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Promoting or inhibiting: The role of socio-economic integration on migrant entrepreneurship

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Published version

ZOU, Jing, YAO, Liming, LAN, Xiaoxuan and DENG, Xiaojun (2023). Promoting or inhibiting: The role of socio-economic integration on migrant entrepreneurship. Transactions in Planning and Urban Research, 2 (4), 432-458.

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Transactions in Planning and Urban Resea

Promoting or inhibiting: The role of socio-economic integration on migrant entrepreneurship

Journal:	*Transactions in Planning and Urban Research*
Manuscript ID	TUP-23-0024.R1
Manuscript Type:	Special Collection: Migration and Migrants in Urban China
Keywords:	socio-economic integration, necessity-based entrepreneurship, opportunity-based entrepreneurship, migrant, endogeneity
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Key words: socio-economic integration; necessity-based entrepreneurship; opportunity-based entrepreneurship; migrant; endogeneity

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1 Introduction

Entrepreneurship plays a key role in promoting global economic growth (Liu and Zhang, 2021). New businesses often is accompanied by new products, innovations, and employment opportunities (De et al., 2008). Topics related to migrants' social integration have been widely discussed in the last few decades (Gordon, 1964; Kearns and Whitley, 2015; Hainmueller et al., 2017; Chen and Wang, 2015; Lin et al., 2020; Wang et al., 2016; Wang et al., 2017; Zou et al., 2022). Recently, more attentions are paid on the relationship between urban inclusiveness and migrant entrepreneurship, as well as the interconnection between settlement intention and migrant entrepreneurship. Talking specifically, in urban areas with a high level of inclusivity, providing public services and social security to migrants is deemed as a sign of 'citizenisation'. This can enhance migrants' capacity to endure entrepreneurial risk, lowering the threshold to enter the urban area, and promoting the entrepreneurial behaviour of migrants (Zhou et al., 2020). Settlement intention affects migrant entrepreneurship through human capital and risk preference (Zou and Deng, 2023). To the best of our knowledge, currently there are very limited studies examining the impact of social integration on migrant entrepreneurship, especially when taking China as the focus of the research.

After 40 years of reform and opening up, China has undergone a tremendous social reform, transforming from 'rural China' with low spatial mobility to a 'migrant China' with high-frequency migration. Migrant in China is defined as people who has been residing in a city or region for more than one month but have no local *hukou* (CMDS, 2014). Unlike American and European countries, most migrants in China are of the same ethnicity but are differentiated through the dual household registration system, a system which is directly linked to their welfare entitlements and access to public facilities (Wang et al., 2016). According to the latest population census, at the end of 2021, the number of Chinese migrants exceeded 385 million, reaching a historic high, accounting for over 27% of the total population. The continuous expansion of migrants in cities has become a noticeable social phenomenon.

With the development of urbanisation and the substantial increase in migrants, the persistence of migrants being actively engaged in entrepreneurship has become increasingly common, and the entrepreneurial activity of migrants are significantly higher than that of locals (Ye et al., 2018). As

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the data shows in China Migrants Dynamic Survey (CMDS), from 2014 to 2018, the proportion of entrepreneurship among rural migrants increased to 45%. However, many existing Chinese policies pay attention to encouraging migrants to return to their hometowns for entrepreneurship, thus less attentions are paid to supporting the migrants' entrepreneurial activities in their destination cities. When making the decisions in terms of entrepreneurship, migrants and local residents held very different perceptions. Migrants are a self-selected group that is prepared to take risks in order to maximise lifetime income. They are strongly motivated to invest in human capital, and are internally motivated to attain success in the local labour market (Wei et al., 2019). Considering the importance of migrant groups to the development of local economic and the social stability, Chinese migrants' entrepreneurial decision-making cannot be ignored any longer. As we mentioned, there is limited study that delves into the impact of socio-economic integration on migrants' entrepreneurial decision-making, and few research explore the internal mechanism and regulatory effect associated with it.

