	69.55

the other 17 positions are labelled as "others" in this paper. Third, ethnicity and marriage status are simplified as dummy variables. Fourth, in order to focus on the migration in pursuit of economic benefits, samples whose reason for migration is neither employment nor business are dropped. By doing these, this paper can, on the one hand, measure the impact of haze pollution and intergenerational migration experience on the settlement intention of rural migrant workers in a more accurate manner. On the other hand, the calculation amount has been lowered substantively.

Table 1 presents the descriptive statistics of migrants' individual characteristics. A total of 76,248 rural migrant workers are investigated, whose average monthly wage is 4291.19 CNY and 79.42% of whom are married. The samples are almost gender-balanced, with female accounting for 46.37%. The samples seem inadequately educated, for 87.43% of them have no degree of associate bachelor or above. In terms of employment, the majority of samples are neither C-level of state-own organization nor professional; i.e., the "other" position accounts for 73.10%. Around 70% of samples work for domestic private employer (72.57%) in the service sector (67.07%).

3. Empirical results and discussions

3.1. Benchmark results

Based on the three hypotheses in Section 3, this paper conducts relevant empirical analysis. In baseline model, we take individual features of rural migrant workers into consideration, including monthly average income, marriage status, gender, age, educational attainment, and ethnicity. We also control, among others, the nature of the employer, sector of employment, profession type, migration duration, migration distance of rural migrant workers, family income of rural migrant workers, housing ownership in the destination city. Furthermore, features of the destination city are also controlled, including regional feature of the destination city (eastern, central, or western China), contribution of the secondary industry to local GDP, the scale of the destination city, and GDP per capita of the destination city.

Table 2 exhibits the estimation results of model (1)–(3), which examine the impact of haze pollution on rural migrant workers' settlement intention in the destination city by adding new control variables gradually. Where all columns are estimated using Probit model and WTS

Table 2
Impact of haze pollution on rural migrant workers' settlement intention at the destination city: benchmark results.

	Model (1)		Model (2)		Model (3)	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0265***	0.0065***	0.0163***	0.0033***	0.0062**	0.0012**
	(0.0013)	(0.0003)	(0.0017)	(0.0003)	(0.0028)	(0.0005)
PM2.5* PM2.5	−0.0002***	−0.0001***	−0.0002***	−0.0000***	−0.0001**	−0.0000**
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Han ethnicity			0.0469*	0.0095*	−0.0180	−0.0035
			(0.0270)	(0.0055)	(0.0310)	(0.0060)
Gender			−0.0312**	−0.0063**	−0.0285*	−0.0055*
			(0.0150)	(0.0030)	(0.0158)	(0.0031)
Age			−0.0024***	−0.0005***	−0.0030***	−0.0006***
			(0.0009)	(0.0002)	(0.0009)	(0.0002)
Education			0.1202***	0.0244***	0.1088***	0.0212***
			(0.0090)	(0.0018)	(0.0095)	(0.0018)
Married			0.0624***	0.0127***	0.0744***	0.0145***
			(0.0227)	(0.0046)	(0.0241)	(0.0047)
Family size			0.2702***	0.0549***	0.2760***	0.0538***
			(0.0075)	(0.0015)	(0.0079)	(0.0015)
Economic incentive			0.3863**	0.0785**	0.6304***	0.1228***
			(0.1826)	(0.0371)	(0.2027)	(0.0395)
Migration distance			−0.1910***	−0.0388***	−0.2256***	−0.0439***
			(0.0103)	(0.0021)	(0.0113)	(0.0022)
Manufacturing			−0.5551***	−0.1127***	−0.6469***	−0.1260***
			(0.0648)	(0.0131)	(0.0720)	(0.0140)
Service			−0.3166***	−0.0643***	−0.3953***	−0.0770***
			(0.0643)	(0.0131)	(0.0714)	(0.0139)
Position			0.1866***	0.0379***	0.1856***	0.0362***
			(0.0331)	(0.0067)	(0.0343)	(0.0067)
Business			0.0901***	0.0183***	0.1085***	0.0211***
			(0.0205)	(0.0042)	(0.0222)	(0.0043)
SOE			0.0835**	0.0170**	0.1268***	0.0247***
			(0.0334)	(0.0068)	(0.0354)	(0.0069)
Self-employed			0.0709**	0.0144**	0.0983***	0.0191***
			(0.0280)	(0.0057)	(0.0307)	(0.0060)
Migration Frequency			−0.0527***	−0.0107***	−0.0517***	−0.0101***
			(0.0057)	(0.0012)	(0.0061)	(0.0012)
Home buyer			1.1118***	0.2258***	1.1412***	0.2223***
			(0.0269)	(0.0054)	(0.0288)	(0.0056)
Eastern					0.0517**	0.0101**
					(0.0206)	(0.0040)
Central					0.0290	0.0057
					(0.0254)	(0.0049)
Industry development					0.0004	0.0001
					(0.0009)	(0.0002)
Population					0.0001**	0.0000**
					(0.0001)	(0.0000)
GDP per capita					0.0000***	0.0000***
					(0.0000)	(0.0000)
Destination province					−0.0051***	−0.0010***
					(0.0007)	(0.0001)
Constant	0.4563***		0.3047***		0.6456***	
	(0.0222)		(0.0890)		(0.1122)	
Pseudo R2	0.0139	0.0139	0.1217	0.1217	0.1815	0.1815
Observations	60,700	60,700	54,995	54,995	51,836	51,836

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

is the dependent variable. The results in model (1)–(3) all reveal that there exists an inverted U-shape relationship between the settlement intention of the rural migrant workers and haze pollution in the destination city. Based on model (3), we calculate that the threshold for this inverted U-shaped relationship is 31. According to the descriptive statistics of the main variables, the level of haze pollution in some Chinese cities has exceeded the threshold value.

In addition, economic incentive showcases significant and positive impacts,[4] in line with neo-classical migration theories which suggest wage as the driver of rural migrant workers. The influence of individual feature variables, employment-related variables, and migration-related variables of rural migrant workers on their probability of settlement in the destination city comes in line with our estimation. Educational attainment, for example, positively affects the settlement intention of the rural migrant workers in the destination city at a significant level. Generally, a better-educated migrant is more likely to earn a better wage in urban areas and thereby is more likely to settle. In contrast, migration distance negatively influences the settlement intention of the rural migrant workers in the destination city at a significant level. That is, the longer the migration distance, the weaker the settlement intention of the rural migrant workers in the destination city. Considering the cost of transport and the social difference across regions, it is more economical for rural migrant workers to shorten their travel distance and life within the same province or even the same prefecture is easier to adapt, which makes migrants more likely to settle.

[4] Economic incentive equals the ratio of rural migrant workers' salary income of the previous month to the average salary at the province where the rural migrant workers are relocated from. Provincial average salary is used because China Migrants Dynamic Survey can only identify the province that the migrants are relocated from.

3.2. Robustness check

3.2.1. Alternative dependent variable

In this section, the settlement intention of rural migrant workers in the destination city was replaced by the willingness of rural migrant workers to re-register their *hukou*[5] in the destination city as the dependent variable. The impact of haze pollution on settlement intention of rural migrant workers is further explored in this way to verify the robustness of the baseline results. The estimation results are shown in Table 3. We identify an inverted U-shape relation between haze pollution and willingness of rural migrant workers to re-register their *hukou* in the destination city in Models (1) and (2), which is consistent with the conclusions in the baseline regression. Furthermore, the inflection points where haze pollution negatively affects the willingness of rural migrant workers re-registering *hukou* has appeared, with about 60% of the samples left on the right hand of the inflection point (i.e., 40.2399 on the x-axis).

3.2.2. Impact of urban settlement threshold

In order to control the impact of the urban settlement threshold, we control the city-level settlement threshold index (J. Zhang et al., 2020), which covers the thresholds of talent recruitment, general employment, investment, and home purchase. J. Zhang et al. (2020) also shared alternative index computed with three different methods (https://chfs.swufe.edu.cn/science/family.html). All three alternative index are introduced as control variable, respectively. The results are shown in Table 4. As indicated in Table 4, Model (1)–(3) reveal an inverted U-shape relation between haze pollution and the settlement intention of rural migrant workers in the destination city, in line with the conclusions of the baseline regression. Thus, the robustness of the baseline results is further corroborated.

3.2.3. Sub-sample results

First, we construct a sub-sample by deleting the non-urban municipal districts as destination for rural migrant workers and this sub-sample is used to investigate the impact of haze pollution on settlement intention of rural migrant workers. The regression results are shown in Table 5. In Table 5, Model (1) and (2) reveal an inverted U-shape relation between haze pollution and the settlement intention of rural migrant workers in the destination city, which is consistent with the conclusions in the baseline regression.

Second, we use the sub-sample of unmarried rural migrant workers to mitigate the impact of children's educational needs. The regression results are shown in Table 6, which also demonstrates the robustness of baseline results.

