

Article

An Evaluation of Factors Influencing Urban Integration and Livelihood of Eco-Migrant Families: Quantitative Evidence from Western China

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Abstract: Background. In China, the policy of ecological migration is a new approach to protect the urban ecological environment. However, the changes in livelihood capital before and after migration and the matching relationship between the livelihood capital and livelihood model of migrants are rarely explored. Our study aims to address these research gaps to determine factors affecting the urban integration of eco-migrant families and their means of sustainable livelihood. Methods. We used the survey data of migrant households in China in 2017 and 2018. Heckman's two-stage model and the endogenous transformation regression model were applied for data analysis. Results. First, most migrants are willing to integrate into urban life after relocation, but the efficiency of their integration into urban life needs to be improved. Second, differences in demographic background and geographic location significantly affect the decisions of migrants in urban integration. Third, family heterogeneity has the greatest impact on the degree of urban integration, followed by geographical location. Lastly, the high degree of urban integration of migrants has a significant impact on their household income. Conclusions. Local governments and communities should provide immigrant families migrating from rural to urban China with more social and economic resources for their better socioeconomic integration.

Keywords: rural to urban immigration; west China; urban integration; Heckman's two-stage model; endogenous transformation and regression; policy implications



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1. Introduction

Under the influence of grazing tradition and climate warming, the structure and function of the ecosystem in the China area are seriously imbalanced. Economic development has regressed, poverty is aggravated, and the tension between the economic society, resources and the environment is intensifying [1]. This has motivated the policy of ecological migration to become a breakthrough in the dual predicament of natural and human resources in areas inhabited by poor people [2]. The successful integration of migrants into cities and towns after their relocation is not only a key step to promoting new urbanization but also an important cornerstone for the harmonious and sustainable development of border ethnic areas [3]. Despite a few studies focusing on eco-immigration in China, they have mainly explored land use [4], transition cost [5], or environmental payment [6,7]. This is worrisome for two reasons. First, not much attention has been paid to the west part of China, which is a key focus of China's poverty alleviation policy [8]. Additionally, western China is facing environmental challenges that are ignorable and more serious compared to other parts of China [9]. Second, existing related studies may have largely ignored household-level factors, such as household income and the willingness of integration of an eco-immigrant family. However, from a sociological perspective, social and economic integration is not only an individual decision but also a family-level decision. In this research, we thus aim to address this gap in the literature through exploring eco-immigrants'

integration and changes in their livelihoods in western China. Specifically, our research hypotheses are developed to address and investigate the changes in livelihood capital before and after migration, and to study the matching relationship between the livelihood capital and livelihood model of migrants, in order to determine methods of sustainable livelihood for eco-migrant families. In addition, methodologically speaking, the correction for sample bias due to the data was solved by the Heckman correction method by combining the predicted individual rates, the personal heterogeneity, family heterogeneity and environmental heterogeneity of immigrants into an additional acceptance variable. To sum up, these are our theoretical and methodological contributions to the related literature.

2. Literature Review

There are plenty of studies in the Chinese context or beyond that have explored migration and its possible social and economic outcomes. For the resettlement and integration of migrants after relocation, international scholars have mainly study the risks and conflicts of migration projects in developing countries and the resilience of migrants [10]. In most cases, relocation does not impoverish their families, but rather broadens their income channels and access to public services, giving migrant families more opportunities for development [11,12]. In China, in order to prevent environmental deterioration in ecologically fragile areas and alleviate the tension between the population, resources and the environment, ecological migration projects have been carried out in various places, and more than 2.5 million migrants have been resettled so far [9,13]. While drawing lessons from international scholars' research, domestic scholars have focused more on how to promote the integration of migrants into cities and towns. They believe that the integration of agriculture and animal husbandry into urban life has a far-reaching impact on migrants [14,15]. Capital endowments acquired before and after relocation are one of the decisive factors of migrants' integration [16,17]. Moreover, factors such as migration mode, institutional environment, community atmosphere and psychological perception play an essential role in urban integration [18,19]. For example, in a study on the results of the urban integration of migrants, urban integration has been found to exert a definite impact on the economic behavior of migrant workers [20]. After relocation, immigrant families entered a period of economic recovery [21]. Therefore, the relocation of migrants is a major help for poor rural households, and it has a major impact on the social and ecological system at the peasant household level [22].