To fill this research gap, this paper explores the relationship between socio-economic integration and migrants' entrepreneurship by using micro-level survey data from the 2017 China Migrants Dynamic Survey. Our study contributes to the research of migrants' socio-economic integration and entrepreneurship in three aspects. First, this paper establishes a theoretical framework, highlighting the relationship between socio-economic integration and migrants' entrepreneurship. This theoretical framework includes undergo theory, social capital theory and risk preference theory, which is a useful supplement to entrepreneurship related theories. Second, with the employment of the two-stage Heckman model and Instrumental Variable (IV) method, we resolve the endogeneity issues check by testing the relationship between migrants' socio-economic integration and entrepreneurship. This is a novelty in the application of econometrical modeling. Third, we explore the underlying mechanism of how socio-economic integration impacts migrant necessity-based entrepreneurship, it is found that the mechanims can be established through changing the situation of migrants perception of difficulty, settlement intention, localised social capital and their risk preference. Further analysis finds out that the degree of marketisation and the level of information have a significant regulatory effect on the relationship between socio-economic integration and migrants' entrepreneurship. Heterogeneity analysis shows that the relationship

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between socio-economic integration and migrant entrepreneurship varies across different levels of human capital, physical capital and experiential capital. This is a novelty finding in the existing studies, for the first time that China is taking as a focus of the research to examine the relationship between socio-economic integration and migrants' entrepreneurship. From the perspective of social integration, we unravel the mystery of how to promote large-scale migrants in cities to achieve employment through entrepreneurship. It is of great significance to stimulate the entrepreneurial vitality of entire population, promoting the development of more comprehensive and high-quality employment. The implication of our research is that our findings can be used as a point of reference by relevant government departments and also help other countries in their decision-making processes.

The remaining part of the paper is structured as follows. Section 2 reviews the existing literature. Section 3 gives the theoretical framework and hypothesis development. Section 4 describes the data, variables and econometrical modelling. Section 5 shows the results of empirical investigations and robustness check. Section 6 further expands the analysis, and the last section finalises the paper by giving discussions and conclusions.

2 Literature review

2.1 The definition and measurement of migrant socio-economic integration

Given the extensive flows and migrations of international and internal migrants, the local integration of these people has become a major policy challenge around the world (Robinson, 2010; Goldstein and White, 1985; Goldlust and Richmond, 1974; Hainmueller et al., 2017). Although scholars held varying opinions about migrants' integration, there is a common consensus that integration is a process in which migrants integrate into destination cities in many aspects, such as employment, income, lifestyle, cultural customs and ideas (Gordon, 1964; Yue et al., 2013; Yang, 2015; Forrest and Kearns, 2001; Kearns and Whitley, 2015).

Scholars also have different opinions on the measurement of migrants' integration. In the initial stages, scholars pointed out that migrants' integration mainly encompassed intermarriage, structural assimilation, racial identity, cultural identity, value matching, discrimination and power contradiction (Gordon, 1964), or social order and supervision, social capital, complex attachment

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and identity (Forrest and Kearns, 2001). Later, some scholars proposed three factors that measuring migrants' integration, which were social relation and community sense, trust reliance and safety constitute integration (Kearns and Whitley, 2015). In recent years, discussions on migrants' integration predominantly covers topics such as cultural fit, psychological matching and social adaptation (Hainmueller et al., 2017; Robinson, 2010; Toruńczyk-Ruiz and Brunarska, 2020). In China, as point out by scholars, integration mainly encompasses social insurance, socio-economic achievement, social adaptation, social relationships, cultural integration, self-identity or psychological integration (Yang, 2015; Zhou, 2012; Lin et al., 2017; Wang et al. 2015; Wang et al., 2017; Zou et al., 2020; Liu et al., 2021; Lin et al., 2020; Zou and Deng, 2022).