Finally, we delete the sample of rural migrant workers who have already purchased house in the destination city, as being a home owner strengthens the willingness of rural migrant workers to settle in the destination city. Table 7 reports the results of this sub-sample, which are still robust.

3.2.4. Results of pooled panel crossed-section regression

We construct the pooled panel crossed-section regression model to investigate the impact of haze pollution on the settlement intention of rural migrant workers in the destination city. The estimation results are shown in Table 8. We identify an inverted U-shape relation between haze pollution and the settlement intention of rural migrant workers in the destination city in Model (1) and (2), in line with the baseline results. Moreover, we also delete the samples of non-urban municipal districts as destination for rural migrant workers and employ the pooled panel crossed-section regression data to test Hypothesis 1. The regression results are shown in Models (3) and (4) of Table 8, consistent with the baseline results. Besides, we also obtained the latest research-related haze pollution and China Migrants Dynamic Survey data in 2018 to further test the robustness of our findings. As indicated in Table A1 in Appendix, there exists an inverted U-shape relation between haze pollution and the settlement intention of rural migrant workers in the destination city, in line with the conclusions of the baseline regression. Thus, the robustness of the baseline results is further demonstrated.

Table 3
Robustness check: alternative dependent variable.

	(1)	(2)
	Coefficient	Marginal Effect
PM2.5	0.0151***	0.0056***
	(0.0025)	(0.0009)
PM2.5* PM2.5	−0.0003***	−0.0001***
	(0.0000)	(0.0000)
Han ethnicity	−0.1033***	−0.0383***
	(0.0306)	(0.0113)
Gender	0.0467***	0.0173***
	(0.0150)	(0.0056)
Age	−0.0016*	−0.0006*
	(0.0009)	(0.0003)
Education	0.1529***	0.0567***
	(0.0085)	(0.0031)
Married	−0.2552***	−0.0947***
	(0.0262)	(0.0097)
Family size	0.0535***	0.0199***
	(0.0071)	(0.0026)
Economic incentive	0.1990	0.0739
	(0.1536)	(0.0570)
Migration distance	0.0678***	0.0252***
	(0.0102)	(0.0038)
Manufacturing	−0.7991***	−0.2965***
	(0.0565)	(0.0208)
Service	−0.7688***	−0.2853***
	(0.0554)	(0.0204)
Position	0.0075	0.0028
	(0.0292)	(0.0108)
Business	−0.1378***	−0.0511***
	(0.0189)	(0.0070)
SOE	0.0228	0.0084
	(0.0313)	(0.0116)
Self-employed	−0.0267	−0.0099
	(0.0250)	(0.0093)
Migration Frequency	−0.0316***	−0.0117***
	(0.0077)	(0.0029)
Home buyer	−0.1343***	−0.0498***
	(0.0160)	(0.0059)
Eastern	0.3277***	0.1216***
	(0.0197)	(0.0072)
Central	0.0195	0.0073
	(0.0227)	(0.0084)
Industry development	−0.0089***	−0.0033***
	(0.0008)	(0.0003)
Population	0.0008***	0.0003***
	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***
	(0.0000)	(0.0000)
Destination province	−0.0030***	−0.0010***
	(0.0011)	(0.0000)
Constant	0.7161***	
	(0.0944)	
Observations	33,248	33,248

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

[5] The *hukou* system is a key political and economic institution in China, which requires every Chinese citizen to be officially and constantly registered from birth. The registration is related to the citizen rights including social welfare. Rural migrant workers were registered in rural *hukou* system from birth and such registration entitled them with some rights of land as property. Registration in urban *hukou* system usually means better social welfare and job opportunities.

Table 4
Robustness check: impact of urban settlement threshold.

	(1)		(2)		(3)	
	Settlement threshold index A1		Settlement threshold index A2		Settlement threshold index A3	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0085**	0.0016**	0.0078**	0.0015**	0.0074**	0.0014**
	(0.0036)	(0.0007)	(0.0036)	(0.0007)	(0.0036)	(0.0007)
PM2.5* PM2.5	−0.0001**	−0.00001**	−0.0002**	−0.00001**	−0.0001*	−0.00001*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Han ethnicity	−0.0715*	−0.0133*	−0.0731*	−0.0136*	−0.0744*	−0.0139*
	(0.0392)	(0.0073)	(0.0392)	(0.0073)	(0.0392)	(0.0073)
Gender	−0.0198	−0.0037	−0.0192	−0.0036	−0.0191	−0.0036
	(0.0190)	(0.0036)	(0.0190)	(0.0035)	(0.0191)	(0.0035)
Age	−0.0024**	−0.0005**	−0.0025**	−0.0005**	−0.0025**	−0.0005**
	(0.0011)	(0.0002)	(0.0011)	(0.0002)	(0.0011)	(0.0002)
Education	0.1228***	0.0229***	0.1239***	0.0231***	0.1241***	0.0231***
	(0.0114)	(0.0021)	(0.0114)	(0.0021)	(0.0114)	(0.0021)
Married	0.0726**	0.0135**	0.0715**	0.0133**	0.0707**	0.0132**
	(0.0292)	(0.0054)	(0.0293)	(0.0054)	(0.0293)	(0.0054)
Family size	0.2838***	0.0529***	0.2838***	0.0529***	0.2840***	0.0529***
	(0.0100)	(0.0018)	(0.0100)	(0.0018)	(0.0100)	(0.0018)
Economic incentive	0.7782***	0.1451***	0.7796***	0.1453***	0.7772***	0.1448***
	(0.2506)	(0.0467)	(0.2505)	(0.0467)	(0.2504)	(0.0467)
Migration distance	−0.1977***	−0.0368***	−0.1974***	−0.0368***	−0.1973***	−0.0368***
	(0.0147)	(0.0027)	(0.0147)	(0.0027)	(0.0147)	(0.0027)
Manufacturing	−0.4795***	−0.0894***	−0.4765***	−0.0888***	−0.4746***	−0.0884***
	(0.0978)	(0.0182)	(0.0977)	(0.0182)	(0.0977)	(0.0182)
Service	−0.2284**	−0.0426**	−0.2275**	−0.0424**	−0.2260**	−0.0421**
	(0.0971)	(0.0181)	(0.0970)	(0.0181)	(0.0971)	(0.0181)
Position	0.2272***	0.0424***	0.2280***	0.0425***	0.2285***	0.0426***
	(0.0419)	(0.0078)	(0.0419)	(0.0078)	(0.0419)	(0.0078)
Business	0.1227***	0.0229***	0.1248***	0.0232***	0.1244***	0.0232***
	(0.0280)	(0.0052)	(0.0280)	(0.0052)	(0.0280)	(0.0052)
SOE	0.0899**	0.0168**	0.0888**	0.0165**	0.0889**	0.0166**
	(0.0431)	(0.0080)	(0.0431)	(0.0080)	(0.0431)	(0.0080)
Self-employed	0.0606	0.0113	0.0610	0.0114	0.0603	0.0112
	(0.0388)	(0.0072)	(0.0388)	(0.0072)	(0.0388)	(0.0072)
Migration Frequency	−0.0515***	−0.0096***	−0.0520***	−0.0097***	−0.0519***	−0.0097***
	(0.0073)	(0.0014)	(0.0073)	(0.0014)	(0.0073)	(0.0014)
Home buyer	1.1451***	0.2135***	1.1443***	0.2132***	1.1446***	0.2133***
	(0.0372)	(0.0069)	(0.0373)	(0.0069)	(0.0373)	(0.0069)
Eastern	0.1266***	0.0236***	0.1378***	0.0257***	0.1454***	0.0271***
	(0.0288)	(0.0054)	(0.0272)	(0.0051)	(0.0280)	(0.0052)
Central	0.1245***	0.0232***	0.1141***	0.0213***	0.1198***	0.0223***
	(0.0325)	(0.0061)	(0.0328)	(0.0061)	(0.0326)	(0.0061)
Industry development	0.0048***	0.0009***	0.0046***	0.0009***	0.0046***	0.0009***
	(0.0012)	(0.0002)	(0.0012)	(0.0002)	(0.0012)	(0.0002)
Population	0.0002***	0.0000***	0.0002***	0.0000***	0.0002***	0.0000***
	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Destination province	−0.0078***	−0.0015***	−0.0076***	−0.0014***	−0.0076***	−0.0014***
	(0.0008)	(0.0002)	(0.0009)	(0.0002)	(0.0008)	(0.0002)
composite_peri2_pp	−0.0468***					
	(0.0101)					
composite_peri2_ew			−0.4200***	−0.0783***		
			(0.1487)	(0.0277)		
composite_peri2_en					−0.3805***	−0.0709***
					(0.1281)	(0.0239)
Constant	0.5115***		0.5467***		0.4957***	
	(0.1445)		(0.1451)		(0.1441)	
Observations	36,621	36,621	36,621	36,621	36,621	36,621

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

3.3. The endogeneity problem

It is worth mentioning there may be estimation bias caused by endogeneity in the above regression. First, the selection of samples may be biased. When conducting baseline regression, 30% of respondents in the CMDS (2016) who selected "Unsure" to the question "Are you going to settle in your current destination city?" are excluded. Descriptive statistics in Table 9 shows some bias in terms of individual characteristics and regional feature across groups with and without explicit settlement intention (i.e., those selecting "Settle/Not settle" and those selecting "Unsure"). For example, respondents aged from 19 to 25 are disproportionately prone to "Unsure", which indicates indecisiveness of young adults in terms of career and future life. Similar bias is significant in terms of education, marriage status, income, and work. Samples selecting "not sure" are mainly those with primary school, high school, or secondary vocational school education. More samples with educational attainment of or above vocational college select "settle/not settle" than "not sure". Samples selecting "not sure" are mostly married while

Table 5
Robustness check: sub-sample without non-urban municipal districts as destination.