Under China's rapid socioeconomic development and transition, eco-migration has become a policy-oriented trend, especially for residents in many rural areas in the middle and west part of the country. However, research on the income of the ecological immigrant family has not been fully investigated. Based on the existing literature in the field, two main research gaps have been identified. First, the factors influencing the urban integration of migrants have not been studied enough, especially the internal mechanism of integration. The common point of the existing research is that it only analyzes the factors that affect the integration behavior of cities and towns but does not deeply analyze the process of integration behavior. In fact, the urban integration behavior of ecological migrants involves two aspects: the decision of integration and the degree of integration. Second, the research on income as a result of urban integration is still weak. Most scholars pay attention to the research on the outcome variables of urban integration. Although simple regression analysis is used to estimate the impact of urban integration and income, the endogenous problems of urban integration and income are neglected.

With these variables in mind, this study has three goals: to use a model constructed to fit the whole process of ecological migrant urban integration behavior, to reveal the dilemma of migrant urban integration, and to open up a new research path for improving the income of migrant families in rural pastoral areas.

Theoretical Basis and Analysis

According to the theory of rational behavior, behavior and intention in many fields can be predicted using simulation models [23]. In terms of rational behavior, immigrants tend to use the optimal strategy of minimum cost and maximum benefit to decide their own behavior [24–26]. Migrants' urban integration behavior can be regarded as decision making and behavior in pursuit of maximum benefits [27]. Migrants' integration into urban life is a random process. Only when the expected net income from integration into urban life is greater than the current income will the income of migrant families improve. The current income of migrants and the cost of urban life are relatively stable variables, while the expected income of urban integration of migrants has certain risks. Expected earnings will be affected by internal factors of the migrants themselves, family factors, and external factors of the surrounding environment, all of which can lead to instability.

The theory of social integration is mainly used to describe the social life and evolution of immigrant groups in the inflow area [28]. After constant revision by academia, social integration has been further refined to the urban integration of migrant workers, so as to understand the process of blending with and penetrating into urban society. Scholars can see that "urban integration" is a gradual and dynamic process. Berry regarded the integration of immigrants as a logical chain containing "influencing factors—integration status—integration consequences" [29]. However, the corresponding economic consequences of immigration integration cannot be ignored. Accordingly, the integration behavior of migrants is a complete research logic composed of antecedents and consequences. That is, the influence of integration behavior on family income depends on the integration decision of migrants. The basis of the integration decision is influenced by the differences of the individual, family and environment, and the corresponding degree of integration of migrants will vary, leading to large differences in family income.

3. Research Hypothesis

Hypothesis 1. *Individual heterogeneity of migrants.*

There exist disparities within the migrant group due to people's demographic and socioeconomic characteristics, including gender, age, educational level, health status, participation in skills training, and participation in community activities. First, gender. There are differences in the adaptability of gender to a new environment. Men are more likely to engage in urban integration than women. Second, age. Since young migrants are more capable of accepting new things than older migrants, the degree of integration in the new generation is generally higher than that of the old generation [30]. However, it has also been found that increased age has a positive impact on the urban integration of migrant workers [31,32]. Third, educational level. The more educated immigrants are, the more opportunity they have to integrate into urban life [33]. Fourth, health status. The physical health of migrants is directly related to the quality of life of the labor force and its integration. Fifth, participation in skills training. Migrants who have participated in various types of skills training have stronger employability than those who have no such experience. They are more likely to decide to live in cities and towns, and their skills are conducive to improving their integration into cities and towns [34]. Sixth, participation in community activities. Immigrants who often participate in various activities such as assistance and ethnic culture in resettlement areas have stronger interpersonal skills and are more receptive to urban life and integration.

The six variables have been explored in studies outside China; however, they have rarely been investigated in the context of China's rapid socioeconomic transition. Therefore, Hypothesis 1 is proposed: Individual heterogeneity significantly affects the decision and degree of urban integration of migrants.

Hypothesis 2. *Migrant family heterogeneity.*

In the Chinese context, eco-migrant families can be defined as rural residents who are recommended to move to urban areas due to the negative environment in some rural areas of China. Moving to towns and cities is due to their better social, educational, medical, and economic resources. Migrant families are heterogeneous in terms of their socioeconomic status and social connections in four main aspects. First, the total number of household labor force. Migrant families are an abundant labor force, which can improve their livelihood in the new environment and allow them to rationally allocate resources, increasing the possibility of migrants' integration. Second, the number of family members and friends. Relatives and friends make up the family's social capital, and immigrants with more social capital are more willing to integrate into the new life. Third, the amount of household farming and animal husbandry machinery. A larger amount of household farming and animal husbandry machinery indicates a greater degree of dependence on agriculture and animal husbandry and a greater inclination toward farming and herding [13]. Fourth, the ability of families to borrow money. As an important precondition for families to maintain their basic life, sufficient funds increase the willingness and degree of integration into urban life.

