



## Research article

# Innovation and entrepreneurship of Chinese returning migrant workers in their home region

Jinfa Liu<sup>\*</sup>, Yawen Yu, Weixin Qi, Xin Ma, Yan Han*School of Management, Qufu Normal University, Shandong, 276826, China*

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## ABSTRACT

This study aims to investigate the influence of pre-entrepreneurial career mobility frequency and job changes among returning migrant workers (RMWs) on the innovation level of enterprises, with a particular focus on the mediating role of urban social capital accumulated by RMWs. Using data from the “current entrepreneurial status of RMWs”, we applied an ordered probit model to validate our hypotheses. To address endogeneity, a recursive bivariate probit model was used, and stepwise regression combined with bootstrap methods was employed to ascertain the mediating influence of urban social capital. Our results demonstrate a significant positive correlation ( $P < 0.01$ ) between pre-entrepreneurial career mobility frequency and the innovation level of enterprises among RMWs. However, there’s a notable negative correlation ( $P < 0.01$ ) between experiences as elementary workers and enterprise innovation level, while technical and marketing roles correlate positively ( $P < 0.01$ ) with enterprise innovation level. Urban social capital mediates the relationship between career mobility and enterprise innovation level, suggesting that career mobility enhance urban social capital accumulation, influencing RMWs’ enterprise innovation levels. This empirical evidence holds even after robustness tests. We further observed that RMWs with fewer than three career moves lean towards low level of enterprise innovation, while those with three or more gravitate towards high level of enterprise innovation. This study advances the theory of career mobility and enriches the understanding of enterprise innovation levels. Additionally, it provides critical theoretical insights for prospective RMWs entrepreneurs in strategizing their career mobility and job changes. Policy implications suggest that, in addition to providing entrepreneurial support, the government should facilitate pre-entrepreneurial career mobility channels for migrant workers and consider the transition from rural to urban employment as a socialized ritual for RMWs engaging in entrepreneurship.

## 1. Introduction

In contemporary China, the entrepreneurship of Chinese returning migrant workers (RMWs) in their home region has emerged as a pivotal element in the “mass entrepreneurship and innovation”, presenting a significant avenue for disadvantaged rural populations to reshape their destinies. Unleashing the innovative potential of RMWs holds the promise of catalyzing a wave of entrepreneurial activities in rural areas, thereby fostering rural economic development. Early research suggested that familial background plays a role in shaping the entrepreneurial innovation of RMWs, with individuals from elite families showing a greater propensity for engaging in

<sup>\*</sup> Corresponding author.

*E-mail address:* [liujinfa@qfnu.edu.cn](mailto:liujinfa@qfnu.edu.cn) (J. Liu).

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innovative activities [1]. Subsequent studies emphasized the correlation between the risk attitudes of RMWs and the level of entrepreneurial innovation, indicating that RMWs involved in innovation tend to exhibit heightened risk tolerance and preferences [2]. Recent studies further highlighted that RMWs with substantial industry experience and social capital are more inclined to undertake innovative activities [2]. However, the aforementioned research predominantly focuses on a static perspective, examining individual characteristics such as the previous work experience of RMWs. In the realm of RMWs entrepreneurship, apart from the influence of individual traits and the social environment, there are several underlying reasons that require urgent investigation. As research progresses, the career mobility of RMWs before they embark on entrepreneurial ventures has been acknowledged as a pivotal factor influencing their levels of enterprise innovation [3]. Following China's reform and opening-up, a significant number of migrant workers have relocated to urban areas, participating in non-agricultural industries. This migration experience has provided them with valuable insights into career mobility prior to embarking on entrepreneurship. Career mobility is not solely limited to assessing changes in occupation or geographical movement, it also facilitates the accumulation of social capital and entrepreneurial knowledge for RMWs [4]. Therefore, the pre-entrepreneurial career mobility of RMWs is likely a crucial independent variable explaining differences in enterprises innovation levels. Consequently, a series of intriguing questions emerge: What are the career mobility characteristics of RMWs before starting their entrepreneurial ventures? How do these characteristics influence the innovation level of enterprises? What are the underlying mechanisms? Addressing these questions remains essential.

Although previous studies have examined individual career mobility, their focus has primarily centered on fields outside of entrepreneurship [5]. Some studies focus on the reasons behind career mobility, while others emphasize its outcomes. Frederiksen [3] discovered that mobility between different geographical locations and industries significantly increases the likelihood of individual entrepreneurship. However, their examination was limited to the impact of career mobility on entrepreneurial attitudes, without delving deeper into the black-box mechanisms between career mobility and enterprise innovation level. In view of this, this study considers pre-entrepreneurial career mobility of RMWs as an independent variable to investigate its influence the innovation level of enterprises. Simultaneously, recognizing that pre-entrepreneurship career mobility plays a crucial role in enabling RMWs to acquire urban social capital, which may subsequently impact the enterprise innovation level, this research further conducts an empirical analysis to examine the mediating role of urban social capital in the relationship between career mobility and enterprise innovation level. This study utilizes survey data on the entrepreneurial status of Chinese RMWs and conducts hypothesis testing through an ordered probit model. Moreover, to tackle endogeneity concerns, a recursive bivariate probit model is employed. Additionally, the study employs stepwise regression and bootstrap methods to explore the mediating role of urban social capital. The primary objective is to fill existing research gaps and enhance the theoretical framework concerning enterprise innovation level among RMWs.

The marginal contributions of this paper are threefold. First, it delves into the deep-rooted reasons for varying levels of enterprise innovation among RMWs, which depends on career mobility frequency and differences in job changes. This departure from previous static perspectives, which primarily focused on personal traits such as entrepreneurs' prior work experience, represents a breakthrough. Second, from the perspective of the spatial dimension of career mobility, this study categorizes social capital into family social capital, village social capital, and urban social capital. By doing so, it expands the current research landscape and offers fresh insights into the study of enterprise innovation levels from the standpoint of social capital. Third, this study investigates the mechanism through which career mobility facilitates the accumulation of urban social capital and subsequently influences the innovation level of enterprises. This enriches both the theory of career mobility and previous research on enterprise innovation levels.

## 2. Concept definition and research hypothesis

### 2.1. Career mobility

According to Forrier [6], career mobility is defined as the transition from one position to another. Feldman extends this definition to include job position changes, organizational changes, and career changes. Job position change refers to alterations in an individual's job responsibilities, grades, or titles within an organization. Organizational change refers to shifts in an individual's employing enterprise, while career change mainly refers to transformations in an individual's career nature [7]. McConnell categorizes career mobility into four distinct types: job change but career category and workplace unchanged, career category change but workplace stays the same, interregional change but career category unchanged, and both interregional and career category change [8]. Li argues that the aforementioned definitions encompass job change, career mobility, and cross-regional mobility, whereas career mobility, in a narrower sense, refers exclusively to job change [9]. Yao's definition of career mobility for Chinese RMWs encompasses changes in their careers, jobs, or even relocation to different cities subsequent to their initial employment in an urban setting. This multifaceted concept includes two key dimensions: career mobility frequency, which quantifies the number of job changes, and career mobility direction, particularly focusing on upward mobility [10]. On the other hand, Liu gauges RMWs' career mobility by examining the number of changes in career types they undergo [11]. Wang, in turn, identifies career mobility based on whether there has been a shift in career types or not [12], and Hu quantifies career mobility by measuring the number of city changes [13]. Expanding upon these insights, this study defines career mobility as changes in the pre-entrepreneurship work of RMWs, and measures it across two dimensions: career mobility frequency and job changes. More specifically, career mobility frequency pertains to the frequency with which individuals relocate to different cities for work within a specific time frame [14], while job changes denote shifts in their job positions.

## 2.2. Enterprises innovation level of returning migrant workers

Entrepreneurship among RMWs is a distinctive outcome of China's dual economy. According to Zhang [15], the entrepreneurship of RMWs involved individuals who had accumulated substantial experience in urban areas. Influenced by factors such as urban allure, hometown attraction, and shifts in economic conditions, they returned to rural areas to establish businesses or engage in individual enterprises. Huang [16] suggested that the entrepreneurship of RMWs was a response to external environmental pressures and entrepreneurial opportunities. It was an endeavor where migrant workers, considering manageable economic risks and mobilizing controllable resources, established new businesses to achieve survival and personal development. Koellinger [17] posited that enterprises innovation involved entrepreneurs with an innovative spirit attempting to initiate activities that significantly differed from existing organizations and markets. Possas [18] suggested that the level of enterprise innovation depended on the extent to which entrepreneurs sought technological diversity and market opportunities. Synthesizing the aforementioned discussions, this study defines the entrepreneurship of RMWs as the act of migrants accumulating various entrepreneurial resources, including material capital, human capital, social capital, and entrepreneurial spirit, through urban experiences and job training while they work away from home, and ultimately returning to their home region to establish enterprises in agricultural or other non-agricultural fields. The enterprise innovation level was determined by the degree to which RMWs broke through existing entrepreneurial domains, entrepreneurial concepts, and market concepts based on their own creativity. This was manifested in levels of product innovation, service innovation, or business model innovation, among others.