	(1)	(2)
	Coefficient	Marginal Effect
PM2.5	0.0103***	0.0018***
	(0.0033)	(0.0006)
PM2.5* PM2.5	−0.0002**	−0.0001**
	(0.0000)	(0.0000)
Han ethnicity	0.0010	0.0002
	(0.0375)	(0.0066)
Gender	−0.0226	−0.0039
	(0.0186)	(0.0032)
Age	−0.0043***	−0.0008***
	(0.0011)	(0.0002)
Education	0.1006***	0.0176***
	(0.0111)	(0.0019)
Married	0.0496*	0.0087*
	(0.0286)	(0.0050)
Family size	0.2652***	0.0463***
	(0.0095)	(0.0016)
Economic incentive	0.5354**	0.0934**
	(0.2354)	(0.0411)
Migration distance	−0.2290***	−0.0400***
	(0.0133)	(0.0023)
Manufacturing	−0.5000***	−0.0872***
	(0.0887)	(0.0155)
Service	−0.2635***	−0.0460***
	(0.0877)	(0.0153)
Position	0.2384***	0.0416***
	(0.0420)	(0.0073)
Business	0.1134***	0.0198***
	(0.0258)	(0.0045)
SOE	0.1608***	0.0281***
	(0.0427)	(0.0075)
Self-employed	0.0923**	0.0161**
	(0.0359)	(0.0063)
Migration Frequency	−0.0417***	−0.0073***
	(0.0076)	(0.0013)
Home buyer	1.1579***	0.2021***
	(0.0335)	(0.0058)
Eastern	0.1149***	0.0201***
	(0.0242)	(0.0042)
Central	0.0363	0.0063
	(0.0288)	(0.0050)
Industry development	0.0000***	0.0000***
	(0.0000)	(0.0000)
Population	−0.0002	−0.0000
	(0.0010)	(0.0002)
GDP per capita	−0.0001**	−0.0000**
	(0.0001)	(0.0000)
Destination province	−0.0032***	−0.0011***
	(0.0003)	(0.0001)
Constant	0.3899***	
	(0.1282)	
Observations	40,863	40,863

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

those selecting "settle/not settle" are mostly married. In terms of income, most samples either select "settle" or "not settle" instead of selecting "not sure". In indicators that reflect work conditions, samples selecting "not sure" are from unstable jobs, low-skill jobs, or jobs in the private sector. In other word, respondents with certain individual characteristics are more likely to be "unsure" of their settlement intention. Therefore, the exclusion of "Unsure" respondents might cause bias of sample selection.

Second, endogeneity might lie in reverse causality. As is suggested in existing literature, population leads to pollution (Akerlof and Kranton, 2000; Lamont and Molnár, 2002). Thus, haze of destination city might be worsening if an increasing number of rural migrant workers are willing to settle. Last, there may also be omitted variables or measurement bias.

In order to address this problem, we construct an instrumental variable: air flow coefficient of city level (Hering and Poncet, 2014). The airflow coefficient can be used as an instrumental variable of haze pollution. On the one hand, a larger value indicates the stronger air mobility, which is negatively correlated with haze pollution. Thus, it satisfies the correlation assumption of effective instrumental variables (Hering and Poncet, 2014). On the other hand, the airflow coefficient is mainly affected by the wind speed and the height of the atmospheric boundary layer, which are determined by the complex meteorological system and geographical conditions. Thus, it satisfies the exogenous assumption of effective instrumental variables (Broner et al., 2012). Furthermore, we employ extended regression models (ERMs) to address the problem of omitted variables, measurement bias, reverse causality, and bias in sample selection.

Table 6
Robustness check: sub-sample of unmarried rural migrant workers.

	(1)	(2)
	Coefficient	Marginal Effect
PM2.5	0.0126**	0.0036**
	(0.0048)	(0.0009)
PM2.5* PM2.5	−0.0001**	−0.0000**
	(0.0001)	(0.0000)
Han ethnicity	0.0559	0.0159
	(0.0664)	(0.0189)
Gender	−0.0174	−0.0049
	(0.0358)	(0.0102)
Age	0.0124***	0.0035***
	(0.0023)	(0.0007)
Education	0.1543***	0.0438***
	(0.0190)	(0.0053)
Family size	0.2180***	0.0620***
	(0.0228)	(0.0064)
Economic incentive	2.4374***	0.6927***
	(0.6515)	(0.1848)
Migration distance	−0.3202***	−0.0910***
	(0.0266)	(0.0073)
Manufacturing	−0.3326	−0.0945
	(0.2143)	(0.0609)
Service	−0.0655	−0.0186
	(0.2127)	(0.0605)
Position	0.1971***	0.0560***
	(0.0632)	(0.0179)
Business	0.2093***	0.0595***
	(0.0774)	(0.0220)
SOE	0.1504**	0.0427**
	(0.0759)	(0.0216)
Self-employed	0.3041***	0.0864***
	(0.1063)	(0.0302)
Migration Frequency	−0.0649***	−0.0184***
	(0.0190)	(0.0054)
Home buyer	1.0384***	0.2951***
	(0.0952)	(0.0267)
Eastern	−0.0534	−0.0152
	(0.0465)	(0.0132)
Central	0.0471	0.0134
	(0.0605)	(0.0172)
Industry development	0.0003	0.0001
	(0.0021)	(0.0006)
Population	0.0002	0.0000
	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***
	(0.0000)	(0.0000)
Destination province	−0.0036**	−0.0010**
	(0.0015)	(0.0004)
Constant	−0.3463	
	(0.2888)	
Observations	7277	7277

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

Table 10 presents the results of the ERMs, where dependent variable is *WTS, Heckcode, PM2.5*, and *PM2.5* squared in Column (1) to (4) respectively. Notably, respondents with and without explicit settlement intention are included in this table. The dependent variable in Column

Table 7
Robustness check: sub-sample without urban home owners.

	(1)	(2)
	Coefficient	Marginal Effect
PM2.5	0.0055**	0.0014**
	(0.0022)	(0.0007)
PM2.5* PM2.5	−0.0001**	−0.0000**
	(0.0000)	(0.0000)
Han ethnicity	−0.0130	−0.0034
	(0.0320)	(0.0083)
Gender	−0.0277*	−0.0072*
	(0.0164)	(0.0043)
Age	−0.0024**	−0.0006**
	(0.0010)	(0.0002)
Education	0.1087***	0.0283***
	(0.0099)	(0.0026)
Married	0.0404	0.0105
	(0.0249)	(0.0065)
Family size	0.2918***	0.0759***
	(0.0083)	(0.0021)
Economic incentive	0.8374***	0.2178***
	(0.2215)	(0.0576)
Migration distance	−0.2246***	−0.0584***
	(0.0118)	(0.0030)
Manufacturing	−0.7092***	−0.1844***
	(0.0770)	(0.0200)
Service	−0.4500***	−0.1170***
	(0.0765)	(0.0199)
Position	0.1815***	0.0472***
	(0.0358)	(0.0093)
Business	0.1306***	0.0340***
	(0.0235)	(0.0061)
SOE	0.1367***	0.0356***
	(0.0372)	(0.0097)
Self-employed	0.1050***	0.0273***
	(0.0328)	(0.0085)
Migration Frequency	−0.0528***	−0.0137***
	(0.0062)	(0.0016)
Eastern	0.0565***	0.0147***
	(0.0215)	(0.0056)
Central	0.0296	0.0077
	(0.0267)	(0.0069)
Industry development	0.0007	0.0002
	(0.0009)	(0.0002)
Population	0.0001**	0.0000**
	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***
	(0.0000)	(0.0000)
Destination province	−0.0049***	−0.0013***
	(0.0007)	(0.0002)
Constant	0.6531***	
	(0.1182)	
Observations	36,562	36,562

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

(2), *Heckcode,* is a dummy variable, where 1 denotes respondent selecting "Settle" or "Not settle" and 0 denotes respondent selecting "Unsure". Column (1) in Table 10 shows the final results with endogeneity taken into account, where the impact of haze pollution on rural migrant workers' settlement intention indicates an inverted U shape, in line with baseline regression results. Hypothesis 1 is demonstrated. As is shown in Columns (2) to (4), the instrument variable, *air flow coefficient*, and its quadratic term is significantly correlated to haze pollution, the key independent variable. Last, the residual between either two of the four dependent variables are significantly correlated, indicating that we address the concern of endogeneity in a proper manner.