Based on these four factors on migrant family characters, Hypothesis 2 is proposed: family heterogeneity significantly affects the decision and degree of urban integration of migrants.

Hypothesis 3. *Geographical location heterogeneity.*

Geographical location heterogeneity is primarily considered through regional dummy variables. Compared with the Yushu Tibetan Autonomous Prefecture, Haixi, Hainan, Huangnan and Guoluo are relatively close to Xining. These areas have relatively higher requirements for industrial development, and they pay more attention to the corresponding new industries, information networks and other aspects such as blockchain [6,35,36]. Cities and towns have a higher enthusiasm for integration [18,37].

Based on these factors regarding the variation in geographic location, Hypothesis 3 is put forward: Geographical location heterogeneity significantly affects the decision and degree of integration of migrant cities and towns.

Hypothesis 4. *Urban integration economic behaviour on family income.*

Hypothesis 4 is about the urban integration behavior of migrants on family income. According to the content of social integration theory, the urban integration of ecological migrants varies according to economic behavior. At the same time, recent immigrants have had a higher degree of integration into urban life, which has increased employment opportunities to a certain extent. In this way, the possibility of expanding family income channels will be greater, resulting in the improvement of the income level of migrants.

Based on these factors concerning social and economic integration behavior from rural to urban areas, Hypothesis 4 is proposed: the high integration of migrants in cities and towns has a significant positive impact on family income.

Our research framework is shown in Figure 1.

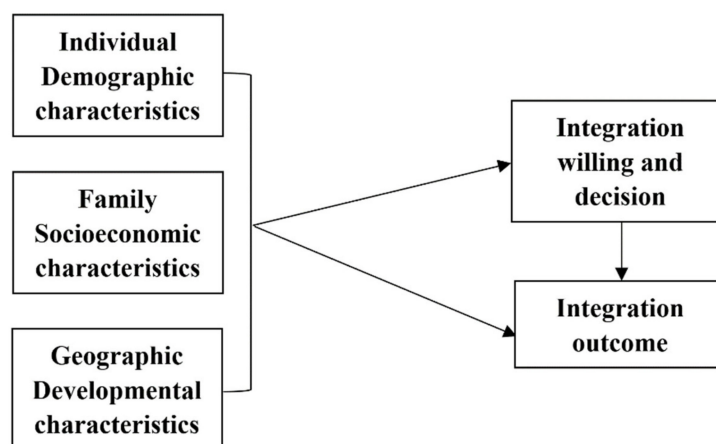


Figure 1. The analytical framework of the current research.

4. Materials and Methods

4.1. Data Sources

Located in the southern part of Qinghai Province of China is the birthplace of the Yangtze River, Yellow River and Lancang River. It is one of the important ecological foundations of China, but it is also a fragile ecological environment. At the same time, Qinghai is one of 14 special districts and “three districts and three states” which are emphatically deployed in the new poverty alleviation strategy of “China’s Rural Poverty Alleviation and Development Program (2011–2020)”. The region is constrained by the “triple contradiction”: the overall poverty and lack of development in ethnic areas, the slow economic construction and fragile ecological environment, and the low population level and lagging public services. Therefore, it is representative to study the income increase of eco-migrant families in this region. The data in this study came from the field survey data in the China area over the time period of 2017 and 2018. The data collection team developed the questionnaire based on a comprehensive review of the prior literature, which helped to identify and confirm what variables to use in order to address research questions. The team discussed the questionnaire and reached a consensus before the official survey. At the beginning, the multi-stage sampling method was applied, and finally, three towns were selected. The map of the study area (longitude 100.10742, latitude 36.77771) is seen as follows. In the last stage of sampling, the team applied the cluster sampling method to identify immigrant families. The team finally distributed a total of 550 questionnaires, among which 436 valid samples were obtained. The response rate was 79.27%. This research was approved by the ethics committee of the corresponding author’s university (Figure 2).

4.2. Analytical Methods

First, the Heckman two-stage model.