## 2.3. Urban social capital

Bourdieu argues that social capital encompasses the collection of actual or potential resources that are connected to institutionalized networks of familiar or recognized relationships [19]. Coleman underscores the notion that social capital is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors [20]. Putnam describes social capital as encompassing norms, trust, and networks [21]. Granovetter distinguishes relationships between individuals and organizations as strong or weak, determined by factors such as contact duration, emotional intensity, degree of familiarity, and reciprocal services [22]. Putnam further divides social capital into bonding social capital and bridging social capital, based on the closeness of ties among society members [23]. Bonding social capital focuses on internal network relationships, primarily occurring within close-knit families or friends, which form exclusive networks characterized by strong ties and homogeneity. Bridging social capital emphasizes external network relationships, among loosely connected individuals who provide each other with valuable information or perspectives, forming open networks characterized by weak ties and heterogeneity [24]. Halpern proposes the concept of linking social capital, which considers cross-class relationship networks where individuals or organizations transcend existing boundaries and statuses to access relevant resources through connections with individuals, organizations, or groups at different levels, representing weaker social relationship [25].

From the perspective of career mobility space for RMWs, this study categorizes social capital into three types: family social capital, village social capital, and urban social capital. Family social capital is developed through the interaction and trust between family members [26]. It originates from family responsibility, trust, and support, functioning as a form of bonding social capital characterized by strong relationships and homogeneity. Village social capital is a primitive form of social capital that is based on kinship and narrow geography. It emerges among RMWs in rural society before their relocation to urban areas and is typified by medium relationship strength and heterogeneity. Urban social capital is a new type of social capital that is reconstructed by RMWs after moving to urban areas. It develops through business relationships and a broader geographical scope, characterized by weak relationships and high heterogeneity. Given China's distinctive urban-rural dual structure, it is essential to employ distinct rural and urban research frameworks when investigating social capital. Furthermore, additional studies indicate that if the existing village network fails to provide the anticipated resources for RMWs in rural societies, the reconstruction of the urban social network becomes necessary [27]. Therefore, this study focuses on the urban social capital of RMWs.

## 2.4. Career mobility and enterprise innovation level

Career mobility of individuals across enterprises, industries, and regions plays a crucial role in facilitating knowledge transfer, serving as a vital mechanism connecting entrepreneurs with enterprise innovation [28]. Past career mobility experiences empower entrepreneurs to gain insights into market development, product trends, and more, fostering the generation of innovative content through the lessons learned. Career mobility exhibits dual characteristics of frequency and direction. Regarding the frequency of career mobility, working away enhances the advantages of RMWs in terms of entrepreneurial funds, experience, and skills [29]. Higher career mobility frequency implies that entrepreneurs experience a wider variety of job types or organization settings, which helps them replicate or transfer the accumulated resources to "new soil". From the perspective of career mobility positions, experiences acquired while working away significantly raise the likelihood of entrepreneurship among RMWs, exerting distinct impacts on the innovation level of enterprises. Even among entrepreneurs with similar experience backgrounds, disparities in knowledge structures and thinking patterns can arise due to their specific sectors, industries, or positions, resulting in variations in their enterprise innovation level. Career mobility has a profound influence on individuals' cognition, actions, and responses [30]. The interweaving of experiences from different job positions often leads to cross-domain knowledge fusion, igniting a continuous stream of innovative activities among entrepreneurs [31]. In summary, this study puts forward the following research hypotheses:

**Hypothesis 1a.** The more frequent the career mobility before entrepreneurship among RMWs, the more beneficial it is for enhancing enterprise innovation level.

**Hypothesis 1b.** The richer the experience of job changes before entrepreneurship among RMWs, the more beneficial it is for enhancing enterprise innovation level.

2.5. Mediating effect of urban social capital

Career mobility is an important means of expanding the communication networks and accumulating social capital. When individuals change job positions between organizations, it creates opportunities for cross-boundary interactions, enabling them to obtain assistance and resources from close social relationships through interpersonal interactions [32]. The experience of urban employment

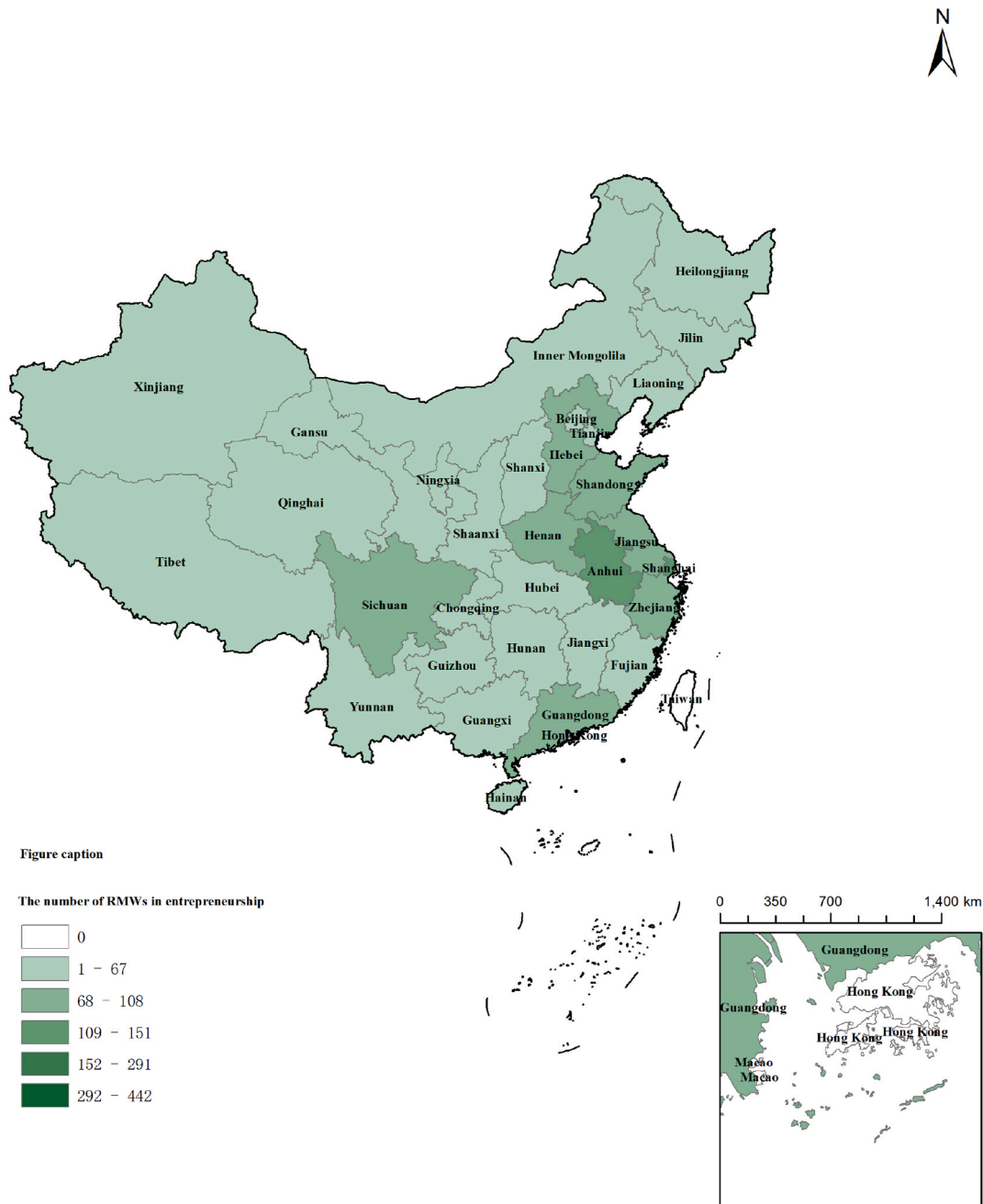


Fig. 1. Number and distribution of surveyed RMWs in entrepreneurship.

enables migrant workers to break through the traditional rural social activity sphere and establish a social network that spans the urban–rural border [33]. The original primary relationships of migrant workers, based on “blood and geography”, expanded into rational secondary relationships characterized by “business and friendship”, and the scale and structure of social networks have changed significantly [34]. The social networks of RMWs are more extensive compared to those of local farmers, which is the accumulation of urban social capital in essence. Given that China is a society that places great emphasis on relationships, RMWs can leverage these social networks to access valuable entrepreneurial resources. This study puts forward the following research hypotheses:

**Hypothesis 2a.** The more frequent the career mobility before entrepreneurship among RMWs, the more beneficial it is for acquiring urban social capital.

**Hypothesis 2b.** The richer the experience of job changes before entrepreneurship among RMWs, the more beneficial it is for acquiring urban social capital.