3.4. Role of direct perception of haze pollution

As is proposed in Hypothesis 2, direct experience strengthens perception of haze pollution. As assumed in Section 2, migration experience causes possible exposure to haze in urban area, and these

Table 8
Robustness check: pooled panel crossed-section regression.

	The full sample		Deleting the sample of non-urban municipal districts	
	(1)	(2)	(3)	(4)
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0091***	0.0021***	0.0074***	0.0016***
	(0.0010)	(0.0002)	(0.0013)	(0.0003)
PM2.5* PM2.5	−0.0001***	−0.00002***	−0.0001***	−0.00001***
	(0.0000)	(0.00001)	(0.0000)	(0.0000)
Han ethnicity	−0.0620***	−0.0143***	−0.0819***	−0.0175***
	(0.0173)	(0.0040)	(0.0215)	(0.0046)
Gender	0.0222**	0.0051**	0.0193*	0.0041*
	(0.0087)	(0.0020)	(0.0106)	(0.0023)
Age	−0.0086***	−0.0020***	−0.0097***	−0.0021***
	(0.0005)	(0.0001)	(0.0007)	(0.0001)
Education	0.0977***	0.0225***	0.0948***	0.0202***
	(0.0053)	(0.0012)	(0.0064)	(0.0014)
Married	0.1279***	0.0295***	0.1307***	0.0279***
	(0.0138)	(0.0032)	(0.0167)	(0.0036)
Family size	0.1800***	0.0415***	0.1720***	0.0367***
	(0.0046)	(0.0011)	(0.0057)	(0.0012)
Economic incentive	0.3771***	0.0870***	0.3253***	0.0694***
	(0.0665)	(0.0153)	(0.0776)	(0.0166)
Migration distance	−0.1455***	−0.0336***	−0.1376***	−0.0294***
	(0.0058)	(0.0013)	(0.0070)	(0.0015)
Manufacturing	−0.2987***	−0.0689***	−0.1873***	−0.0400***
	(0.0254)	(0.0059)	(0.0338)	(0.0072)
Service	−0.0710***	−0.0164***	0.0175	0.0037
	(0.0249)	(0.0058)	(0.0330)	(0.0070)
Position	0.2098***	0.0484***	0.2532***	0.0540***
	(0.0189)	(0.0044)	(0.0238)	(0.0051)
Business	0.0503***	0.0116***	0.0768***	0.0164***
	(0.0127)	(0.0029)	(0.0151)	(0.0032)
SOE	0.0470***	0.0108***	0.0836***	0.0178***
	(0.0181)	(0.0042)	(0.0220)	(0.0047)
Self-employed	0.2164***	0.0499***	0.1907***	0.0407***
	(0.0116)	(0.0027)	(0.0138)	(0.0029)
Migration Frequency	0.0588***	0.0136***	0.0554***	0.0118***
	(0.0011)	(0.0002)	(0.0013)	(0.0003)
Home buyer	1.1504***	0.2654***	1.1572***	0.2470***
	(0.0205)	(0.0047)	(0.0246)	(0.0052)
Eastern	0.1120***	0.062***	0.1077***	0.066***
	(0.0232)	(0.0045)	(0.0182)	(0.0042)
Central	0.0229	0.0065	0.0244	0.0061
	(0.0237)	(0.0049)	(0.0200)	(0.0047)
Industry development	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Population	−0.0003***	−0.0000***	−0.0003***	−0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
GDP per capita	−0.0001**	−0.0000**	−0.0001**	−0.0000**
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Destination province	−0.0039***	−0.0009***	−0.0055***	−0.0012***
	(0.0003)	(0.0001)	(0.0004)	(0.0001)
2013.year	−0.1883***	−0.0238***	−0.0835***	−0.0221***
	(0.0203)	(0.0047)	(0.0252)	(0.0054)
2014.year	−0.1006***	−0.0238***	−0.1041***	−0.0232***
	(0.0203)	(0.0047)	(0.0252)	(0.0054)
2015.year	0.0675***	0.0339***	−0.1161***	−0.0292***
	(0.0203)	(0.0047)	(0.0252)	(0.0054)
2016.year	0.1169***	0.0256***	0.1524***	0.0306***
	(0.0211)	(0.0047)	(0.0262)	(0.0055)
Constant	0.3222***		0.4311***	
	(0.0472)		(0.0596)	
Observations	263,043	263,043	205,930	205,930

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

Table 9
Descriptive statistics by group: "Settle/Not settle" vs. "Unsure".

Item		Settle/Not settle	Unsure
Han ethnicity		92.43%	92.21%
Married		85.66%	74.35%
Monthly income (mean value, CNY)		4325.175	3590.568
Self-employed		8.79%	6.61%
Gender		41.86%	42.92%
Age	18 and below	0.38%	1.08%
	19–25	10.72%	17.86%
	26–35	40.94%	36.98%
	36–45	30.36%	26.24%
	46–55	14.88%	14.90%
	56–65	2.35%	2.08%
	66 and above	0.28%	0.21%
Education	Elementary school and below	13.42%	15.51%
	Secondary school (junior, senior, vocational)	58.75%	74.00%
	Associate bachelor and above	17.82%	10.49%
Profession Type	C-level of state-owned organization	0.62%	0.22%
	Professional	8.92%	5.94%
	Others	90.46%	93.84%
Ownership of Employer	State-owned	8.08%	4.13%
	Collectively-owned	0.93%	0.92%
	Domestic private	69.81%	73.50%
	Foreign	3.72%	1.92%
	Others	17.46%	19.52%
Economic region of current destination city	Eastern	42.53%	44.22%
	Central	17.88%	16.36%
	Western	32.00%	33.22%

experienced migrants are more likely to recognized the harm of haze. Thus, in this section, we take migration frequency as proxy of rural migrant workers' direct experience in terms of haze. Table 11 presents the distribution of sample across migration frequencies. Obviously, the majority of respondents (78.4%) have migrated only once, whom are defined as "first-time migrants". In contrast, the other 21.6% of respondents who have migrated more than once are defined as "experienced migrants". Accordingly, we divide the sample used in Table 2.

Table 12 presents the results of sub-sample: "first-time migrants" and "experienced migrants". The results suggest significant difference between the two sub-samples. To be specific, coefficient of neither haze pollution nor its quadratic term is significant for the sub-sample of "first-time migrants". However, results of the other sub-sample indicate a significant inverted U-shape relation between haze pollution and rural migrant workers' settlement intention. In other word, individuals with direct experience of haze pollution are more likely to be sensitive with it. Therefore, Hypothesis 2 is tested.

Moreover, people's concern about haze pollution is mainly due to concerns about environment. Different types of rural migrant workers may have different compromise options for the environment and urban amenities. Generally, the local degree of haze pollution also means more opportunities for employment and development in the city. For low-income rural migrant workers, they may not have the financial support to choose a dwelling with better environment, so they might only suffer from haze. Conversely, for rural migrant workers with higher income, especially high-income rural migrant workers with mobile experience and more sensitive to the harm of haze pollution, the expansion of haze pollution may make them leave the city. To test this, we first divide the full sample of rural migrant workers into two sub-samples according to their average wage: high-income group and low-income group. According to the results in Table 13, we find that the impact of haze pollution on the settlement intention of high-income rural migrant workers is inverted U-shaped. When the degree of haze pollution is relatively high, the settlement intention of high-income rural migrant workers will decrease; while the settlement intention of

Table 10
Impact of haze pollution on rural migrant workers' settlement intention at the destination city: Endogeneity.