2.2 Previous study on determinants of individual entrepreneurship

The entrepreneurial activities of individuals are an effective way to promote employment and opportunities and improve the quality of employment. It has been evidenced that individuals' entrepreneurship is influenced by numerous factors, including individual characteristics, social connections, housing wealth and regional characteristics (Bergmann and Sternberg, 2007). Educational background, work experience and social capital are found to have a significant impact on entrepreneurship, however, the influence of these factors has undergone significant shifts with the change in the system (Dai et al., 2019). Several research examines the impact of housing wealth on entrepreneurial behaviour in developed countries, pointing out that the appreciation in housing wealth would positively influence entrepreneurs' risk appetite (Hurst and Pugsley, 2011, 2017; Kerr et al., 2015). Capital gains generated from housing appreciation provide families with increases family wealth and financial stability, houses can be used as a collateral item which subsequently enhances families' borrowing capacity thus promoting families to engage in entrepreneurship (Corradin and Popov, 2015; Adelino et al., 2015; Harding and Rosenthal, 2017; Jensen et al., 2015). Social capital refers to the nature of social relationships and how these relationships can be used for self-interest. The paternalistic relationship between employers and workers, as well as the social networks within races have been a subject of research for an extended period (Ma, 2002). As part of resource endowment, entrepreneurs with great potentials can effectively utilise human capital, such as their own and others' skills, abilities, characteristics, and qualifications (Williams and Krasniqi, 2018). People with higher level of human capital has the higher probability of becoming

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an entrepreneur (Rath and Swagerman, 2016). Delving into the perspectives of social and human capital, Sanders (1996) explores the entrepreneurial issues of Asian and Hispanic migrants in the United States, finding that both social and human capital would significantly increase the probability of migrant entrepreneurship. Allen (2000) proposes a theoretical model that social networks can reduce entrepreneurial costs, pointing out that the size and structure of social networks can affect individual's entrepreneurial choices. Andersson and Hammarstedt (2010) examine the correlation between entrepreneurial activities among grandparents, fathers, and grandchildren, evidencing that parents with entrepreneurial experience have substantial positive influences on their children's entrepreneurial activities. Furthermore, the accumulation of material capital, such as production factors like factories and equipment, along with personal experiences including information obtained from others, lessons learned from past experiences, and connections gained through social networks, all contribute to the increase in the likelihood of migrants to become entrepreneurs (Wahba and Zenou, 2012).

Looking at entrepreneurship from the viewpoint of enterprise growth, development, and entrepreneurial motivation, some research divides migrant entrepreneurship into two types: necessity-based entrepreneurship and opportunity-based entrepreneurship (Zhang, 2018; Wei et al., 2018). The necessity-based entrepreneurship which only provides employment opportunities for entrepreneurs or their family members; the opportunity-based entrepreneurship means that once a business is established, it can develop into a relatively large enterprise and create more jobs and income for others (Schoar, 2010; Zhang, 2018). Necessity-based entrepreneurs are driven by a range of factors. Unemployment is a fundamental factor that preventing migrants from being self-employed. Individuals are more inclined to start their own businesses to earn for a living when they cannot find a job or confront the low prospects of getting a paid work (Oxenfeldt, 1943). Consequently, some individuals choose to engage in the survival entrepreneurship to escape from the unemployment (Rocha et al., 2015; Thurik et al., 2008). Family pressure and job dissatisfaction can also affect individual's entrepreneurship (Hisrich and Brush, 1986). Shane et al. (1991) discuss the driving factors for becoming opportunity-based entrepreneurs, including recognition, independence, learning, and roles. Birley and Westhead (1994) identify seven factors motivating individuals to become opportunity-based entrepreneurs, pertaining to the need for approval, need

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for independence, need for personal development, need for welfare improvement, perceived instrumentality of wealth, tax reduction and indirect benefits, and following role models.

2.3 Research on migrant entrepreneurship in China

In China, most migrants are employed in the formal sector, however, they are excluded from entering the system of social welfare, job security, or the legal protection of national labour law. From this point of view, entrepreneurship activities play an important role of promoting employment and improving the quality of employment for this group, paving an effective way for migrants to settle in cities (Wang and Feng, 2017). However, because migrants are often labelled as 'outsiders', they often encounter many obstacles in their entrepreneurial activities, such as urban *hukou* registration restrictions, credit constraints, social integration and challenging business environment (Wei et al., 2018).