The entrepreneurial behavior of RMWs often reflects a strong conformity mindset, with frequent engagement in entrepreneurship by imitating new products or business methods of other enterprises within their social network. However, there are studies suggesting that social capital serves as a catalyst for entrepreneurial innovation, facilitating the acquisition of advanced technical knowledge and hastening entrepreneurial learning and innovation activities [35]. The social relationship network established between RMWs and the urban population is a weak relationship network based on the business relationship, which is used by people in instrumental actions. Combined with the aforementioned discussion, it can be inferred that the effect of career mobility on the innovation level of enterprises depends at least partly on urban social capital. In view of this, the following research hypothesis is proposed:

**Hypothesis 3a.** Urban social capital plays a mediating effect between the frequency of career mobility before entrepreneurship among RMWs and the innovation level of enterprises.

**Hypothesis 3b.** Urban social capital plays a mediating effect between job changes before entrepreneurship among RMWs and the innovation level of enterprises.

### 3. Data sources and research design

#### 3.1. Data source

The data was collected from a survey examining the current entrepreneurial status of Chinese RMWs. The survey spanned from June to September 2016 and employed a multistage stratified unequal probability sampling method within a stratified random sampling framework. Initially, 30 counties were proportionally selected based on population size across 22 provinces in China. Subsequently, 2 representative towns were chosen from each county, followed by the selection of 10 representative villages from each town. Ultimately, 5 households of RMWs engaged in entrepreneurship were randomly chosen from these villages, resulting in a total of 1500 villages being randomly selected, and 4600 questionnaires being completed. Fig. 1 illustrates the study area. The study specifically targets “employers” and “self-employed” individuals among RMWs, excluding “employees” from the scope of investigation. After excluding samples that did not meet the specified criteria, such as questionnaires with missing key variables, missing data units, and inconsistencies in data before and after, a total of 4185 valid samples were obtained. This yielded an effective response rate of 90.98 % for the questionnaire. Verbal informed consent was secured from all participants in our research.

#### 3.2. Variable selection

##### 3.2.1. Dependent variables: Enterprise innovation level

The dependent variable is innovation (enterprise innovation level). The questionnaire includes the following question: “Compared to the market’s existing products or services, how do you perceive the degree of innovation in the products or services you provide?” Drawing on Young’s [36] comprehensive framework for assessing innovation, the answer options encompass “Very low”; “Low”; “Moderate”; “High” and “Very high”. Accordingly, this study assigns values to the innovation level of enterprises using ordinal variables 1–5, with specific assignments as follows: “Very low = 1; Low = 2; Moderate = 3; High = 4; Very high = 5”. Consistent with Samuelsson’s [37] definition of the degree of innovation, higher variable values indicate a higher level of enterprise innovation.

##### 3.2.2. Independent variable: Career mobility

The independent variable is career mobility, which is divided into career mobility frequency and job changes. Career mobility frequency is assessed by calculating the number of cities in which RMWs have worked and dividing it by their total duration of mobility [38]. On the other hand, job changes are evaluated based on whether RMWs have undergone transitions into roles as elementary worker, technical work, or marketing professionals. Elementary workers are primarily engaged in physically demanding labor, technical workers are those who require specialized technical skills and professional expertise, and marketing workers encompass individuals involved in various sales activities.

##### 3.2.3. Mediator variable: Urban social capital

The mediator variable is the urban social capital. According to Coleman, the traditional role of “primary social capital” provided by

families and communities is gradually diminishing. Consequently, individuals need to create and establish social organizations within their social interactions to replace the declining trend of “primary social capital” [39]. In China, the primary social organizations that RMWs encounter in urban areas are trade associations and chambers of commerce. Therefore, this study selects trade associations and chambers of commerce as proxy variables to measure urban social capital among RMWs. Trade associations represent civic organizations, such as breeding organization, cooking organization. Chambers of commerce stand for business organizations, such as entrepreneur clubs and local business gangs.

3.2.4. Control variables

The control variables used in this study encompass individual, family, village, organizational, and regional characteristics of RMWs. At the individual level, the variables considered are gender (Gender), age (Age), and education (Edu). The family level variable is total family population (Famnum). The village level uses “interpersonal relationships” as a proxy variable for village social capital (Villcap), because it represents the social network relationship of individuals in the village. The organizational level variable is the number of years of entrepreneurship (Years). The regional level includes region (Region). The details are shown in Table 1:

4. Empirical analysis

4.1. Model design

4.1.1. Ordered probit model

Since the values of enterprise innovation level have an ordinal significance, we used the ordered probit model to test the hypotheses. The setup of the ordered probit model is as shown in equation (1), and the selection rules for the dependent variable are as shown in equation (2).

$$Innovation_i^* = \alpha + \beta Careermob_i + \gamma Control_i + \epsilon_i \tag{1}$$

**Table 1**  
Variable definitions and descriptive statistics.

Variable types	Variable code	Variable	Measuring method	Min	Mean	Std. Dev
Dependent variable	Innovation	Enterprise innovation level	Very low - 1 Low - 2 Moderate - 3 High - 4 Very high - 5	1	2.278	1.399
Independent variable	Frq	Career mobility frequency	The number of cities where RMWs have worked divided by their total duration of mobility	0.041	0.857	1.051
	Post 1	Elementary worker	Elementary worker - 1 Otherwise - 0	0	0.211	-
	Post 2	Technical worker	Technical worker - 1 Otherwise - 0	0	0.150	-
	Post 3	Marketing	Marketing - 1 Otherwise - 0	0	0.050	-
Mediator variable	Trd	Participate in the trade associations	Participated - 1 Not participating - 0	0	0.109	-
	Biz	Participate in the chambers of commerce	Participated - 1 Not participating - 0	0	0.049	-
Control variable	Gender	Gender	Male - 1 Female - 0	0	0.803	-
	Age	Age	Age ≤30 - 1, Age 31 to 45 - 2, Age 46 to 60 - 3, Age ≥61 - 4	1	2.356	0.698
	Edu	Educational level	Primary school and under - 1 Junior high school - 2 High school/Technical secondary school - 3 Junior college and above - 4	1	2.618	0.842
	Famnum	Total family members	Total number of RMWs' family members ≤5 - 1 Total number of RMWs' family members >5 - 2	1	1.309	0.462
	Villcap	Village social capital	The interpersonal relationships of RMWs in rural areas ≤3 - 1 The interpersonal relationships of RMWs in rural areas >3 - 2	1	0.856	0.498
	Years	Number of years of entrepreneurship	Number of years of entrepreneurship ≤10 - 1 Number of years of entrepreneurship >10 - 2	1	1.377	0.484
	Region	Region	Location of entrepreneurship, east - 1; central - 2; west - 3	1	1.824	0.833

$$Innovation_i = \begin{cases} 1, & Innovation_i^* \leq r_1 \\ 2, & r_1 < Innovation_i^* \leq r_2 \\ 3, & r_2 < Innovation_i^* \leq r_3 \\ 4, & r_3 < Innovation_i^* \leq r_4 \\ 5, & Innovation_i^* > r_4 \end{cases} \tag{2}$$

in equations (1) and (2),  $i$  ( $i = 1, 2, \dots, n$ ) represents the sample size.  $Innovation_i^*$  is the latent variable representing the enterprise innovation level of the  $i$ -th returning migrant worker,  $Careermob_i$  is the core independent variable indicating whether the  $i$ -th returning migrant worker has experienced career mobility,  $Control_i$  represents control variables,  $\beta$  and  $\gamma$  are the estimated coefficients, and  $\varepsilon_i$  is the random disturbance term that follows a normal distribution (i.e., zero mean value and constant variance) [40,41].  $Innovation_i^*$  is a piecewise function that categorizes enterprise innovation into different levels,  $r$  denotes the threshold parameter, representing the boundary values for each interval. Based on the assumption that the random disturbance term follows a normal distribution, the probability of  $Innovation$  taking the corresponding ordinal values is determined in the ordered probit model.

Additionally, this study conducted robustness tests using the binary logit model and binary probit model. Following the methodology introduced by Fan [42], the specific operational method involves categorizing the RMWs selecting “very high” as engaging in high-level innovation, while categorizing the other options as non-high-level innovation. The corresponding models are formulated as shown in equation (3).

$$Innovation_i = \begin{cases} 1, & Innovation_i^* > 0 \\ 0, & Innovation_i^* \leq 0 \end{cases} \tag{3}$$

#### 4.1.2. Endogenous test: recursive bivariate probit model

As career mobility occurring before the entrepreneurial activities of RMWs, there is no “reverse causality” between career mobility enterprise innovation level. However, there may be an endogeneity issue related to “missing variables”. To address this concern, we employed a bivariate probit model to mitigate the endogeneity problem in the aforementioned model. The specific model is as follows:

$$Innovation_i^* = \alpha + \beta Careermob_i + \gamma Control_i + \varepsilon_i \tag{4}$$

$$Careermob_i^* = \alpha_0 + \gamma_0 Control_i + \nu_i \tag{5}$$

in equations (4) and (5),  $i$  ( $i = 1, 2, \dots, n$ ) represents the sample size,  $Innovation_i^*$  is the latent variable representing the enterprise innovation level of the  $i$ -th returning migrant worker,  $Careermob_i^*$  is the latent variable representing the career mobility of the  $i$ -th returning migrant worker,  $Control_i$  is control variables. Assuming that the random disturbance term  $(\varepsilon_i, \nu_i)$  obeys a two-dimensional joint normal distribution with expectation 0 and variance 1, the correlation coefficient between them is  $\rho$ .

$$\begin{pmatrix} \varepsilon \\ \nu \end{pmatrix} \sim N \left\{ \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right\}$$

The observable variables are determined by the following equations (6) and (7):

$$Innovation_i = \begin{cases} 1, & Innovation_i^* > 0 \\ 0, & Innovation_i^* \leq 0 \end{cases} \tag{6}$$

$$Careermob_i = \begin{cases} 1, & Careermob_i^* > 0 \\ 0, & Careermob_i^* \leq 0 \end{cases} \tag{7}$$

Equations (4)–(7) are recursive bivariate probit models. The link between equations (4) and (5) is the correlation  $\rho$  of the random disturbance term. When  $\rho$  is 0, it means that the two equations are not related and can be estimated separately. When  $\rho$  is not equal to 0, maximum likelihood estimation can be performed.