	(1)	(2)	(3)	(4)
	WTS	Heckcode	PM2.5	PM2.5*PM2.5
PM2.5	0.167***			
	(0.022)			
PM2.5*PM2.5	−0.002***			
	(0.000)			
Air Flow Coefficient		−0.000***	0.045***	3.581***
		(0.000)	(0.001)	(0.058)
Air Flow Coefficient* Air Flow Coefficient		0.000***	−0.000***	−0.001***
		(0.000)	(0.000)	(0.000)
Han ethnicity	−0.055**	0.011	2.654***	242.643***
	(0.026)	(0.020)	(0.136)	(11.207)
Gender	−0.000	−0.001	0.426***	26.308***
	(0.013)	(0.010)	(0.092)	(8.092)
Age	−0.004***	0.009***	−0.001	−0.273
	(0.001)	(0.001)	(0.005)	(0.474)
Education	0.034***	0.131***	0.721***	61.805***
	(0.008)	(0.006)	(0.054)	(4.821)
Married	−0.103***	0.130***	1.995***	198.066***
	(0.021)	(0.016)	(0.143)	(12.401)
Family size	0.155***	0.135***	−0.411***	−29.545***
	(0.010)	(0.005)	(0.044)	(3.765)
Economic incentive	−0.157	1.501***	12.399***	1131.822***
	(0.176)	(0.166)	(1.311)	(117.444)
Migration distance	−0.090***	−0.165***	−2.578***	−230.447***
	(0.014)	(0.007)	(0.063)	(5.527)
Manufacturing	−0.303***	−0.289***	−1.895***	−177.681***
	(0.067)	(0.044)	(0.322)	(27.159)
Service	−0.229***	−0.231***	−1.097***	−68.245**
	(0.061)	(0.044)	(0.315)	(26.533)
Position	0.082***	0.152***	−0.114	−3.528
	(0.028)	(0.021)	(0.193)	(17.334)
Business	0.087***	−0.007	0.587***	55.019***
	(0.018)	(0.014)	(0.121)	(10.696)
SOE	−0.041	0.321***	−0.501**	−20.341
	(0.029)	(0.024)	(0.202)	(17.817)
Self-employed	0.050**	0.067***	−0.742***	−54.968***
	(0.026)	(0.019)	(0.157)	(13.775)
Migration Frequency	−0.024***	0.002	−0.634***	−58.672***
	(0.006)	(0.004)	(0.039)	(3.474)
Home buyer	0.905***			
	(0.044)			
Eastern		0.208***	0.304***	4.866
		(0.012)	(0.108)	(9.342)
Central	0.027	−0.039***	10.008***	872.347***
	(0.028)	(0.014)	(0.128)	(11.116)
Industry development	0.472***	0.063***	10.578***	689.526***
	(0.062)	(0.016)	(0.133)	(11.134)
Population	0.018***	0.000	0.426***	27.547***
	(0.002)	(0.001)	(0.004)	(0.378)
GDP per capita	0.000**	0.000***	−0.000***	−0.005***
	(0.000)	(0.000)	(0.000)	(0.000)
Han ethnicity	0.002***	0.000***	0.039***	2.539***
	(0.000)	(0.000)	(0.000)	(0.026)
Province	−0.007***	−0.002***	−0.273***	−19.875***
	(0.001)	(0.000)	(0.004)	(0.341)
Constant	3.085***	−2.208***	−26.065***	−2944.778***
	(0.225)	(0.130)	(1.117)	(95.502)
Observations	77,593	77,593	77,593	77,593
Corr (e.heckcode, e. WTS)	−0.661***			
	(0.055)			
Corr (e.PM2.5, e. WTS))	−0.140***			
	(0.028)			
Corr (e. PM2.5*PM2.5, e. WTS))	−0.280***			
	(0.028)			
Corr (e.PM2.5, e. heckcode)	0.058***			
	(0.005)			
Corr (e. PM2.5*PM2.5, e. heckcode)	0.058***			
	(0.005)			
Corr (e. PM2.5*PM2.5, e. PM2.5)	0.976***			
	(0.000)			

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

Table 11
Distribution of migration frequency.

Migration frequency	Sample	Percentage
Once	59,809	0.784
Twice	10,703	0.140
Three Times	3445	0.045
More Than Three Times	2291	0.030

Table 12
Role of direct perception of haze pollution.

	First-time migrants		Experienced migrants	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0021	0.0004	0.0223***	0.0048***
	(0.0032)	(0.0006)	(0.0061)	(0.0013)
PM2.5*PM2.5	−0.0000	−0.0000	−0.0003***	−0.0001***
	(0.0000)	(0.0000)	(0.0001)	(0.0000)
Han ethnicity	−0.0228	−0.0043	0.0055	0.0012
	(0.0359)	(0.0067)	(0.0612)	(0.0133)
Gender	−0.0244	−0.0046	−0.0285	−0.0062
	(0.0181)	(0.0034)	(0.0324)	(0.0070)
Age	−0.0018*	−0.0003*	−0.0063***	−0.0014***
	(0.0011)	(0.0002)	(0.0019)	(0.0004)
Education	0.1013***	0.0190***	0.1338***	0.0290***
	(0.0109)	(0.0020)	(0.0193)	(0.0042)
Married	0.0707**	0.0132**	0.0756	0.0164
	(0.0279)	(0.0052)	(0.0483)	(0.0105)
Family size	0.2563***	0.0480***	0.3355***	0.0727***
	(0.0091)	(0.0017)	(0.0157)	(0.0032)
Economic incentive	0.8893***	0.1666***	0.0590	0.0128
	(0.2482)	(0.0465)	(0.3561)	(0.0772)
Migration distance	−0.2143***	−0.0401***	−0.2750***	−0.0596***
	(0.0127)	(0.0024)	(0.0245)	(0.0052)
Manufacturing	−0.6156***	−0.1153***	−0.6657***	−0.1443***
	(0.0792)	(0.0148)	(0.1738)	(0.0376)
Service	−0.4165***	−0.0780***	−0.2856*	−0.0619*
	(0.0784)	(0.0147)	(0.1736)	(0.0376)
Position	0.1844***	0.0345***	0.1918***	0.0416***
	(0.0399)	(0.0075)	(0.0677)	(0.0147)
Business	0.1100***	0.0206***	0.1018**	0.0221**
	(0.0251)	(0.0047)	(0.0473)	(0.0102)
SOE	0.2085***	0.0390***	−0.0856	−0.0186
	(0.0422)	(0.0079)	(0.0673)	(0.0146)
Self-employed	0.0384	0.0072	0.3073***	0.0666***
	(0.0345)	(0.0065)	(0.0686)	(0.0148)
Home buyer	1.1230***	0.2103***	1.2372***	0.2682***
	(0.0315)	(0.0059)	(0.0726)	(0.0155)
Eastern	0.0029	0.0005	0.1641***	0.0356***
	(0.0237)	(0.0044)	(0.0437)	(0.0095)
Central	−0.0040	−0.0008	0.1486**	0.0322**
	(0.0283)	(0.0053)	(0.0584)	(0.0127)
Industry development	0.0004	0.0001	−0.0014	−0.0003
	(0.0010)	(0.0002)	(0.0018)	(0.0004)
Population	0.0002***	0.0000***	−0.0001	−0.0000
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Destination province	−0.0057***	−0.0011***	−0.0020	−0.0004
	(0.0007)	(0.0001)	(0.0015)	(0.0003)
Constant	0.616***		−0.106	
	(0.120)		(0.254)	
Pseudo R2	0.1683	0.1683	0.2148	0.2148
Observations	39,816	39,816	12,020	12,020

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

low-income rural migrant workers will continue to increase as the degree of haze pollution increases.

Additionally, according to experience of migration, we further divide the high-income rural migrant workers and low-income rural migrant workers into four sub-samples: high-income without migration experience, high-income with migration experience, low-income without migration experience, and low-income with migration experience. As is shown in Table 14, for low-income rural migrant workers, whether they have migration experience or not, their settlement intention in the inflow area increases as the degree of haze pollution increases. Nevertheless, for high-income rural migrant workers, the migration

Table 13
Role of income.

	(1)	(2)	(3)	(4)
	High-income rural migrant workers		Low-income rural migrant workers	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0116**	0.0020**	0.0025***	0.0005***
	(0.0046)	(0.0008)	(0.0007)	(0.0002)
PM2.5* PM2.5	−0.0002***	−0.00002***		
	(0.0001)	(0.0000)		
Han ethnicity	−0.0405	−0.0068	0.0235	0.0050
	(0.0575)	(0.0097)	(0.0366)	(0.0078)
Gender	−0.1525***	−0.0258***	0.0377*	0.0080*
	(0.0282)	(0.0048)	(0.0195)	(0.0041)
Age	−0.0059***	−0.0010***	−0.0010	−0.0002
	(0.0016)	(0.0003)	(0.0011)	(0.0002)
Education	0.1013***	0.0171***	0.1144***	0.0244***
	(0.0152)	(0.0026)	(0.0122)	(0.0026)
Married	−0.0544	−0.0092	0.1032***	0.0220***
	(0.0427)	(0.0072)	(0.0297)	(0.0063)
Family size	0.2765***	0.0467***	0.2701***	0.0575***
	(0.0128)	(0.0021)	(0.0100)	(0.0021)
Economic incentive	0.4888*	0.0826*	−0.2410	−0.0513
	(0.2519)	(0.0426)	(0.6870)	(0.1463)
Migration distance	−0.2371***	−0.0401***	−0.2215***	−0.0472***
	(0.0193)	(0.0032)	(0.0139)	(0.0029)
Manufacturing	−0.7855***	−0.1327***	−0.5827***	−0.1241***
	(0.1959)	(0.0331)	(0.0788)	(0.0167)
Service	−0.5228***	−0.0883***	−0.3433***	−0.0731***
	(0.1955)	(0.0330)	(0.0776)	(0.0165)
Position	0.1440***	0.0243***	0.2107***	0.0449***
	(0.0499)	(0.0084)	(0.0476)	(0.0101)
Business	0.0686**	0.0116**	0.1543***	0.0329***
	(0.0332)	(0.0056)	(0.0303)	(0.0064)
SOE	−0.0813	−0.0137	0.2472***	0.0526***
	(0.0571)	(0.0096)	(0.0457)	(0.0097)
Self-employed	0.1149***	0.0194***	0.0683	0.0145
	(0.0400)	(0.0068)	(0.0485)	(0.0103)
Migration Frequency	−0.0593***	−0.0100***	−0.0492***	−0.0105***
	(0.0087)	(0.0015)	(0.0086)	(0.0018)
Home buyer	1.1577***	0.1956***	1.1591***	0.2469***
	(0.0433)	(0.0073)	(0.0388)	(0.0082)
Eastern	0.1457***	0.0246***	−0.0030	−0.0006
	(0.0339)	(0.0057)	(0.0259)	(0.0055)
Central	0.1004**	0.0170**	0.0281	0.0060
	(0.0434)	(0.0073)	(0.0296)	(0.0063)
Industry development	−0.0003	−0.0000	−0.0002	−0.0001
	(0.0015)	(0.0003)	(0.0010)	(0.0002)
Population	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
GDP per capita	0.0000	0.0000	0.0001**	0.0000**
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
Destination province	0.0061***	0.0010***	0.0050***	0.0010***
	(0.0011)	(0.0001)	(0.0008)	(0.0001)
Constant	0.7751***		0.3188***	
	(0.2413)		(0.1199)	
Observations	21,822	21,822	30,014	30,014

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

Table 14
The combined role of direct perception of haze pollution and income.