The urban integration behavior of migrants can be divided into two stages: integration decision and integration degree. Only when immigrants decide to integrate can the degree of integration be observed. However, if immigrants decide not to integrate in the first stage, then there is no observation in the second stage. Therefore, a two-stage Heckman model was established to solve the problem of sample selectivity bias [38,39]. The model was constructed as follows:

$$y_{i1}^* = x_i' \alpha + \mu_i \quad y_{i1} = \begin{cases} 1, & \text{when } y_{i1}^* > 0 \\ 0, & \text{when } y_{i1}^* \leq 0 \end{cases} \quad (1)$$

$$y_{i2}^* = z_i' \beta + \varepsilon_i \quad y_{i2} = \begin{cases} \text{Observable value,} & \text{when } y_{i2}^* > 0 \\ \text{Unobservable value,} & \text{when } y_{i2}^* \leq 0 \end{cases} \quad (2)$$



Figure 2. The map of the study area (southern part of Qinghai province, China).

Formula (1) represents the selection equation and Formula (2) represents the result equation. The formula code has the following meanings. y_{i1}^* and y_{i2}^* are latent variables, y_{i1} and y_{i2} are dependent variables, x_i' and z_i' are independent variables, α and β are coefficients to be estimated, μ_i and ε_i are residual terms, i is the i -th sample. According to the above two formulas, the unconditional probability model was constructed as follows:

$$\text{prob}(y_{i1} = 0 | x_i, z_i) = 1 - \Phi_1(x_i' \alpha) \quad (3)$$

$$\text{prob}(y_{i2} = 0, y_{i1} = 1 | x_i, z_i) = \Phi_2(-z_i' \beta, x_i' \alpha, -\rho) \quad (4)$$

$$\text{prob}(y_{i2} = 1, y_{i1} = 1 | x_i, z_i) = \Phi_2(-z_i' \beta, x_i' \alpha, -\rho) \quad (5)$$

In Formulas (3)–(5), $\Phi_1(*)$ represents the standard normal distribution function and $\Phi_2(*)$ represents the cumulative binary normal distribution function. According to the data availability and research purposes, y_i is taken as the dependent variable of the integration decision and degree seen in migrant towns, x_i and z_i are taken as the variables of individual characteristics, family characteristics, geographical location characteristics and identification variables, respectively. The research model can be extended by Formulas (3)–(5) as follows:

$$\text{prob}(y_{i1} = 0 | x_i, z_i) = 1 - \Phi_1(\alpha_0 + \sum_{k=1}^{16} \alpha_k x_{ki}) \quad (6)$$

$$\text{prob}(y_{i2} = 0, y_{i1} = 0 | x_i, z_i) = \Phi_2(-\beta_0 - \sum_{k=1}^{14} \beta_k z_{ki}, \alpha_0 + \sum_{k=1}^{16} \alpha_k x_{ki}, -\rho) \quad (7)$$

$$\text{prob}(y_{i2} = 1, y_{i1} = 0 | x_i, z_i) = \Phi_2(\beta_0 + \sum_{k=1}^{14} \beta_k z_{ki}, \alpha_0 + \sum_{k=1}^{16} \alpha_k x_{ki}, -\rho) \quad (8)$$

In Formula (6)–(8), α_0 and β_0 are constant terms. The maximum likelihood estimation is applied to the empirical model to obtain the coefficients to be estimated and the statistics needed for testing.

Second, the endogenous conversion model.

Although Heckman's two-stage model can solve the errors caused by unobservable variables, the impact mechanism of the integration decision of the i -th immigrant and the degree of urban integration on family income may be different. Therefore, it is necessary to further use the endogenous transformation model to estimate the processing effect of urban integration on household income. In this part, the impact of a high degree of integration on household income was explored, and a model of household income was constructed.

$$Y_i = X_i\alpha + Z_i\beta + \varepsilon_i \quad (9)$$

In the above formula, Y_i is the income of immigrant families; X_i is the personal heterogeneity, family heterogeneity and environmental heterogeneity of immigrants; Z_i is the fictitious variable of whether immigrants belong to high level integration; α and β are the parameters to be evaluated; ε_i is the error item. It should be noted that the high degree of integration of migrants does not belong to exogenous variables. One reason is that migrants choose to integrate into cities and towns. The second reason is that there may be unobservable variables, which also affect the high level of integration and family income. Therefore, using the endogenous switching regression model (ESRM) for estimation can control the heterogeneity of observable and unobservable variables and effectively solve the sample selection error [40].