In order to mitigate endogeneity issues arising from the potential presence of “missing variables”, we have incorporated instrumental variable estimation into our study. Following well-established methodologies within the field, we have employed the proportion of RMWs experiencing career mobility at the county level as an instrumental variable [43,44]. The rationale behind this instrumental variable lies in its impact on the career mobility of RMWs before entrepreneurship, without directly influencing the enterprise innovation level of RMWs. This satisfies the relevance and exogeneity principles for instrumental variable selection [45], signifying its association with the independent variable while theoretically lacking a causal relationship with the dependent variable. To mitigate the potential underestimation of standard errors in regression, as identified by Moulton [46] when regressing micro level variables on aggregated macroeconomic variables, we controlled for cluster-robust standard errors at the county level in all regression analyses. Specifically, we employed the “cluster” command in Stata 15.0 software to adjust for the clustered effects of our sample at the county level.

4.1.3. Mediating effect model

In order to explore whether urban social capital plays a mediating effect between career mobility and enterprise innovation level of RMWs, this study constructed the following models:

$$Innovation_i = \alpha + \beta Careermob_i + \gamma Control_i + \varepsilon_i \tag{8}$$

$$Socialcap_i = \alpha_1 + \beta_1 Careermob_i + \gamma_1 Control_i + \delta_i \tag{9}$$

$$Innovation_i = \alpha_2 + \beta_2 Socialcap_i + \chi Careermob_i + \gamma_2 Control_i + \omega_i \tag{10}$$

in equations (8)–(10),  $i (i = 1, 2, \dots, n)$  represents the sample size,  $Innovation_i$  represents the enterprise innovation level of the  $i$ -th returning migrant worker.  $Careermob_i$  represents the career mobility of the  $i$ -th returning migrant worker, divided into career mobility frequency and job changes.  $Socialcap_i$  represents the urban social capital of the  $i$ -th returning migrant worker, divided into trade associations and chambers of commerce.  $Control_i$  stands for control variable.  $\varepsilon_i$ ,  $\delta_i$  and  $\omega_i$  represents the residuals.

When testing the mediating effect of urban social capital, we need not only to consider equations (8) and (9), but also to test equation (10). We check the coefficient  $\beta$  of equation (8), the coefficient  $\beta_1$  of equation (9), and the coefficient  $\beta_2$  of equation (10) in turn. If  $\beta$ ,  $\beta_1$  and  $\beta_2$  are significant at the same time, the mediating effect is established. At this time, if the coefficient  $\chi$  in equation (10) is not significant, it shows that there is a complete mediating effect. If  $\chi$  is significant, it indicates that there is a partial mediating effect.

4.2. Regression results of career mobility on enterprise innovation level

The estimation was performed by Stata15.0 statistical software while applying ordered probit model. The results of the parallel line test indicated a significance level of  $P = 0.075 > 0.05$ , and the regression equations were parallel to each other with a high degree of discrimination, comply with the basic requirements for ordered probit regression analysis. The difference significance level in model fitting is  $0.000 < 0.005$ , and the test results are statistically significant. To mitigate the impact of extreme or aberrant values, this paper applied winsorization to the primary variables at the 1 % level. Table 2 presents the estimation results for the entire valid sample.

**Model 1.** serves as the control variable model, while Models 2–5 incorporate additional independent variables based on Model 1. The results of Model 2 reveal a significant positive correlation between the frequency of career mobility and the enterprise innovation level ( $\beta = 0.1350, P < 0.01$ ), indicating that a higher frequency of career mobility corresponds to an elevated innovation level among RMWs, thus supporting Hypothesis 1a. The results of Model 3 demonstrate a significant negative relationship between elementary work experience and the enterprise innovation level ( $\beta = -0.6797, P < 0.01$ ), suggesting that RMWs with elementary work experience are less inclined to partake in innovative activities. The findings of Model 4 and Model 5 show that technical and marketing work experience are significantly and positively linked to the enterprise innovation level ( $\beta = 0.5268, P < 0.01; \beta = 0.5320, P < 0.01$ ),

**Table 2**  
Regression results of career mobility on enterprise innovation level.

Variable	Innovation				
	Model 1	Model 2	Model 3	Model 4	Model 5
Gender	0.0270 (0.0722)	-0.0222 (0.0727)	-0.0795 (0.0727)	0.0052 (0.0727)	0.0259 (0.0724)
Age	-0.0086** (0.0034)	-0.0062* (0.0035)	-0.0084** (0.0034)	-0.0084** (0.0035)	-0.0082** (0.0034)
Edu	-0.0642** (0.0303)	-0.0410 (0.0306)	-0.0723** (0.0306)	-0.0607** (0.0306)	-0.0752** (0.0305)
Famnum	0.0356** (0.0174)	0.0215 (0.0176)	0.0379** (0.0174)	0.0276 (0.0175)	0.0350** (0.0174)
Villcap	0.0357 (0.0350)	0.0343 (0.0352)	0.0358 (0.0352)	0.0379 (0.0353)	0.0344 (0.0351)
Years	0.0002 (0.0038)	0.0032 (0.0038)	-0.0011 (0.0038)	0.0016 (0.0038)	0.0016 (0.0038)
Rengion	0.1019*** (0.0350)	0.0801** (0.0353)	0.1237*** (0.0352)	0.0971*** (0.0353)	0.1082*** (0.0351)
Frq		0.1350*** (0.0148)			0.0110 (0.0013)
Post 1			-0.6797*** (0.0710)		
Post 2				0.5268*** (0.0700)	
Post 3					0.5320***
Chi <sup>2</sup>	28.9159	121.0431	123.8604	85.9936	51.3262
Pseudo R <sup>2</sup>	0.0024	0.0100	0.0103	0.0071	0.0043
N	4185	4185	4185	4185	4185

Note. \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.



implying that RMWs with technical and marketing work experience are more predisposed to engaging in innovative activities. Therefore, Hypothesis 1b receives partial support.

### 4.3. Endogenous discussion

This study employs the “Margins” command in the Stata15.0 software to calculate marginal effects, as presented in Table 3. Specifically, while keeping other control factors constant, the marginal effect of career mobility frequency on the enterprise innovation level is 0.021, significant at the 1 % level. The marginal effect of elementary work experience on the enterprise innovation level is −0.251, also significant at the 1 % level. Technical work experience yields a marginal effect of 0.247 on the enterprise innovation level, significant at the 1 % level, and marketing work experience demonstrates a marginal effect of 0.312 on the enterprise innovation level, also significant at the 1 % level. To assess endogeneity, this study employed a recursive bivariate probit model. In the first stage, instrumental variables show a significant positive correlation with career mobility. The coefficients are statistically significant at the 1 % level. Weak instrument variable tests result in first stage F-values of 25.760, 18.850, 15.723, and 30.312, all of which surpass the commonly accepted threshold of 10. This implies the absence of weak instrument problems and confirms the relevance of the instruments. In the second stage, career mobility displayed a significant positive impact on the enterprise innovation level of RMWs. The coefficient of career mobility decreases compared to the baseline regression but remains statistically significant at the 1 % level. Since the parameters of the endogenous test are statistically significant, the original hypothesis that career mobility was an exogenous variable can be rejected. This indicates the validity of the estimation results obtained from the recursive bivariate probit model.