	(1)		(2)		(3)		(4)	
	Low-income and first-time floating migrants		Low-income and multiple floating migrants		High-income and first-time floating migrants		High-income and multiple floating migrants	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0031***	0.0006***	0.0046***	0.0011***	−0.0054	−0.0008	0.0461***	0.0090***
	(0.0009)	(0.0002)	(0.0017)	(0.0004)	(0.0056)	(0.0009)	(0.0092)	(0.0018)
PM2.5* PM2.5					0.0001	0.0000	−0.0006***	−0.0001***
					(0.0001)	(0.0000)	(0.0001)	(0.0000)
Han ethnicity	0.0104	0.0021	−0.0467	−0.0108	−0.1075	−0.0169	0.0783	0.0154
	(0.0424)	(0.0088)	(0.0747)	(0.0173)	(0.0690)	(0.0108)	(0.1088)	(0.0213)
Gender	0.0410*	0.0085*	0.0459	0.0106	−0.1527***	−0.0240***	−0.1179**	−0.0231**
	(0.0221)	(0.0046)	(0.0418)	(0.0097)	(0.0330)	(0.0052)	(0.0555)	(0.0109)
Age	−0.0007	−0.0001	−0.0046*	−0.0011*	−0.0049**	−0.0008**	−0.0095***	−0.0019***
	(0.0013)	(0.0003)	(0.0025)	(0.0006)	(0.0020)	(0.0003)	(0.0030)	(0.0006)
Education	0.0993***	0.0205***	0.1613***	0.0374***	0.0986***	0.0155***	0.0979***	0.0192***
	(0.0137)	(0.0028)	(0.0269)	(0.0062)	(0.0181)	(0.0028)	(0.0281)	(0.0055)
Married	0.0805**	0.0166**	0.1809***	0.0419***	−0.0178	−0.0028	−0.1204	−0.0236
	(0.0338)	(0.0070)	(0.0634)	(0.0146)	(0.0516)	(0.0081)	(0.0776)	(0.0152)
Family size	0.2645***	0.0546***	0.3058***	0.0708***	0.2407***	0.0378***	0.3703***	0.0726***
	(0.0114)	(0.0023)	(0.0213)	(0.0047)	(0.0154)	(0.0024)	(0.0235)	(0.0044)
Economic incentive	−0.2016	−0.0416	0.2687	0.0622	0.7795**	0.1224**	−0.0625	−0.0123
	(0.7934)	(0.1639)	(1.4090)	(0.3263)	(0.3202)	(0.0503)	(0.4129)	(0.0809)
Migration distance	−0.2054***	−0.0424***	−0.2775***	−0.0643***	−0.2285***	−0.0359***	−0.2517***	−0.0493***
	(0.0156)	(0.0032)	(0.0321)	(0.0073)	(0.0225)	(0.0035)	(0.0387)	(0.0075)
Manufacturing	−0.5464***	−0.1129***	−0.8014***	−0.1856***	−0.9543***	−0.1499***	−0.3878	−0.0760
	(0.0850)	(0.0175)	(0.2157)	(0.0498)	(0.2689)	(0.0422)	(0.3090)	(0.0605)
Service	−0.3650***	−0.0754***	−0.4132*	−0.0957*	−0.7419***	−0.1165***	−0.0630	−0.0124
	(0.0834)	(0.0172)	(0.2152)	(0.0498)	(0.2684)	(0.0421)	(0.3087)	(0.0605)
Position	0.2360***	0.0488***	0.1121	0.0260	0.0985*	0.0155*	0.2452***	0.0481***
	(0.0539)	(0.0111)	(0.1025)	(0.0237)	(0.0598)	(0.0094)	(0.0913)	(0.0179)
Business	0.1612***	0.0333***	0.1256*	0.0291*	0.0528	0.0083	0.0878	0.0172
	(0.0340)	(0.0070)	(0.0669)	(0.0155)	(0.0383)	(0.0060)	(0.0676)	(0.0133)
SOE	0.2748***	0.0568***	0.1401	0.0325	0.0580	0.0091	−0.3202***	−0.0628***
	(0.0516)	(0.0107)	(0.1002)	(0.0232)	(0.0741)	(0.0116)	(0.0949)	(0.0185)
Self-employed	0.0090	0.0019	0.3331***	0.0772***	0.0683	0.0107	0.2848***	0.0558***
	(0.0534)	(0.0110)	(0.1196)	(0.0277)	(0.0457)	(0.0072)	(0.0847)	(0.0166)
Home buyer	1.1112***	0.2295***	1.4370***	0.3328***	1.1507***	0.1807***	1.1292***	0.2213***
	(0.0413)	(0.0084)	(0.1241)	(0.0284)	(0.0493)	(0.0078)	(0.0930)	(0.0179)
Eastern	−0.0517*	−0.0107*	0.1193**	0.0276**	0.0880**	0.0138**	0.1844***	0.0361***
	(0.0297)	(0.0061)	(0.0572)	(0.0132)	(0.0400)	(0.0063)	(0.0691)	(0.0135)
Central	−0.0476	−0.0098	0.2495***	0.0578***	0.0985**	0.0155**	0.0461	0.0090
	(0.0329)	(0.0068)	(0.0738)	(0.0171)	(0.0501)	(0.0079)	(0.0915)	(0.0179)
Industry development	0.0009	0.0002	−0.0021	−0.0005	−0.0001	−0.0000	0.0003	0.0001
	(0.0012)	(0.0002)	(0.0023)	(0.0005)	(0.0018)	(0.0003)	(0.0028)	(0.0005)
Population	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
GDP per capita	0.0002***	0.0000***	0.0001	0.0000	0.0002*	0.0000*	−0.0002	−0.0000
	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0001)	(0.0000)	(0.0002)	(0.0000)
Destination province	−0.0052***	−0.0011***	−0.0029	−0.0007	−0.0071***	−0.0011***	−0.0016	−0.0003
	(0.0009)	(0.0002)	(0.0020)	(0.0005)	(0.0013)	(0.0002)	(0.0024)	(0.0005)
Constant	0.4899***		0.7037**		1.5255***		−0.3241	
	(0.1403)		(0.3092)		(0.3248)		(0.4237)	
Observations	23,789	23,789	6225	6225	16,027	16,027	5795	5795

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

experience has an impact on the relationship between their settlement intention and haze pollution. High-income rural migrant workers with migration experience are more sensitive to the harm of haze pollution. When the degree of haze pollution is relatively high, their settlement intention will decrease.

Finally, we also employ the questions “the cumulative migration time since your first migration” as the proxy of migration experience. This proxy is used to explore the role of migration experience on the relationship between haze pollution and the settlement intention of rural migrant workers in the destination city. The estimation results are shown in Table 15. For the “experienced rural migrant workers” with longer time of migration, their settlement intention shows an inverted U-shape as haze pollution increases; while for the rural migrant workers with shorter time of migration, haze pollution has a positive impact on their settlement intention. This also verifies that the experienced rural migrant workers are more sensitive to the harm of haze pollution. Therefore, Hypothesis 2 is further demonstrated.

3.5. Role of indirect perception of haze pollution

As is proposed in Hypothesis 3, indirect experience strengthens perception of haze pollution. In this section, we take parents’ migration experience as proxy of rural migrant workers’ indirect experience in terms of haze. Table 16 shows the distribution of migration experience of the parents of 67,945 rural migrant workers. The results indicate that only 8810 rural migrant workers are those whose parents migrated before, accounting for 13%; 3845 rural migrant workers are those whose fathers migrated while mothers did not, accounting for 5.7%; 1043 rural migrant workers are those whose mothers migrated while fathers did not, accounting for 1.5%; with a total number 54,247, the rural migrant workers whose parents had no migration experience are the most, occupying 79.8% of the total migrants.