According to current research, factors influencing entrepreneurship in China can be categorised into two sides: the positive factors and the negative factors. The positive factors encompass higher education, housing wealth, social network, language skills, high-speed railway, subsided childcare programs, financial knowledge or risk preference, digital finance, and party membership (Yang et al., 2020). To be specific, Huang et al. (2021) suggest that education attainment is generally negatively related to the probability of entrepreneurship. However, other research indicate that education does not influence the possibility of employees becoming entrepreneurs (Cheng et al., 2021b). Concerning the impact of housing wealth on entrepreneurship, some research points out that housing wealth has a positive impact on the probability of entrepreneurship (Liu and Zhang, 2021), similar research finds that housing capital gains do not decrease the probability of entrepreneurship (Fu et al., 2016). Further studies analyse the effects of different types of home purchases on entrepreneurship (Li and Li, 2016; Chen and Hu, 2019). Social network can influence migrants' entrepreneurial choice through the two mechanisms: providing entrepreneurial capital and enhancing entrepreneurial ability (Wang and Feng, 2018). Hu et al. (2021) highlight that families not only provide emotional support, but also enhance social capital, and facilitate labour pooling. In addition, the ability to understand and speak the local language fluently is found to have a substantial positive impact on the probability of migrants' entrepreneurship (Wei et al., 2019). Hometown language with weak future-time reference can significantly and positively influence immigrant

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entrepreneurship (Hu et al., 2022). Ma et al. (2021) find that having good access to high-speed railway can increase the probability of entrepreneurship by approximately 3.5 percent. Wang and Lin (2018) suggest that having access to childcare services is more conducive for women to get involved in the entrepreneurship. In the context of studies about the impact of financial knowledge or risk attitude on entrepreneurship, Ying et al. (2015) employ 2013 CHFS data to capture that in individuals had financial knowledge can increase the probability of entrepreneurship. In terms of risk attitudes, risk-neutral individuals prefer to become entrepreneurs, while risk-averse and risk-taking individuals prefer paid work (Hu, 2014). Party members who became entrepreneurs after the policy change in 2002 tend to have higher qualifications than those who started businesses before the constitutional reform (Yang et al., 2020). Li et al. (2021) suggest that digital finance may reduce the probability of migrant engaging in survival entrepreneurship, but the impact on theses activities is rather insubstantial.

Recent research seeks to examine the impact of negative factors on entrepreneurship, such as unhealthy childhood experiences, *hukou*-based labour market discrimination, energy poverty and other factors. Notably, those who experienced famine in their youth are more likely to become entrepreneurs (Cheng et al., 2021a). Hukou-based labour market discrimination makes migrants more inclined to participate in survival entrepreneurship (Chen and Hu, 2021). When a large portion of household income is used for energy consumption or energy scarcity, the probability of entrepreneurship increases (Cheng et al., 2021c).

2.4 Summary

In summary, much valuable research has been conducted on the determinants of migrant entrepreneurship, including both positive and negative factors. However, there are relatively few studies focusing on the relationship between socio-economic integration and migrant entrepreneurship, and the internal mechanism in between has not yet been elucidated. In this paper, we aim to explore and demonstrate the relationship between the two core variables to provide decision-making reference to relevant government departments and migrants themselves.

3 Theoretical hypothesis and analysis

Promoting mass entrepreneurship and innovation has become a compelling driving force in

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boosting economic and social development. The two types of entrepreneurship, necessity-based entrepreneurship and opportunity-based entrepreneurship (Schoar, 2010; Zhang, 2018), have been discussed in our previous sections. Delving into more detail, the basic social security and public services provided by the urban government exert a 'risk smoothing' influence, making it more likely that migrants who eligible for these social benefits will be motivated to start a businesses. Receiving benefits from the social security can enhance people's sense of security, consequently prompting them to purse higher business satisfaction, this is referred to as opportunity-based entrepreneurship. On the other hand, when the utility of being self-employed is higher than that of being employed or unemployed, people are more inclined to choose survival entrepreneurship.