### 4.4. Testing the mediating effect of urban social capital

The first step tested the significance of the independent variables’ effect on the dependent variable, and the corresponding results are presented in Table 2. The second step examined the significance of the independent variables’ impact on the mediator variable, with results outlined in Table 4. In Model 1, career mobility frequency exhibited a significant positive correlation with trade associations ( $\beta = 0.0686, P < 0.01$ ). Similarly, in Model 5, career mobility frequency was found to have a significant positive correlation with chambers of commerce ( $\beta = 0.0959, P < 0.01$ ), thus supporting Hypothesis 2a. In Models 2 and 6, the effects of elementary work experience on trade associations ( $\beta = 0.0132, P > 0.1$ ) and chambers of commerce ( $\beta = -0.1780, P > 0.1$ ) were not statistically significant. Likewise, in Models 3 and 7, the effects of technical work experience on trade associations ( $\beta = 0.1564, P > 0.1$ ) and chambers of commerce ( $\beta = 0.2042, P > 0.1$ ) were also not found to be significant. Conversely, Model 4 suggested that marketing work experience was significantly positively correlated with trade associations ( $\beta = 0.8452, P < 0.01$ ), and Model 8 confirmed a similar positive correlation with chambers of commerce ( $\beta = 0.7257, P < 0.01$ ). Therefore, Hypothesis 2b is partially supported.

In the third step, we assessed the significance of the impact of independent variables and the mediator variable on the dependent variable. The regression results for the mediating effect of trade associations are presented in Table 5. In Model 1, trade associations exhibited a significant positive correlation with the enterprise innovation level ( $\beta = 0.1935, P < 0.05$ ), and the positive effect of career mobility frequency on the enterprise innovation level remained statistically significant ( $\beta = 0.1336, P < 0.01$ ). Notably, the magnitude of the impact of career mobility frequency on the enterprise innovation level decreased slightly ( $0.1336 < 0.1350$ ), indicating that trade associations exert a partial mediating effect between career mobility frequency and enterprise innovation level of RMWs. Hypothesis 3a is supported.

In Model 4, trade associations significantly positively correlated with enterprise innovation level ( $\beta = 0.2016, P < 0.05$ ), the positive effect of marketing work experience on enterprise innovation level is still significant ( $\beta = 0.5128, P < 0.05$ ). However, the

**Table 3**  
The marginal effects of the recursive bivariate probit model.

	Stage I				Stage II			
IV	0.227*** (0.037)	0.182*** (0.014)	0.238*** (0.016)	0.172*** (0.026)				
Frq					0.021*** (0.011)			
Post 1						−0.251*** (0.010)		
Post 2							0.247*** (0.015)	
Post 3								0.312*** (0.027)
Control	control	control	control	control	control	control	control	control
F-values	25.760	18.850	15.723	30.312				
Endogenous test					0.349*** (0.064)	2.373*** (0.119)	0.429** (0.168)	0.487*** (0.152)
Wald chi-square value	1413.653***							
N	4185	4185	4185	4185	4185	4185	4185	4185

Note. \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

**Table 4**  
Regression results of career mobility on urban social capital.

Variable	Trade Associations				Chambers of Commerce			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Frq	0.0686*** (0.0215)				0.0959*** (0.0261)			
Post 1		0.0132 (0.1299)				-0.1780 (0.1973)		
Post 2			0.1564 (0.1386)				0.2042 (0.1960)	
Post 3				0.8452*** (0.1859)				0.7257*** (0.2638)
Control	control	control	control	control	control	control	control	control
Constant	4.7641*** (0.5051)	4.6746*** (0.5052)	4.6901*** (0.5036)	4.7351*** (0.5063)	5.8461*** (0.7338)	5.6381*** (0.7331)	5.7193*** (0.7307)	5.7396*** (0.7332)
Chi <sup>2</sup>	117.0054	107.9121	109.1437	125.9816	70.2982	60.1102	60.3130	65.7558
Pseudo R <sup>2</sup>	0.0406	0.0374	0.0379	0.0437	0.0433	0.0370	0.0371	0.0405
N	4185	4185	4185	4185	4185	4185	4185	4185

Note. \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

**Table 5**  
Regression results of career mobility and trade associations on enterprise innovation level.

Variable	Innovation			
	Model 1	Model 2	Model 3	Model 4
Trd	0.1935** (0.0930)	0.2379*** (0.0921)	0.2301** (0.0926)	0.2016** (0.0926)
Frq	0.1336*** (0.0148)			
Post 1		-0.6808*** (0.0711)		
Post 2			0.5256*** (0.0700)	
Post 3				0.5128*** (0.1133)
Control	control	control	control	control
Chi <sup>2</sup>	125.3548	130.4888	92.1380	56.0461
Pseudo R <sup>2</sup>	0.0104	0.0108	0.0076	0.0046
N	4185	4185	4185	4185

Note. \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

**Table 6**  
Regression results of career mobility and chambers of commerce on enterprise innovation level.

Variable	Innovation			
	Model 1	Model 2	Model 3	Model 4
Biz	0.0289 (0.1344)	0.0962 (0.1334)	0.1022 (0.1336)	0.0625 (0.1338)
Frq	0.1348*** (0.0148)			
Post 1		-0.6794*** (0.0710)		
Post 2			0.5267*** (0.0700)	
Post 3				0.5286*** (0.1132)
Control	control	control	control	control
Chi <sup>2</sup>	121.0891	124.3789	86.5765	51.5438
Pseudo R <sup>2</sup>	0.0100	0.0103	0.0072	0.0043
N	4185	4185	4185	4185

Note: \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

magnitude of the impact of marketing work experience on enterprise innovation level decreased ( $0.5128 < 0.5320$ ), indicating that trade associations have a partial mediating effect between marketing work experience and enterprise innovation level of RMWs. Hypothesis 3b is partially supported.

Similarly, we investigated the mediating effect of chambers of commerce, and the results are presented in Table 6. Nevertheless, it is noteworthy that the impact of chambers of commerce on enterprise innovation level is not statistically significant. This may be because RMWs have not yet become the business elite recognized by the chambers of commerce, making it challenging for them to accrue the necessary social capital through the chamber.

We further employed the bootstrap method, bootstrapping 5000 samples and setting a confidence interval at 95 %. If the confidence interval does not include 0, it signifies a significant mediating effect. Table 7 presents the results, indicating that the mediating effect value of the trade association between career mobility frequency and enterprise innovation level is 0.0013, with a 95 % confidence interval that does not encompass 0. This signifies a statistically significant mediating effect. Similarly, the mediating effect of trade associations between marketing work experience and enterprise innovation level is also significant.

#### 4.5. Robustness test

There are three methods for robustness test, including replace of variables, changing measurement methods, and adjusting samples by classification. This study used those methods to test robustness.

##### 4.5.1. Change the measurement indicators of urban social capital

In China, a society built upon human interactions, the cultivation of human relationships serves as a vital means for RMWs to acquire urban social capital. It has been observed that a higher expenditure on human relationship leads to a more extensive social network [47]. To verify the robustness of the mediating effect, this study utilized human relationship expenditure as a proxy variable for urban social capital. By excluding samples in which human relationship expenditure is zero, the final sample size for this test amounts to 3725. The specific results are shown in Tables 8 and 9. Table 8 shows the regression results of career mobility on the mediator variable of human relationship expenditure. Table 9 depicts career mobility and human relationship expenditure as independent variables, regressing them against the dependent variable of enterprise innovation level. The regression findings do not exhibit any significant deviations from the previous findings.

##### 4.5.2. Change the measurement method

The dependent variables adopted in this test are dummy variables. To address these concerns, it is customary to employ either the logit or probit model [48]. In this study, we classify the choice of “very high” by RMWs as high-level innovation, while grouping all other options as non-high-level innovation. We define high-level innovation as 1, non-high-level innovation as 0, and use the binary logit and probit models to assess robustness. The results are shown in Table 10 and demonstrate consistent alignment with prior research findings.

##### 4.5.3. Sample replacement or sample adjustment

This study references Bagger [49], excludes the sample of individuals under the age of 25, and performs a robustness test with 4124 new samples. The regression results of this new sample do not exhibit significant differences compared to the previous study. Additionally, we also conduct sub-sample regressions based on career mobility frequency. As shown in Table 11, it is observed that when the number of career mobility is less than three, the entrepreneurial innovation level of RMWs tends to be lower, however, when it is equal to or greater than three, the entrepreneurial innovation level of RMWs is higher.