Table 15
Role of direct perception of haze pollution: alternative measure of migration experience.

	(1)	(2)	(3)	(4)
	The first migration time is for rural migrant workers in 2012 and beyond		The first migration time is for rural migrant workers before 2012	
PM2.5	0.0015**	0.0003**	0.0176***	0.0036***
	(0.0007)	(0.0001)	(0.0065)	(0.0013)
PM2.5* PM2.5	–	–	−0.0003***	−0.0001***
			(0.0001)	(0.0000)
Han ethnicity	−0.0177	−0.0034	−0.0207	−0.0042
	(0.0350)	(0.0067)	(0.0676)	(0.0138)
Gender	−0.0221	−0.0042	−0.0493	−0.0101
	(0.0177)	(0.0034)	(0.0352)	(0.0072)
Age	−0.0017	−0.0003	−0.0094***	−0.0019***
	(0.0010)	(0.0002)	(0.0021)	(0.0004)
Education	0.1050***	0.0200***	0.1208***	0.0247***
	(0.0106)	(0.0020)	(0.0213)	(0.0043)
Married	0.0704***	0.0134***	−0.0107	−0.0022
	(0.0271)	(0.0052)	(0.0554)	(0.0113)
Family size	0.2585***	0.0492***	0.3219***	0.0659***
	(0.0090)	(0.0017)	(0.0164)	(0.0032)
Economic incentive	0.9253***	0.1763***	−0.2361	−0.0483
	(0.2434)	(0.0464)	(0.3801)	(0.0778)
Migration distance	−0.2196***	−0.0418***	−0.2512***	−0.0514***
	(0.0125)	(0.0024)	(0.0262)	(0.0053)
Manufacturing	−0.6379***	−0.1215***	−0.5903***	−0.1209***
	(0.0791)	(0.0150)	(0.1759)	(0.0360)
Service	−0.4241***	−0.0808***	−0.2440	−0.0500
	(0.0783)	(0.0149)	(0.1756)	(0.0360)
Position	0.1923***	0.0366***	0.1582**	0.0324**
	(0.0389)	(0.0074)	(0.0742)	(0.0152)
Business	0.1089***	0.0207***	0.0924*	0.0189*
	(0.0249)	(0.0047)	(0.0494)	(0.0101)
SOE	0.1813***	0.0345***	−0.0285	−0.0058
	(0.0409)	(0.0078)	(0.0739)	(0.0151)
Self-employed	0.0331	0.0063	0.3569***	0.0731***
	(0.0342)	(0.0065)	(0.0723)	(0.0148)
Migration Frequency	−0.2312***	−0.0441***	−0.0682***	−0.0140***
	(0.0294)	(0.0056)	(0.0085)	(0.0017)
Home buyer	1.1243***	0.2142***	1.2209***	0.2500***
	(0.0313)	(0.0059)	(0.0752)	(0.0152)
Eastern	−0.0067	−0.0013	0.2385***	0.0488***
	(0.0232)	(0.0044)	(0.0468)	(0.0095)
Central	0.0091	0.0017	0.1470**	0.0301**
	(0.0266)	(0.0051)	(0.0619)	(0.0127)
Industry development	0.0002	0.0000	0.0002	0.0000
	(0.0010)	(0.0002)	(0.0019)	(0.0004)
Population	0.0002***	0.0000***	0.0000	0.0000
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Destination province	−0.0055***	−0.0011***	−0.0020	−0.0004
	(0.0007)	(0.0001)	(0.0017)	(0.0003)
Constant	0.9025***		0.6336**	
	(0.1239)		(0.2658)	
Observations	1130	1130	14,889	14,889

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

Table 16
Distribution of parents' migration experience.

Migration experience of parents	Sample	Percentage
Both parents migrated	8810	0.130
Father migrated only	3845	0.057
Mother migrated only	1043	0.015
Neither parent migrated	54,247	0.798

Table 17
Role of indirect perception of haze pollution.

	(1)	(2)	(3)	(4)
	Parents Have Migration Experience		Parents do not Have Migration Experience	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	0.0140**	0.0029**	0.0042	0.0008
	(0.0067)	(0.0014)	(0.0031)	(0.0006)
PM2.5* PM2.5	−0.0002**	−0.0000**	−0.0001	−0.0000
	(0.0001)	(0.0000)	(0.0000)	(0.0000)
Han ethnicity	−0.0501	−0.0104	−0.0067	−0.0013
	(0.0689)	(0.0143)	(0.0355)	(0.0067)
Gender	−0.0498	−0.0104	−0.0243	−0.0046
	(0.0354)	(0.0074)	(0.0181)	(0.0034)
Age	−0.0001	−0.0000	−0.0038***	−0.0007***
	(0.0026)	(0.0006)	(0.0011)	(0.0002)
Education	0.1455***	0.0303***	0.1009***	0.0191***
	(0.0209)	(0.0043)	(0.0109)	(0.0021)
Married	0.1917***	0.0399***	0.0209	0.0040
	(0.0468)	(0.0097)	(0.0296)	(0.0056)
Family size	0.2356***	0.0491***	0.2918***	0.0551***
	(0.0164)	(0.0033)	(0.0092)	(0.0017)
Economic incentive	0.6975	0.1453	0.6473***	0.1223***
	(0.4661)	(0.0971)	(0.2326)	(0.0439)
Migration distance	−0.2581***	−0.0537***	−0.2186***	−0.0413***
	(0.0269)	(0.0055)	(0.0128)	(0.0024)
Manufacturing	−0.5463***	−0.1138***	−0.6753***	−0.1276***
	(0.1652)	(0.0344)	(0.0838)	(0.0158)
Service	−0.2710*	−0.0564*	−0.4299***	−0.0812***
	(0.1640)	(0.0342)	(0.0832)	(0.0157)
Position	0.2226***	0.0463***	0.1631***	0.0308***
	(0.0729)	(0.0152)	(0.0396)	(0.0075)
Business	0.0347	0.0072	0.1154***	0.0218***
	(0.0529)	(0.0110)	(0.0249)	(0.0047)
SOE	0.0592	0.0123	0.1290***	0.0244***
	(0.0826)	(0.0172)	(0.0399)	(0.0075)
Self-employed	0.1314*	0.0274*	0.0850**	0.0161**
	(0.0748)	(0.0156)	(0.0346)	(0.0065)
Migration Frequency	−0.0515***	−0.0107***	−0.0518***	−0.0098***
	(0.0141)	(0.0029)	(0.0069)	(0.0013)
Home buyer	0.9795***	0.2040***	1.1693***	0.2209***
	(0.0661)	(0.0136)	(0.0327)	(0.0061)
Eastern	0.0312	0.0065	0.0556**	0.0105**
	(0.0480)	(0.0100)	(0.0235)	(0.0044)
Central	0.0575	0.0120	0.0208	0.0039
	(0.0615)	(0.0128)	(0.0288)	(0.0054)
Industry development	−0.0016	−0.0003	0.0017*	0.0003*
	(0.0020)	(0.0004)	(0.0010)	(0.0002)
Population	0.0000	0.0000	0.0002***	0.0000***
	(0.0001)	(0.0000)	(0.0001)	(0.0000)
GDP per capita	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Destination province	−0.0033**	−0.0007**	−0.0056***	−0.0010***
	(0.0016)	(0.0003)	(0.0007)	(0.0001)
Constant	0.2447		0.7614***	
	(0.2593)		(0.1292)	
Pseudo R2	0.1775	0.1775	0.1838	0.1838
Observations	9707	9707	40,686	40,686

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

Table 17 presents the results of two sub-samples: "both parents migrated" and "neither parent migrated". The inverted U-shape relation holds for the former sub-sample while the effect of haze pollution is not significant for the latter. In other word, individuals with indirect experience of haze pollution are more likely to be sensitive with it. Therefore, Hypothesis 3 is tested.

Furthermore, we investigate the role of each parent in terms of passing indirect experience to their children. Table 18 presents the

Table 18
Role of mother.