Compared to local residents, migrants are relatively disadvantaged in the labour market and are vulnerable to local discrimination, this is considered as a typical example of 'vulnerable entrepreneurs' (Miller and Le Breton-Miller, 2017). Entrepreneurial undergo theory states that the difficulties experienced by individuals cultivate them the relevant qualities to become entrepreneurs and help them build resilience (Fregetto, 2004). In an environment with a higher degree of socio-economic integration, it reduces the probability that migrants will encounter difficulties, which therefore is unsupportive for migrants engaging in necessity-based entrepreneurship. In addition, social integration is an important factor influencing migrants' settlement intention (e.g., Chen and Liu, 2016; Lin and Zhu, 2016; Lin and Zhu, 2022). Migrant workers is willing to settle in an urban city has significant impact on their self-employment in China (Cao et al., 2015). Specifically, a strong settlement intention may potentially minish migrants' willingness to take risk, promoting them to seek employment rather than entrepreneurship.

The concept of social capital in social science is perceived as 'network capital', which refers to the social relationships that entrepreneurs can use to obtain resources,values and advantages (Anderson and Miller, 2003; Aldrich and Martinez, 2007; Cope et al., 2007). The stronger the social capital, the closer the social relationships among individuals, and the higher probability of their participation in social activities (Kilduff and Tsai, 2003). These characteristics facilitate individuals' motivation to find and participate in businesses with relatively low transaction costs, increasing their probabilities of achieving success in entrepreneurship (Davidsson and Honig, 2003; Zhang and Zhao, 2015; Wei et al., 2019; Clough et al., 2019). Meanwhile, social capital is a critical positive factor

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associated with migrants' socio-economic integration (Zou and Deng, 2021). A high level of socio-economic integration means that migrants established more interactions and communications with local people who have local *hukou* in destinations (Zou and Deng, 2022), which is beneficial to their accumulation of social capital and preparation for entrepreneurship. Compared to migrating alone, migrating with family members would effectively reduce liquidity risks by diversifying income sources, optimising the utilisation of social networks and other benefits (Williams and Balá, 2012). Migrants who migrate alone tend to be more adventurous than other migrants in the same family or those who migrate with family members (Dustmann et al., 2017). Socio-economic integration provides migrants with a sense of security and belonging, which increases their willingness of taking risks. To explain further, risk-taking individuals have more likelihood to start a business (Kihlstrom and Laffont, 1979). Compared to necessity-based entrepreneurship, the opportunity-based entrepreneurship is a higher level of entrepreneurship, generating higher demands on social capital and risk preference. With the support of the above theoretical framework, we propose the following assumptions:

Hypothesis 1: Migrants' socio-economic integration has significant impact on their and entrepreneurial behavior. To be more precise, migrants' socio-economic integration has a significant negative impact on survival entrepreneurship but delivers a significant positive impact on opportunity-based entrepreneurship. The underlying mechanism is the interconnections established among migrants' perception of difficulty, settlement intention, social capital and changes in risk preference.

The impact of socio-economic integration on migrants' entrepreneurial decisions is also affected by the external environment. The institutional environment not only affects entrepreneurial opportunities, but also increases the potential risks entailing in entrepreneurship. The level of marketisation is a proxy for the institutional environment, indicating the degree to which market forces are exerted in an economy, reflecting the role of market mechanism in resource allocation process. A higher level of marketisation demonstrates that market forces play a decisive role in regulating resource allocation, providing more opportunities and incentive mechanisms for entrepreneurial activities, while also promoting an incentive market economy and generating higher entry threshold of entrepreneurship (Zhang, 2018). The threshold of engaging in opportunity-based

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entrepreneurship is higher than that of survival entrepreneurship. Therefore, the degree of market orientation may diminish the probability of participating in opportunity-based entrepreneurship but promote the probability of engaging in survival entrepreneurship. Furthermore, the degree of market orientation has a regulatory role in the impact of socio-economic integration on migrant entrepreneurship, it can boost the the spillover effect of the urban agglomeration effect. On the other hand, a higher level of informatisation can eliminate the spatial constraint on the consumer market and reduce the transaction cost (Ye et al., 2018), creating entrepreneurial incentives (Zhou et al., 2020), especially for opportunity-based entrepreneurship, which is highly dependent on informatisation. Therefore, the following hypothesis is proposed.