## 5. Discussion

Existing studies have indicated that inter-city mobility among RMWs is detrimental to the formation of stable rural social networks, resulting in a reduction in the village social capital support for RMWs' entrepreneurship [38]. Consequently, this increases the opportunity costs associated with entrepreneurship for RMWs and restrains their innovation activities. However, our study proposes that changes in cities or occupations enables RMWs to accumulate urban social capital, thereby creating conditions conducive to innovation. Furthermore, our study reveals that the impact of career mobility frequency on the innovation level of enterprises varies. Specifically, when the number of career changes is less than three, the enterprises innovation level of RMWs is lower. In contrast, when the number of career changes is equal to or greater than three, the enterprises innovation level of RMWs is higher. This provides RMWs with a reference for enhancing their enterprises innovation level through career mobility. Additionally, some scholars posit that

**Table 7**  
Bootstrap method for testing mediating effect of urban social capital.

Variable	Dependent variable	
	mediating effect	95 % confidence interval
Frq	0.0013 ( 6.32 e−06 )	[0.0001,0.0033]
Post 3	0.0170 ( 0.0001 )	[0.0030,0.0392]

**Table 8**  
Regression results of career mobility on human relationship expenditure.

Variable	Human Relationship Expenditure			
	Model 1	Model 2	Model 3	Model 4
Frq	0.0227*** (0.0088)			
Post 1		-0.1114** (0.0432)		
Post 2			0.0460 (0.0480)	
Post 3				0.1862** (0.0794)
Control	control	Control	control	control
Constant	4.0390*** (0.1690)	4.1052*** (0.1692)	4.0605*** (0.1689)	4.0604*** (0.1686)
R <sup>2</sup>	0.0403	0.0403	0.0388	0.0400
N	3725	3725	3725	3725

Note: \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

**Table 9**  
Regression results of career mobility and human relationship expenditure on enterprise innovation level.

Variable	Innovation			
	Model 1	Model 2	Model 3	Model 4
lnrq	0.0580*** (0.0218)	0.0533** (0.0216)	0.0619*** (0.0218)	0.0613*** (0.0219)
Frq	0.0585*** (0.0117)			
Post 1		-0.5827*** (0.0569)		
Post 2			0.1271** (0.0639)	
Post 3				0.1668 (0.1059)
Control	control	control	control	control
Constant	2.0431*** (0.2411)	2.3321*** (0.2394)	2.0811*** (0.2417)	2.0973*** (0.2416)
R <sup>2</sup>	0.0141	0.0347	0.0085	0.0081
N	3725	3725	3725	3725

Note: \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

**Table 10**  
Regression results of binary logit model and binary probit model.

Variable	Innovation							
	Logit		Probit		Logit		Probit	
Frq	0.0583*** (0.0213)	0.0310*** (0.0119)						
Post 1			-0.9506*** (0.1633)	-0.4694*** (0.0770)				
Post 2					0.3637*** (0.1295)	0.1906*** (0.0694)		
Post 3							0.5233*** (0.1993)	0.2776** (0.1096)
Control	control	control	control	control	control	control	control	control
Constant	-2.4376*** (0.4978)	-1.3943*** (0.2528)	-2.0912*** (0.5008)	-1.2338*** (0.2554)	-2.4128*** (0.4971)	-1.3874*** (0.2528)	-2.3808*** (0.4976)	-1.3658*** (0.2526)
Chi <sup>2</sup>	28.5823	28.3510	63.1620	62.9774	29.3156	29.1810	28.0793	27.9765
Pseudo R <sup>2</sup>	0.0103	0.0102	0.0227	0.0227	0.0105	0.0105	0.0101	0.0101
N	4185	4185	4185	4185	4185	4185	4185	4185

Note: \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

migrating for work significantly increases the probability of RMWs engaging in innovative activities [42]. However, our study demonstrates that different career mobility experiences have varying effects on the enterprises innovation level of RMWs. Specifically, working as elementary workers negatively influences enterprises innovation level, while experiences in technical and marketing roles positively impact enterprises innovation level. This phenomenon can be attributed to the nature of the work undertaken by elementary

**Table 11**  
Sub-sample regression results of career mobility frequency.

Variable	Model 1	Model 2
	Career mobility frequency is less than three	Career mobility frequency is equal to or greater than three
Low level of innovation	0.1162** (0.0566)	0.0068 (0.0296)
High level of innovation	0.0764 (0.0813)	0.0814** (0.0349)
N	3692	493

Note: \*\*\*P < 0.01; \*\*P < 0.05; \*P < 0.1, the numbers in brackets represent the robust standard errors after adjusting for clustering effects at the county level.

workers, which involves auxiliary tasks with relatively lower technical complexity. For them, imitation becomes a strategy to mitigate the inherent risks associated with entrepreneurship. In contrast, technical and marketing roles provide advantages in terms of technical skills and access to sales channels, increasing the likelihood of individuals in these roles participating in entrepreneurial innovation activities. While prior studies have highlighted that backgrounds in elite families, government departments, state-owned enterprises, or foreign companies contribute to heightened enterprises innovation [44], such backgrounds are rare among RMWs. In contrast, our study illuminates that work experiences in technical and marketing occupations can also stimulate enterprises innovation, aligning more closely with the current livelihood situation of RMWs.

Prior studies have previously indicated that career mobility plays a role in augmenting urban social capital [50]. This study corroborates this perspective by affirming that the higher career mobility frequency among RMWs, the more likely they are to cultivate social relationships at various levels, thus enriching their urban social capital. Nonetheless, conflicting research posits that changing jobs may have adverse effects on the accrual of urban social capital [51]. Nevertheless, our empirical research validates a correlation between the accumulation of urban social capital and the career mobility of RMWs. While the work experiences of elementary and technical positions exhibit an insignificant impact on the accumulation of urban social capital, marketing experience demonstrates a significantly positive influence. This phenomenon is attributable to the fact that elementary and technical positions exist on the social periphery and remain confined within particular social strata [52]. Conversely, the career experience in marketing equips RMWs with the means to leverage sales networks, expand their social circles, establish social trust [53], and consequently gain cross-class urban social capital.

Previous studies have predominantly assessed the social capital of RMWs from the perspectives of family and village relationships [54], without distinguishing between the types of social capital accumulated by RMWs before and after their migration to urban areas. Nevertheless, the acquisition of urban social capital is likely to play a pivotal role for enhancing the innovation level of enterprises led by RMWs. This study presents a quantitative analysis that confirms the mediating role of urban social capital in the connection between career mobility and the enterprise innovation level of RMWs, thus addressing a gap in the current literature.

## 6. Conclusion

This study aims to examine the impact of career mobility and urban social capital on the level of enterprise innovation among RMWs. Employing data on the entrepreneurial activities of RMWs, we employ an ordered probit model to empirically analyze the factors influencing the enterprise innovation level of RMWs. The research findings indicate that RMWs with a higher number of career mobility experiences prior to entrepreneurship exhibit an elevated level of innovation. Additionally, those with diverse experiences in job position changes before entrepreneurship demonstrate a higher level of innovation. The analysis reveals a significant positive correlation between the frequency of career mobility and industry associations ( $\beta = 0.0686$ ,  $P < 0.01$ ), as well as chambers of commerce ( $\beta = 0.0959$ ,  $P < 0.01$ ). However, the impact of experiences in elementary and technical worker positions on industry associations and chambers of commerce is not statistically significant. Conversely, experiences in marketing sales roles exhibit a noteworthy positive correlation with industry associations ( $\beta = 0.8452$ ,  $P < 0.01$ ) and chambers of commerce ( $\beta = 0.7257$ ,  $P < 0.01$ ). This suggests that urban social capital acts as a mediator not only between career mobility frequency and enterprise innovation level but also between marketing work and enterprise innovation level. The study also discovers that when the number of career mobility is less than three, the enterprise innovation level of RMWs is lower, whereas when the number is greater than or equal to three, the enterprise innovation level of RMWs is higher.

### 6.1. Policy implications

The conclusions derived from this study serve not only to assist RMWs in evaluating their own resource endowments but also offer experiential support for governmental bodies in formulating policies and guiding RMWs in entrepreneurship. It is crucial for RMWs to recognize the variations in enterprise innovation levels resulting from differences in the extent of career mobility. To achieve high-level enterprise innovation, migrant farmers should increase their career mobility experiences. Additionally, they should prioritize career advancement and cross-industry job mobility to consistently accumulate urban social capital, thereby enhancing their prospects for engaging in innovative entrepreneurship. Given that career mobility lies at the root of explaining the differences in enterprise innovation levels among RMWs, an effective approach to address entrepreneurial challenges faced by RMWs is to encourage more young individuals to work outside their hometowns. This is crucial because migrating to urban areas for employment serves as a socialization mechanism for farmers. Neglecting the importance of accumulating urban social capital through employment and hastily

pursuing social status elevation through entrepreneurship can result in a situation of “low-end lock-in” at the outset of entrepreneurial efforts. This situation can exacerbate market saturation, increase entrepreneurial risks and difficulty in transitioning business types, and even pose the risk of “urban-rural circulation”. In such a scenario, individuals may find it challenging to integrate into urban life while struggling to establish roots in rural areas, resulting in an unstable state of rootlessness between urban and rural environments. Fig. 2 illustrates the interplay of different forms of social capital in the RMWs entrepreneurship. Therefore, it is imperative for the government to expand urban employment opportunities for migrant farmers, bolster their social integration in urban settings, facilitate the urbanization of individuals and families, and encourage the accumulation of urban social capital among migrant farmers. In addition, the government should actively support the establishment or participation of migrant farmers in industry associations and chambers of commerce, providing them with avenues to enhance their urban social capital through organized initiatives.