Firstly, the selection equation is estimated, that is, the model estimation of high-level integration behavior of migrants. Then, the result equation is estimated, that is to say, two household income models are constructed by using two sub-samples of high-level and non-high-level integration, respectively. The estimation equation is as follows:

$$Z_i = W_i\eta + \omega_i \quad (10)$$

$$income_{i1} = X'_i\beta_{i1} + \varepsilon_{i1}, \text{ if } Z_i = 1 \quad (11)$$

$$income_{i0} = X'_i\beta_{i0} + \varepsilon_{i0}, \text{ if } Z_i = 0 \quad (12)$$

In the above formula, $Z_i = 1$ is a high level of integration for immigrants, and $Z_i = 0$ is a low level of integration for immigrants. $income_{i1}$ and $income_{i0}$ are family income for high-level integration and low-level integration for immigrants. X'_i is an explanatory variable. ε_{i1} and ε_{i0} are random error items. In order to make the model recognition more accurate, the "residence time" is introduced as a tool variable of whether immigrants belong to high-level integration. Residence time will affect migrants' attitudes and behaviors towards urban integration, but it will not directly affect the income of migrant families. After testing, the residence time variable has a significant impact on whether immigrants belong to high-level integration, but it has no direct impact on the income of migrant families, and it meets the selection conditions of tool variables.

Based on Formulas (11) and (12) of the above endogenous transformation model, the formula of family income that belongs to the high-level integration of migrants into cities and towns and the low-level integration of migrants into cities and towns can be expressed as follows (Formulas (13) and (14)).

$$E(income_{i1}|urban_integration_i = 1) = X_i\beta_1 + \sigma_{1\mu}\lambda_{1i} \quad (13)$$

$$E(income_{i0}|urban_integration_i = 1) = X_i\beta_0 + \sigma_{0\mu}\lambda_{0i} \quad (14)$$

For high-level immigrants, the average processing effect of family income (ATT) is subtracted from Equations (13) and (14).

$$ATT = E[income_{i1}|Z_i = 1] - E[income_{i0}|Z_i = 1] = X_i(\beta_{i1} - \beta_{i0}) + \lambda_{i1}(\sigma_{v1} - \sigma_{v0}) \quad (15)$$

5. Results

First, principal component analysis. In this study, IMB SPSS22.0 (IBM Corp., New York, NY, the United States of America; available online: <https://www.ibm.com/support/>

[pages/spss-statistics-220-available-download](#), accessed on 1 September 2022) is used to standardize the original data, and then the urban integration index of each sample is calculated through the following steps. Firstly, the KMO test value is 0.714 after calculation, and the p value of Bartlett's sphericity test is less than 0.05, which indicates that the sample data is suitable for factor analysis. The second step is to select the maximum variance method when the factor rotates, and then extract four common factors whose characteristic roots are larger than 1 by extracting the principal component method. The cumulative variance contribution rate is 66.68%. Thirdly, the variance rate of each common factor is taken as the weight, and the factor scores of the four dimensions of urban integration are weighted to calculate the urban integration index of each sample. In order to facilitate analysis, variable towns are integrated into discretization according to extreme and mean points, as shown below. When $\min \leq \text{urban integration degree} \leq \text{mean}$, the value is 0. When $\text{mean} \leq \text{urban integration degree} \leq \text{max}$, the value is 1. The high degree of integration = 1, and the low degree of integration = 0.

Second, analysis of the decision of urban integration of eco-migrants and the degree of urban integration. The Heckman two-stage model is run with Stata 13.0 software (StataCorp, College Station, Texas, the United States of America, available online: <https://www.stata.com/>, accessed on 1 September 2022), and the decision and degree of integration of migrant towns are estimated at the same time. Specific model estimates are shown in Table 1. The Wald chi-square values of the empirical equation are significant in the estimated results of the model and pass the test at the 1% level, which shows that the overall fitting degree of the equation is ideal.

Table 1. Heckman two-stage estimation results.

Variable Name	Decision of Integration		Degree of Integration	
	Coefficient	Standard Deviation	Coefficient	Standard Deviation
Individual heterogeneity				
Gender of respondents	0.374 *	0.228	−0.124 **	0.054
Age of respondents	0.155 ***	0.058	0.012	0.012
Age Square	−0.002 **	0.001	−0.000	0.000
Educational level of respondents	0.808 *	0.450	−0.064	0.075
Health status of respondents	−0.117	0.089	−0.013	0.020
Participation in skills training	1.114 ***	0.173	0.289 ***	0.059
Participation in resettlement activities	0.186 **	0.094	0.031	0.023
Family heterogeneity				
Difficulty of family borrowing	−0.133	0.123	0.111 ***	0.027
Number of family members and friends	0.219 *	0.136	0.050 *	0.027
Number of agricultural and animal husbandry machinery	0.009	0.118	−0.085 ***	0.026
Number of family labor force	0.081	0.112	−0.101 ***	0.023
Geographical location heterogeneity				
Hainan	0.355	0.306	−0.030	0.080
Haixi	1.004 ***	0.298	−0.066	0.078
Huangnan	0.708 *	0.402	−0.561 ***	0.096
Guoluo	0.926 *	0.477	−0.539 ***	0.136
Constant term	5.368 ***	1.634	1.516 ***	0.333
Identifying variables				
Distance to the state capital of the state	−0.353 **	0.145		
Local mature industries	0.418 ***	0.132		
Inverse Mills Ratio	0.450 ***	0.162		