Hypothesis 2: The level of marketisation has a positive regulatory effect on the relationship between socio-economic integration and migrants' necessity-based entrepreneurship, but has a negative regulatory effect on the relationship between socio-economic integration and opportunity-based entrepreneurship. In addition, the level of informatisation has a positive regulatory effect on the relationship between socio-economic integration and opportunity-based entrepreneurship.

There is no definitive conclusion on the impact of education on entrepreneurship (Le, 1999; Van der Sluis et al., 2010; Simoes et al., 2015). Education contributes to both entrepreneurial and professional skills (Parker, 2008). To explain further, education attainment can improve individuals' ability to discover and exploit entrepreneurial opportunities (Block et al., 2013; Estrin et al., 2016). The higher the level of educational achievement, the higher the opportunity cost of becoming an entrepreneur (Le, 1999; Belghitar, 2006; Van der Sluis et al., 2008; Estrin et al., 2016). Entrepreneurship is widely appealing to highly educated IT talents, and the expected risk premium is high enough to compensate the risks involved in their entrepreneurial activities. For entrepreneurs who start a necessity-based business, obtaining a higher level of human capital is more beneficial in enhancing the ability to engage in entrepreneurial activities. Rural migrants with higher educational achievement are more likely to engage in entrepreneurial activities (Cheng et al., 2021; Cui et al., 2015). For opportunity-based entrepreneurs, given the truth of high standard of entry threshold, it is believed that the opportunity cost for entrepreneurs to improve human capital is even higher. Migrants are more likely to choose employment over opportunity-based entrepreneurship.

The accessibility of resources is a key prerequisite for migrants' entrepreneurship (Wei et al.,

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2019). Entrepreneurship is an activity that heavily replies on financial support. To a certain extent, the initial accumulation of material capital would have a positive impact on entrepreneurship. For migrants, necessity-based entrepreneurship has a high reliance on the support of the startup capital, while opportunity-based entrepreneurship is significantly driven by the support of subsequent social capital and the continuous expansion of liquid capital. As has been discussed in the previous section, the necessity-based entrepreneurship provides employment opportunities for entrepreneurs themselves or their family members, which heavily depends on entrepreneur's early or parental entrepreneurial experience. However, given the substantial barrier to entry the opportunity-based entrepreneurship, entrepreneurs are pushed to have a strong dependence on social capital rather than the early business experience of their parents. Therefore, we propose hypothesis 3.

Hypothesis 3: Human capital, material capital and experience capital have different heterogeneous impact on the interconnection among socio-economic integration, necessity-based entrepreneurship, and opportunity-based entrepreneurship.

The theoretical framework is shown in Figure 1:

(Figure 1 is here)

4 Data and methodology

4.1 Data and variables

This research employs the micro-level data collected, under the scheme of China Migrants Dynamic Survey (CMDS). This is the national micro-level survey conducted every year since 2009 by the Floating Population Service Centre of China's National Health Commission. We employ the 2017 survey data in our research as this dataset aligns with our research needs. The dataset covers 31 provinces (regions and cities) in mainland China and the migrant concentration influx sites in Xinjiang Production and Construction Crops. The respondents included in this survey are migrants over 15 years old who do not have a local *hukou* but have lived in the migrated place for more than one month. The sampling methods used in this survey is probability proportional and scale sampling. Considering heterogeneity effects in different regions, we also match the city-level data in the dataset by incorporating a one-year lag. The municipal data attached in the dataset are collected from the 2017 China Urban Statistical Yearbook (CUSY), which is published by the National Bureau of Statistics of China. With the inclusion of city characteristics, the final sample size is