	Father migrated only		Mother migrated only	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
PM2.5	−0.0029	−0.0008	0.0444**	0.0061**
	(0.0221)	(0.0011)	(0.0211)	(0.0030)
PM2.5* PM2.5	0.0002	0.0000	−0.0001***	−0.0000***
	(0.0001)	(0.0000)	(0.0000)	(0.0000)
Han ethnicity	−0.1886	−0.0417	−0.0254	−0.0046
	(0.1385)	(0.0306)	(0.2783)	(0.0502)
Gender	−0.0364	−0.0080	0.0805	0.0145
	(0.0660)	(0.0146)	(0.1579)	(0.0285)
Age	−0.0040	−0.0009	0.0173	0.0031
	(0.0046)	(0.0010)	(0.0112)	(0.0020)
Education	0.2292***	0.0507***	0.1947*	0.0351*
	(0.0387)	(0.0084)	(0.1015)	(0.0182)
Married	0.1250	0.0277	0.0318	0.0057
	(0.0919)	(0.0203)	(0.2107)	(0.0380)
Family size	0.3025***	0.0669***	0.3150***	0.0569***
	(0.0340)	(0.0073)	(0.0825)	(0.0146)
Economic incentive	0.8689	0.1922	3.5324	0.6375
	(0.9365)	(0.2071)	(2.8355)	(0.5101)
Migration distance	−0.2851***	−0.0631***	−0.2790**	−0.0503**
	(0.0477)	(0.0104)	(0.1238)	(0.0221)
Manufacturing	−1.3750***	−0.3042***	−4.2654	−0.7698
	(0.4176)	(0.0921)	(143.7388)	(25.9421)
Service	−1.0779***	−0.2384***	−4.0945	−0.7390
	(0.4164)	(0.0920)	(143.7388)	(25.9421)
Position	0.1361	0.0301	0.7667	0.1384
	(0.1261)	(0.0279)	(0.5086)	(0.0915)
Business	0.1661	0.0368	−0.0997	−0.0180
	(0.1062)	(0.0235)	(0.2363)	(0.0426)
SOE	0.2887**	0.0639**	0.4453	0.0804
	(0.1428)	(0.0315)	(0.4002)	(0.0720)
Self-employed	−0.0682	−0.0151	0.2948	0.0532
	(0.1386)	(0.0307)	(0.3303)	(0.0596)
Migration Frequency	−0.0236	−0.0052	0.2084*	0.0376*
	(0.0240)	(0.0053)	(0.1137)	(0.0204)
Home buyer	1.0060***	0.2225***	1.0934***	0.1973***
	(0.1239)	(0.0269)	(0.2733)	(0.0484)
Eastern	0.0787	0.0174	0.1142	0.0206
	(0.0903)	(0.0200)	(0.2114)	(0.0381)
Central	−0.0012	−0.0003	0.2693	0.0486
	(0.1109)	(0.0245)	(0.2734)	(0.0493)
Industry development	−0.0067*	−0.0015*	−0.0066	−0.0012
	(0.0037)	(0.0008)	(0.0087)	(0.0016)
Population	−0.0001	−0.0000	−0.0008	−0.0001
	(0.0002)	(0.0001)	(0.0006)	(0.0001)
GDP per capita	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Destination province	−0.0046*	−0.0010*	0.0157**	0.0028**
	(0.0027)	(0.0006)	(0.0071)	(0.0013)
Constant	1.0636*		1.9515	
	(0.5546)		(143.7411)	
Pseudo R2	0.1995	0.1995	0.2417	0.2417
Observations	2754	2754	584	584

Notes: Numbers in parentheses denote the robust standard error, ***/**/* indicate the significance at the 1%, 5%, 10% levels, respectively.

results of two sub-samples: "father migrated only" and "mother migrated only". The inverted U-shape relation holds for the latter sub-sample while the effect of haze pollution is not significant for the former, which suggest that mother pass more indirect experience about health to children. This may be related to the division of gender roles between parents in parenting. The masculinity of fathers and the femininity of mothers may lead to a different focus on the content of their children's rearing (McKinney and Renk, 2008). Mothers place more emphasis on the physical and psychological dimensions of their children and the development of intimate relationships, whereas fathers are more concerned with the reality of their children's situation and the fulfilment of their jobs and goals (Russell et al., 1998).

4. Conclusions and discussions

This paper relaxes the complete information assumption in the traditional migration model, introduces a new factor "direct or indirect experience" into the model, and explores the relationships between haze pollution, intergenerational migration experience and settlement intentions of rural migrant workers using the city-level haze data of China from NASA's EOSDIS and data from CMDS. Our findings are concluded in three folds. First, we identify an inverted U-shape relation between the intensity of haze pollution in destination city and rural migrant workers' settlement intention; the threshold for this inverted U-shaped relationship is 31. On one hand, when haze pollution is below the threshold, the economic benefits (wages) outweigh the potential health losses (harm from haze pollution), and as haze increases, rural migrant workers will continue to settle in their destination city. On the other hand, once haze pollution exceeds the threshold, the economic benefits are lower than the potential health losses, and as haze increases, rural migrant workers are more likely to leave their current destination city.

Second, migration experience of individual per se increases their perception of haze pollution. The results show that the inverted U-shape relation between the intensity of haze pollution in destination city and rural migrant workers' settlement intention holds for the individuals who have migrated before. However, there is no evidence showing such inverted U-shape if the migrants have never migrated before. Moreover, for low-income rural migrant workers, whether they have migration experience or not, their settlement intention in the inflow area increases as the degree of haze pollution increases. Nevertheless, for high-income rural migrant workers, the migration experience has an impact on the relationship between their settlement intention and haze pollution. High-income rural migrant workers with migration experience are more sensitive to the harm of haze pollution. This further proves that rural migrant workers face the trade-off between the economic benefits and the potential health losses.

Third, intergenerational migration experience increases individual's perception of haze pollution. We find that the impact of haze pollution on settlement intention of rural migrant workers whose parents do not have migration experience is not significant. But the inverted U-shape effect remains significant for rural migrant workers whose parents have migration experience. This may be due to a varied migration experience of parents results in awareness variance in haze pollution among their children, leading to significant difference in the impact of haze pollution on their children's settlement intention.

Finally, compared to migration experience of father, that of mother exerts a more significant impact on individual's perception of haze pollution. In cases where fathers migrated but mothers did not, then the impact of haze pollution on the settlement intention of their children is not significant. In cases where mothers migrated while fathers did not, the settlement intention of their children turns on an inverted U shape due to influence by haze pollution. This may be related to the different roles that Chinese fathers and mothers play in the family, with fathers being more concerned with what their children can achieve and mothers being more concerned with the physical and psychological dimensions of their children.

In general, this study demonstrates that rural migrant workers, when making settlement decisions, care not only about economic incentives but potential health damage which they may suffer. When the environment of the destination city deteriorates to a certain degree, people would rather abandon potentially higher economic benefits out of health concerns. This explains to some extent that health threats caused by environmental pollution have gradually become the obstacle of the urbanization in terms of rural migrant workers. Moreover, the conclusion of this study also shows that migration experience of individual per se and intergenerational migration experience will increase their perception of haze pollution, and prompt rural migrant workers to consider more comprehensively when making a settlement decision. They may suffer from urban harmful factors in a certain period of time and haze pollution is one of the harmful factors. The reason is that health damage caused by environmental issues such as haze is incremental. It takes long for people to realize the problem in reality, during which harm may incur due to lack of awareness.

The findings in our study carry some policy implications. First, cities should control haze pollution in accordance with their respective conditions. With particular note, larger cities suffer from severe haze pollution due to large population and population density. Large cities should pay more attention to environmental protection to ensure that rural migrant workers do not have to sacrifice their health for wealth while making settlement decisions. Second, efforts in improving the awareness of haze pollution should be strengthened. This is particularly relevant to male migrants without any migration experience as they are more likely to expose themselves or their family members to haze pollution, which causes physical and psychological damage. Last, the awareness of environmental protection in the whole society should be promoted. According to previous research, haze pollution is closely related to population conglomeration. Human life and production affect environment. Therefore, in order to mitigate haze pollution substantively, we must improve the awareness of each and every member of the society and translate the awareness into real actions.

Due to the constraints in access to data, there exists some insufficiency in measuring the heterogeneity. First, due to the different stages of economic development in different countries, there may be some differences in the impact of haze pollution on the settlement intentions of migrant workers from an empirical perspective. In developed countries, where people have already gone through the process of industrialization and are more aware of the dangers of haze pollution, the negative effect of haze pollution on their intentions to settle in cities is likely to be more significant. In developing countries, the negative impact of haze pollution on the intention to settle in cities is relatively weak because of the late start of industrialization and the lack of understanding of the hazards of haze pollution among migrant workers, especially those from rural areas. In other words, the threshold at which haze pollution has a negative impact on the urban settlement intentions of rural migrant workers is higher. Second, there may be some differences in the perception of haze pollution among rural migrants with different types of occupations due to differences in their work characteristics, such as indoor or outdoor work. Rural migrant workers who work outdoors may be more concerned about the hazards of haze pollution, and thus the negative effect of haze pollution on their intention to settle in the city is more significant. Therefore, the heterogeneous effects of haze pollution on the urban settlement intentions of migrants from different countries and different occupation are worth further investigation in the future, when survey data on the urban settlement intentions of migrants from different countries or migrants with sufficient samples of segmented occupations are available.

Author statement

We declare that we do not have any commercial or associative interest that represents a conflict of interest in connection with the work submitted.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgments

Research Projects Funded by Shanghai Municipal Foundation for Philosophy and Social Sciences (2023EJB017).

Appendix

Table A1
Impact of haze pollution on rural migrant workers' settlement intention at the destination city: Using 2018 CMDS data

	Coefficient
PM2.5	0.0149***
	(0.0028)
PM2.5* PM2.5	−0.0002***
	(0.0000)
Individual characteristics	Control
Urban characteristics	Control
Regional characteristics	Control
Observations	66316
Pseudo R2	0.0988

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