6.2. Limitations and future research directions

This research has certain limitations that can be addressed in future studies. Firstly, the sample data used in this study was collected at an early stage and relied on cross-sectional data rather than panel data. This limitation makes it challenging to establish strict causal relationships between variables. To mitigate this limitation, future research should broaden the scope of investigation in the post-COVID-19 era. This can be achieved by enriching the questionnaire content and conducting longitudinal empirical studies based on multi-period data. Secondly, this study primarily focuses on the impact of career mobility frequency and job changes on the innovation level of RMWs’ enterprises. However, it overlooks other significant aspects of career mobility, such as mobility between different cities or regions. To provide a more comprehensive understanding, future research should integrate the various features of career mobility and explore their influence on the innovation level of RMWs’ enterprises. This approach will lead to a deeper comprehension of the

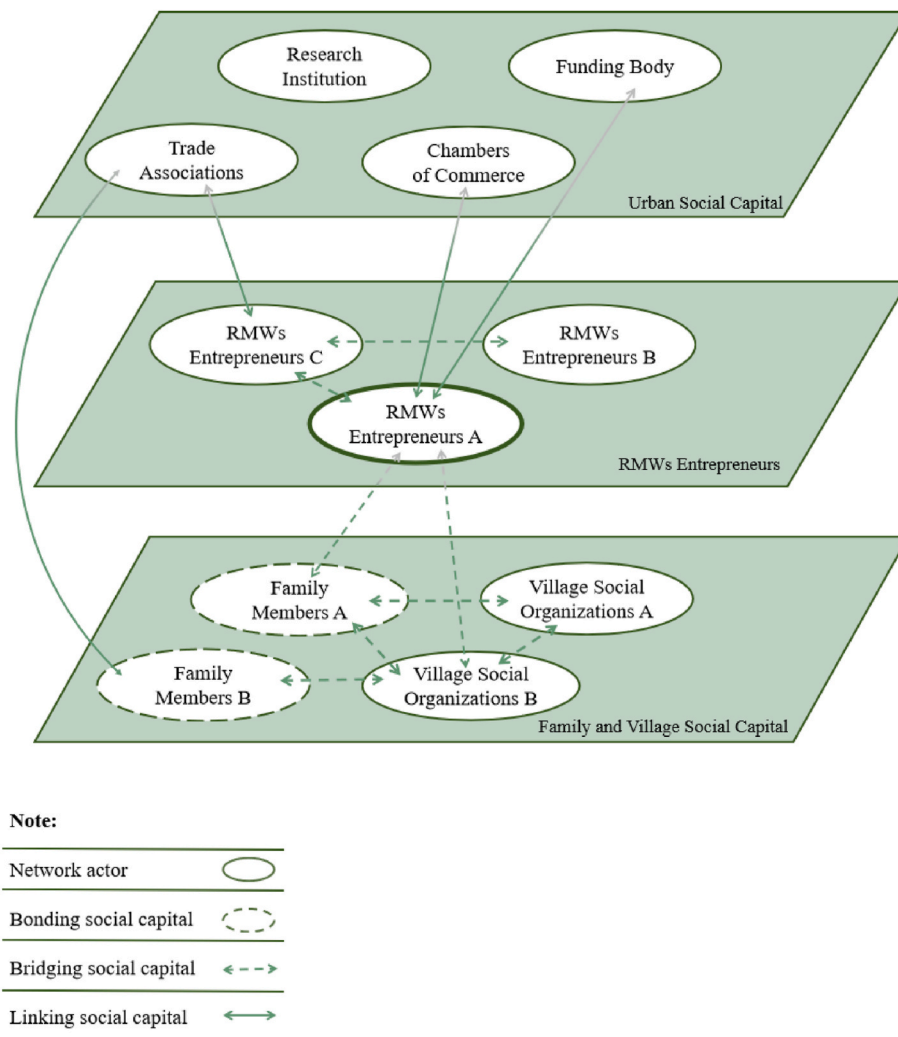


Fig. 2. The interplay of different forms of social capital in RMWs entrepreneurship.

innovation and entrepreneurial behavior of RMWs. Thirdly, while the study takes into account the number of cities involved in career mobility, it fails to consider the size of these cities. Subsequent research can further investigate whether variations in city size have an impact on the innovation level of RMWs' enterprises. Classifying cities based on their sizes will provide valuable insights into this aspect. Fourthly, although this study distinguishes between family social capital, village social capital, and urban social capital, it does not examine their respective roles and differences in influencing the innovation level of RMWs' enterprises. To address this gap, future research should delve into the mechanisms through which different forms of social capital influence the innovation level of RMWs' enterprises.

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### Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### CRedit authorship contribution statement

**Jinfa Liu:** Writing – review & editing, Writing – original draft. **Yawen Yu:** Writing – review & editing, Writing – original draft. **Weixin Qi:** Writing – review & editing, Data curation. **Xin Ma:** Data curation, Conceptualization. **Yan Han:** Methodology.

### 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.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e30296>.

### References

- [1] M. Khoshmaram, N. Shiri, R.S. Shinnar, M. Savari, Environmental support and entrepreneurial behavior among Iranian farmers: the mediating roles of social and human capital, *J. Small Bus. Manag.* 58 (5) (2020) 1064–1088, <https://doi.org/10.1111/jsbm.12501>.
- [2] Y. Mai, S. Zhou, The driven motivation for innovative entrepreneurship, *Sci. Res. Manag.* 31 (5) (2010) 11–21, <https://doi.org/10.19571/j.cnki.1000-2995.2010.05.002> (in Chinese).
- [3] L. Frederiksen, K. Wennberg, C. Balachandran, Mobility and entrepreneurship: evaluating the scope of knowledge-based theories of entrepreneurship, *Enterpren. Theor. Pract.* 40 (2) (2016) 359–380, <https://doi.org/10.1111/etap.12223>.
- [4] F.F. Tian, N. Lin, Weak ties, strong ties, and job mobility in urban China: 1978–2008, *Soc. Network.* 44 (1) (2016) 117–129, <https://doi.org/10.1016/j.socnet.2015.08.002>.
- [5] X. Wang, Z. Niu, X. Zhou, R. Jiang, Pre-entrepreneurial career mobility and entrepreneurial performance—an empirical study based on survey data of Chinese private enterprises, *Business and Management Journal* 41 (9) (2019) 125–140, <https://doi.org/10.19616/j.cnki.bmj.2019.09.008> (in Chinese).
- [6] A. Forrier, L. Sels, D. Stynen, Career mobility at the intersection between agent and structure: a conceptual model, *J. Occup. Organ. Psychol.* 82 (4) (2009) 739–759, <https://doi.org/10.1348/096317909X470933>.
- [7] D.C. Feldman, T. Ng, Careers: mobility, embeddedness, and success, *J. Manag.* 33 (3) (2007) 350–377, <https://doi.org/10.1177/0149206307300815>.
- [8] S.L. Brue, C.R. McConnell, McGrawHill, *Contemporary Labor Economics*, Osborne McGraw-Hill, 2003.
- [9] C. Li, An empirical analysis on the discrimination of occupational mobility against the migrant workers and its impact on their income, *Population & Economics* (6) (2010) 27–32 (in Chinese).
- [10] Y. Yao, G. Zhang, Information access and the career mobility of the new generation of migrant workers — based on the research on the new generation of migrant workers in large, medium and small cities, *Journal of Agrotechnical Economics* (9) (2013) 52–60, <https://doi.org/10.13246/j.cnki.jae.2013.09.009> (in Chinese).
- [11] J. Liu, L. Wei, The influencing factors and the difference analysis of two generation of migrant workers' occupational mobility, *Soft Sci.* 31 (2) (2017) 38–43, <https://doi.org/10.13956/j.ss.1001-8409.2017.02.09> (in Chinese).
- [12] D. Wang, F. Chen, Will occupational mobility affect residents' fertility intentions?—an analysis of dual perspectives of inter-generational and intra-generational mobility, *South China Popul.* 34 (5) (2019) 56–68 (in Chinese).
- [13] W. Hu, J. Zhang, The power of cities: hierarchical migration and wage premium of migrant workers, *J. Finance Econ.* 47 (2) (2021) 4–18, <https://doi.org/10.16538/j.cnki.jfe.20201015.401> (in Chinese).
- [14] L. Peng, Y. Zhu, L.Y. Lin, The temporary return in the floating population's migration and their determinants: A life-course perspective, *South China Popul.* 32 (6) (2017) 1–13 (in Chinese).
- [15] X.E. Zhang, A.J. Jiang, L.Y. Wang, A study on the factors influencing the growth of entrepreneurship enterprises for returning migrant workers in China and countermeasures, *Enterprise Research* 13 (2012) 55–58 (in Chinese).
- [16] X.Y. Huang, W. Liu, Z.Y. Li, Rural migrant workers returning to their hometowns for entrepreneurship: definition and boundaries, mechanisms of occurrence, and conceptual models, *Reform of Economic System* (4) (2012) 71–75 (in Chinese).
- [17] P. Koellinger, Why are some entrepreneurs more innovative than others? *Small Bus. Econ.* 31 (2008) 21–37, <https://doi.org/10.1007/s11187-008-9107-0>.
- [18] M.L. Possas, S. Salles-Filho, J. da Silveira, An evolutionary approach to technological innovation in agriculture: some preliminary remarks, *Res. Pol.* 25 (6) (1996) 933–945, [https://doi.org/10.1016/0048-7333\(96\)00884-0](https://doi.org/10.1016/0048-7333(96)00884-0).
- [19] B. Pierre, Forms of capital, *Journal of Economic Sociology* 3 (5) (2002), <https://doi.org/10.17323/1726-3247-2002-5-60-74>.