Note: *, **, and ***, respectively, indicate that they passed statistical tests with significance levels of 10%, 5% and 1%.

Table 1 shows the individual heterogeneity. Specifically, in terms of the decision of the urban integration of migrants, the other variables have significant influence on the decision of urban integration, except health status. Among them, gender has a significant positive

correlation at the level of 10%, which indicates that men are more willing to choose to integrate into cities and towns. Age is positively correlated with urban integration decision, while the square value of age is negatively correlated with integration decision, indicating that there is an inverted U-shaped relationship between age and integration decision. Educational level, skills training and community activities are positively correlated at the 10%, 1% and 5% significance levels, indicating that immigrants with a high educational level, the mastering of some skills, or the willingness to participate in various activities have a higher ability to adapt and prefer to integrate into urban life. As far as the degree of urban integration of ecological migrants is concerned, only gender and the participation in skills training among those migrants interviewed have a significant positive impact on the degree of integration, which indicates that after training in the knitting of Tibetan carpets, the drawing of Thangka and the carving of Mani Stone, the migrants have grasped different degrees of livelihood and effectively improved their employability. With such skills, the degree of integration into the town will be higher. To conclude, our first hypothesis, which aims to address the contribution of eco-immigrants' individual heterogeneity to their socioeconomic integration, has been confirmed by the results shown in Table 1.

Family heterogeneity is also observed. From Table 1, it can be seen that only the number of relatives and friends of the migrant families interviewed is significant and positively correlated at the level of 10%, which has a significant impact on the decision of integration. This shows that the migrants who have familiar relatives and friends in the new environment after relocation will find the sustenance of interpersonal communication in their urban life, and they will be willing to integrate into the new life with relatives and friends. As far as the degree of urban integration of migrants is concerned, the ability to borrow money, the number of relatives and friends, the amount of agricultural and animal husbandry machinery and the total labor force of migrant families have significant effects on the degree of urban integration, but to varying degrees. It is worth noting that the amount of farming and animal husbandry machinery and the number of household labor force have a negative impact on the integration of migrants into cities and towns, which is consistent with the previous hypothesis and the actual survey. These results have confirmed our second hypothesis. Specifically, the findings show that heterogeneity among the eco-immigrants' families regarding their total labor force and household assets are important contributors to their integration.

Geographical regional heterogeneity cannot be ignored. From the perspective of geographical region, Yushu Tibetan Autonomous Prefecture, the farthest from Xining, the capital of Qinghai Province, is regarded as the reference group according to its geographical location. As can be seen from Table 1, for the decision of the urban integration of migrants, the decision and degree of urban integration of ecological migrants in different regions also vary. In this study, it is found that compared with Yushu prefecture, migrants from Huangnan, Hainan and Haixi prefectures are more inclined to integrate into cities and towns, indicating that they prefer to integrate into urban life. Among them, the most prominent is the Mongolian and Tibetan Autonomous Prefecture in Haixi, which is positively correlated at the level of 1% significance. In addition, the degree of integration of immigrants also varies in different degrees. Compared with Yushu Prefecture, only Huangnan and Guoluo Prefecture have a relatively weak degree of integration. According to these results, therefore, our third hypothesis regarding geographic regional heterogeneity or differences in eco-immigrants' integration outcomes has been tested and further confirmed.

We have identified variables that contribute to the urban integration of eco-immigrants and factors that impact their livelihood after immigration. Specifically, the results of the model estimation in Table 1 show significance levels of 5% and 1% of the identified variables, indicating that all the identified variables are more suitable for the current econometric model. The distance from the locale to the state capital and the mature local industries have a significant effect on the willingness of migrants to integrate into urban life. The closer the immigrants are to the state capital, the more convenience they will have, and the more likely they will choose to integrate into urban life. The more mature and promising the

development of local industries is, the more employment opportunities for migrants there are, and the more likely they are to choose new industries and integrate into urban life. Lastly, from an economic or financial perspective focusing on the changes in livelihoods of eco-immigrant families, our fourth hypothesis concerning the integration outcomes facing eco-immigrant families in the west part of China has been examined with significant evidence.