- [20] J.S. Coleman, Social capital in the creation of human capital, *Am. J. Sociol.* 94 (1988) 95–120, <https://doi.org/10.1016/B978-0-7506-7222-1.50005-2>.
- [21] D. Robert Putnam, The prosperous community: social capital and public life, *Am. Prospect* 13 (4) (1993) 35–42.
- [22] M.S. Granovetter, The strength of weak ties, *Am. J. Sociol.* 78 (6) (1973) 1360–1380.
- [23] D. Robert, Putnam, *Bowling Alone: the Collapse and Revival of American Community*, Simon and Schuster, 2000, pp. 22–23, <https://doi.org/10.1145/358916.361990>.
- [24] N.B. Ellison, C. Steinfield, C. Lampe, The benefits of facebook “friends” social capital and college students’ use of online social network sites, *J. Computer-Mediated Commun.* 12 (4) (2007) 1143–1168, <https://doi.org/10.1111/j.1083-6101.2007.00367.x>.
- [25] D. Halpern, *Social Capital*, Policy Press, Cambridge, UK, 2005.
- [26] Q. Evansluong, M. Ramírez-Pasillas, The role of family social capital in immigrants’ entrepreneurial opportunity creation processes, *Int. J. Enterpren. Small Bus.* 36 (1–2) (2019) 164–188, <https://doi.org/10.1504/IJESB.2019.096973>.
- [27] Z. Cao, The Re-established social network by the peasant workers and the orientation of the resource flow in the social network, *Sociol. Stud.* 18 (3) (2003) 99–110, <https://doi.org/10.19934/j.cnki.shxy.2003.03.009> (in Chinese).
- [28] R. Agarwal, D. Audretsch, M.B. Sarkar, The process of creative construction: knowledge spillovers, entrepreneurship, and economic growth, *Strateg. Entrep. J.* 1 (3–4) (2007) 263–286, <https://doi.org/10.1002/sej.36>.
- [29] Y. Xie, Q. Yang, Experience of migrant work, entrepreneurial behavior, and entrepreneurial performance, *Econ. Rev.* (1) (2020) 146–160, <https://doi.org/10.19361/j.er.2020.01.10> (in Chinese).
- [30] Z.E. Wale, C. Unity, H. Nolzazi, Towards identifying enablers and inhibitors to on—farm entrepreneurship: evidence from smallholders in KwaZulu—Natal, South Africa, *Heliyon* 7 (1) (2021) e05660, <https://doi.org/10.1016/j.heliyon.2020.e05660>.
- [31] K.M. Hmieleski, R.A. Baron, Entrepreneurs’ optimism and new venture performance: a social cognitive perspective, *Acad. Manag. J.* (3) (2009) 473–488.
- [32] B.S. Narmaditya Suratno, A. Wibowo, Family economic education, peer groups and students’ entrepreneurial intention: the mediating role of economic literacy, *Heliyon* 7 (4) (2021) e06692, <https://doi.org/10.1016/j.heliyon.2021.e06692>.
- [33] S. Li, Non-farm work experience, social capital and farmers’ enjoyable durable goods consumption, *Journal of Guizhou University of Finance and Economics* (5) (2017) 100–110 (in Chinese).
- [34] X. Zhang, J. Xie, M. Zhang, Social capital, loan characteristics and farmers’ entrepreneurial model choice, *Research on Financial and Economic Issues* (3) (2015) 104–112, <https://doi.org/10.3969/j.issn.1000-176X.2015.03.015> (in Chinese).
- [35] B. Ortiz, M.J. Donate, F. Guadamillas, Inter-organizational social capital as an antecedent of a firm’s knowledge identification capability and external knowledge acquisition, *J. Knowl. Manag.* 22 (6) (2018) 1332–1357, <https://doi.org/10.1108/JKM-04-2017-0131>.
- [36] S.L. Young, W. Christopher, C. Michael, Stability vs. flexibility: the effect of regulatory institutions on opportunity type, *J. Int. Bus. Stud.* 49 (4) (2018) 407–441.
- [37] M. Samuelsson, P. Davidsson, Does venture opportunity variation matter? Investigating systematic process differences between innovative and imitative new ventures, *Small Bus. Econ.* 33 (2) (2009) 229–255, <https://doi.org/10.1007/s11187-007-9093-7>.
- [38] S.K. Liang, Y. Tian, C.B. Chen, The impact of interurban mobility on migrant workers’ entrepreneurship: from a dual perspective of social capital and social integration, *Reform* (3) (2021) 144–155 (in Chinese).
- [39] James Coleman, *Foundations of Social Theory*, Belknap Press of Harvard University Press, 1990, <https://doi.org/10.1002/9781444304992.ch1>.
- [40] R.L. Brown, J. Durbin, J.M. Evans, Techniques for testing the constancy of regression relationships over time, *J. Roy. Stat. Soc. B: Methodological* 37 (2) (1975) 149–163, <https://doi.org/10.1111/j.2517-6161.1975.tb01532.x>.
- [41] E. Ehsan, K. Zainab, Z. Zhixin, Understanding farmers’ intention and willingness to install renewable energy technology: a solution to reduce the environmental emissions of agriculture, *Appl. Energy* 309 (1) (2022), <https://doi.org/10.1016/j.apenergy.2021.118459>.
- [42] B. Fan, W. Ying, Research on the impact of family background on farmers’ entrepreneurial model, *Journal of Jiangxi University of Finance and Economics* (3) (2020) 73–86, <https://doi.org/10.13676/j.cnki.cn36-1224/f.2020.03.007> (in Chinese).
- [43] Y. Chen, K.L. Peng, C.G. Li, The influence of job mobility on employed migrant workers’ employment quality: Evidence from the CLDS data, *Research of Agricultural Modernization* 43 (2) (2022) 273–284, <https://doi.org/10.13872/j.1000-0275.2022.0020> (in Chinese).
- [44] Y. Tian, J. Yin, Poverty reduction effect assessment and its mechanism analysis of internet entry into village: Based on the background of the rural E-commerce entrepreneurship boom, *Modern Economic Research* (2) (2019) 98–106, <https://doi.org/10.13891/j.cnki.mer.2019.02.013> (in Chinese).
- [45] J. Wooldridge, *Econometric Analysis of Cross-Section and Panel Data*, The MIT Press., Cambridge, Massachusetts, 2002.
- [46] Moulton, An illustration of a pitfall in estimating the effects of aggregate variables on micro units, *Rev. Econ. Stat.* 72 (1990) 334–338.
- [47] F. Zhang, J. Huang, H. Yu, Intra institutional relations and entrepreneurship, *Journal of Management World* (4) (2017) 92–105, <https://doi.org/10.19744/j.cnki.11-1235/f.2017.04.009> (in Chinese).
- [48] M.T. Falk, E. Hagsten, Threat perception and adaptive capacity of natural world heritage site management, *Environ. Manag.* 71 (2) (2023) 285–303, <https://doi.org/10.1007/s00267-022-01780-y>.
- [49] J. Bagger, J.A. Birchenall, H. Mansour, S. Urzúa, Education, birth order and family size, *Econ. J.* 131 (633) (2021) 33–69, <https://doi.org/10.1093/ej/ueaa089>.
- [50] P. Liu, L. Li, X. Wang, Gender differences in entrepreneurship—a study from the perspective of entrepreneurship motivation, *Manag. World* (8) (2013) 126–135, <https://doi.org/10.19744/j.cnki.11-1235/f.2013.08.013> (in Chinese).
- [51] X. Sun, L. Zhang, G. Zhang, Employment stability and social integration of migrant workers: a comparison of the hypotheses of complete rationality and bounded rationality, *Journal of Agrotechnical Economics* (11) (2018) 44–55, <https://doi.org/10.13246/j.cnki.jae.2018.11.003> (in Chinese).
- [52] W. Zhang, Research on social capital in China: concepts, operational measurement, and empirical studie, *Jiangsu Soc. Sci.* (3) (2007) 142–149, <https://doi.org/10.3969/j.issn.1003-8671.2007.03.023> (in Chinese).
- [53] R. Ying, Z. Zhu, Z. Xu, Why do Chinese farmers’ professional cooperatives choose “Non-standard”, *Issues in Agricultural Economy* 38 (11) (2017) 4–13, <https://doi.org/10.13246/j.cnki.iae.2017.11.001> (in Chinese).
- [54] Z. Le, N. Xiang, Acquaintance Society: the level and differences of village social capital, *Issues in Agricultural Economy* (5) (2020) 66–78, <https://doi.org/10.13246/j.cnki.iae.2020.05.006> (in Chinese).