Third, the impact of high integration into cities and towns on the income of migrant families. The endogenous transformation regression model is used to estimate the impact of high urban integration on the income of migrant families. The estimated results of the model are shown in Table 2. The regression results show that there is a negative selectivity bias when $\rho_{\mu 0} < 0$. On the contrary, $\rho_{\mu 1} > 0$ indicates that there is a positive selectivity bias, which indicates that the higher the degree of integration of migrants into cities and towns is, the higher the level of family income is, which is consistent with the actual survey. Next, as shown in Table 3, the ATT of high integration is further considered, which indicates the average treatment effect of high integration on the income of immigrant families. After eliminating selective bias by endogenous transformation model, ATT is found to be 1.91, and all of them are significant at the 1% level, indicating that after overcoming the endogenous problem of self-selection, high integration contributes to a 23.07% increase in the income of immigrant families.

Table 2. The impact of high immigration integration on family income.

Variable Name	High Integration Model		Family Income			
			Non-High-Level Integration		High-Level Integration	
	Coefficient	Standard Deviation	Coefficient	Standard Deviation	Coefficient	Standard Deviation
Individual heterogeneity						
Gender of respondents	−0.199	0.170	−0.239 *	0.133	0.271 **	0.125
Age of respondents	0.019	0.031	−0.025	0.029	0.005	0.023
Age Square	−5.550	0.000	0.000	0.000	−0.000	0.000
Educational level of respondents	−0.341	0.235	0.095	0.159	0.144	0.186
Health status of respondents	0.022	0.164	−0.218 *	0.119	−0.012	0.123
Participation in skills training	−0.526 ***	0.133	−0.471 ***	0.154	−0.037	0.090
Participation in resettlement activities	0.215 ***	0.073	0.175 ***	0.061	−0.085 *	0.048
Family heterogeneity						
Difficulty of family borrowing	−0.047	0.115	−0.082	0.096	−0.005	0.079
Number of family members and friends	0.135	0.103	0.014	0.088	−0.145 **	0.069
Number of agricultural and animal husbandry machinery	−0.399 ***	0.082	−0.018	0.075	0.258 ***	0.058
Number of family labour force	0.338 ***	0.081	−0.073	0.066	−0.109 **	0.050
Geographical location heterogeneity						
Hainan	−0.211	0.269	−0.338	0.277	0.065	0.177
Haixi	−0.349	0.233	−0.491 *	0.260	−0.085	0.147
Huangnan	−1.711 ***	0.327	0.065	0.289	0.880 ***	0.282
Guoluo	−0.938 **	0.429	0.030	0.309	0.667 *	0.392
Constant term	0.470	0.917	9.556 ***	0.838	8.213 ***	0.652
Instrumental variable						
Residence time in cities and towns after relocation	0.099 **	0.053				
$\rho_{\mu 0}$ (or $\rho_{\mu 1}$)			−0.630 **	0.202	0.967 ***	0.022
LR test of indep. eqns.		14.35 ***				
Log likelihood		−550.853				

Note: *, **, and *** respectively indicate that they passed statistical tests with significant levels of 10%, 5% and 1%.

Table 3. Average processing effect of immigrants' high-level integration on household income.

	Mean Value		ATT	Standard Deviation	Change Rate%
	High-Level Integration	Non-High-Level Integration			
Family income	8.00	7.77	1.91	0.12 ***	23.07%

Note: *** means passing the statistical test of 1% significance level respectively.

6. Discussion

Domestic migration is not uncommon in China under the specific context of the country's unbalanced economic distribution between urban and rural areas [37] (Wang & Fan, 2012). One leading purpose of migration is to improve socioeconomic status; however, there exist gradients within the migrant subpopulation in terms of their integration into urban lives. Our research concentrates on migrants' integration in Qinghai, a Chinese province with a relatively lower level of economic development compared to eastern and middle parts of China. Rural residents in Qinghai provinces are also confronted with ecological and environmental challenges, which is a fundamental cause of their migration decision. In this context, our research is among the few to examine the potential factors contributing to domestic migration success in the province of Qinghai. Our findings thus shed light on the theory of social integration based on empirical evidence from contemporary China.

To reduce the endogeneity issue, we applied a two-stage prediction model to identify the underlying factors influencing the income of migrant families through the decision to integrate and the degree of integration degree into migrant towns. First of all, we examined the degree to which migrants have integrated themselves into their new living environments. The descriptive results show that after migration, 85% of migrants have a higher willingness to integrate, but 35.88% of migrants have not achieved high integration at the time of investigation. This indicates that the degree and efficiency of the integration of migrants into urban life need to be improved.

We then examined the factors contributing to the socioeconomic success of migrants and migrant families. There were reported significant individual differences and geographic location differences that influence the decision of migrants to integrate into urban life. At the individual level, male immigrants with a high educational level, some skills, or a willingness to participate in various activities are more likely to decide to integrate into cities and towns. This reveals gender differences in the success of urban life integration as well as the importance of educational achievements. Based on this finding, we suggest local governments provide relatively disadvantaged migrant groups, including women and people with lower levels of education and skills, with more opportunities to improve their income and ability to integrate into urban life. Besides gender and education, the results also highlight that there is an inverted U-shaped relationship between age and the urban integration of migrants. Specifically, middle-aged migrants are the ablest to adjust themselves to a new living environment; in comparison, younger and older migrants require more attention. Our findings contribute to the theory of social integration by adding empirical evidence regarding social integration eco-immigrant families from western China. All the demographic, socioeconomic, and geographic variables show special characteristics of our research participants and confirm that social integration is closely affected by domestic social, economic, cultural, and environmental contexts.

At the meso level, family heterogeneity is the most critical factor affecting the integration of migrant towns. Family heterogeneity refers to the variation in economic resources and human capital across migrant families. In particular, the ability to borrow money from families and the number of relatives and friends positively and significantly impact the integration of migrant towns. In contrast, the amount of agricultural and animal husbandry machinery and the total labor force have a negative and significant impact on the integration of migrant towns.

At the macro level, geographical location also plays a crucial role. Specifically, compared with Yushu, immigrants from Haixi, Huangnan and Guoluo are more likely to decide to integrate into urban life. At the same time, compared with Yushu, immigrants from Huangnan and Hainan prefectures have a slightly lower degree of integration.

We finally examined whether and how urban integration is related to household income. The findings show that the high degree of urban integration of migrants has a significant impact on improving their household income. Because of the selectivity bias caused by unobservable variables, after using the endogenous transformation model, it is found that a high degree of integration contributes to a 23.07% increase in the income of immigrant families. This causality confirms the significance of better integration for migrant families and responds to the rational behavior theory that one of migration's main targets is improving economic status. Speaking practically, the results also indicate that more policy efforts should be conducted by communities where migrants dwell and local governments to enhance the ability of integration of the disadvantaged due to their gender, education, age, family resources, and geographic location.

This study is not without limitations. First, this research only focuses on the specific case of domestic migration in the province of Qinghai. Given the complexity of Chinese society due to its demographic and economic scales, more empirical explorations are encouraged to explore the factors leading to successful rural-to-urban integration in other areas of China. Second, the current way to reduce endogeneity can be improved by using some other simulation models such as Monte Carlo to predict the relations. In addition, other soft computing algorithms, especially the recent advances in metaheuristics such as the red deer algorithm [41] or social engineering optimizer [42] can be applied to improve the prediction operator and to reduce errors.

7. Conclusions

Eco-immigration has become a newly emerged social phenomenon during the process of China's rapid socioeconomic transition; however, its consequences for immigrant families have not been fully explored. In this research, we aim to address two research gaps in the literature: factors remain unclear that contribute to the social and economic integration of eco-migrant families from rural to urban areas in China and how eco-migrant families sustain livelihood. We explored the migrant household data in China collected during 2017 and 2018 and identified underlying contributors to social and economic integration among immigrant families.

There are four take-home messages. First, immigrants are willing to integrate into urban life after relocation. Second, age, educational attainment, income, age, and geographic location are significant factors that affect migrants' decisions in urban integration. Third, the variations in family-level socioeconomic status affect their urban integration to the highest degree, followed by geographical location. Fourth, the degree to which Chinese eco-migrants integrate themselves into urban lives impacts their household income with statistical significance. These findings warrant further efforts targeting the improvement of eco-migrants' ability for urban integration, especially by offering them more opportunities with social and economic resources.

Despite the existing limitations regarding the coverage of the data in use, our research is among the first to explore factors leading to differences in urban integration among eco-immigrants in China. Future research is suggested to focus on a broader geographic range beyond the western part of China. Additionally, more detailed measurements of social and economic integration among eco-migrants from rural to urban areas are suggested in order to capture a more comprehensive picture of urban integration.

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