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122450. The description and measurements of the key variable are as follows:

Socio-economic integration. Following the existing literature (Chen & Wang, 2015; Wang et al., 2015; Lin et al., 2017; Zou et al., 2020; Zou and Deng, 2021), we select these variables for factor analysis, including individual monthly income, number of social activities, participation in medical insurance, participation in local activities, participation in the social security, application for residence permit (including temporary residence permit), perception of discrimination, differences in customs, differences in health habits, self-identity, love for the destination city, attention to the destination city, willingness to integrate, and acceptance willingness. The results of factor analysis can be found in Section 5.1.

Migrants' entrepreneurship. The corresponding questions in the survey used to evaluate migrants' entrepreneurship are as follows: What is your current employment status? In the survey, employment status is grouped into the following five categories: (1) steady employment; (2) taking on intermittent or irregular work; (3) employers; (4) self-employed; (5) others. We recode the above five categories of employment status according to our research needs. First, we generate a binary variable of entrepreneurial choice, indicating whether the migrant is an entrepreneur. A value of 0 means 'employees', and a value of 1 means 'employers and self-employed workers', treating the other items as missing values. Second, a variable of entrepreneurial type is generated. Following Hu (2014) and Chen and Hu (2021), we further define entrepreneurship into two types: (1) necessity-based entrepreneurship, encoding 1 to 'self-employed workers', the others is 0; and (2) opportunity-based entrepreneurship, encoding 1 to "employers", 0 to "employees", and dealing with other categories as missing values.

Other control variables. In this paper, we control the personal characteristics (gender, age, education, nationality, communist, *hukou*), household characteristics (family composition, household income), mobility attribute (flow time and mobility scope) and homeownership (Chen and Hu, 2021; Cheng et al., 2021b). We also control other urban-level variables, including per GDP, industrial structure, average wage of employees in the city, loan-to-deposit ratio and city house prices (Glaeser et al., 2010; Chen & Hu, 2019; Chen & Hu, 2021).

Table 1 shows the descriptive statistics of each variable. The entrepreneurship rate of migrants is 38.46%. This proportion is significantly higher than that of urban residents', which is about 8%

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(Chen & Hu, 2019). This proportion is also higher than the results of another national surveys, which recorded that the entrepreneurial probability of Chinese migrant workers was 28% in 2009 (Meng, 2012). In addition, necessity-based entrepreneurship accounts for 34.67%, while opportunity-based entrepreneurship accounts for 8.6%, indicating that migrants are more inclined to engage in necessity-based entrepreneurs rather than the opportunity-based entrepreneurship.

(Table 1 is here)

4.2 Methodology

Since the dependent variable is a binary variable, the standard probit model is used to estimate the results. Probit model has a latent variable y^*, when $y^* > 0$, the value of entrepreneurship is 1, otherwise it is 0. The expressions of the latent variable and the benchmark model are defined as follows.

$$y_{ij}^* = \beta_0 + \beta_1 Intergation_{ij} + \beta_2 X_{ij} + \beta_3 City_j + I_d + P_h + \varepsilon_{ij} \quad (1)$$

$$\Pr(y_{ij} = 1) = \Pr(y_{ij}^* > 0) = \emptyset(\beta_0 + \beta_1 Intergation_{ij} + \beta_2 X_{ij} + \beta_3 City_j + I_d + P_h) \quad (2)$$

Among them, y_{ij} refers to the virtual variable whether i individual in j city is an entrepreneur. $Intergation_{ij}$ stands for the socio-economic integration of migrant i in j city. X_{ij} represents the personal characteristics, such as gender, age, education, *hukou*, communist identity, and ethnicity, household characteristics (housedhold composition and household income), mobility attributes (mobility time and scope), and homeownership. $City_j$ is the city-level control variable, including per GDP, industrial structure, average wage of urban on-the-job workers, LTD and housing prices. We also added industry dummy variables I_d to control the differences in entrepreneurship in industry and introduce the province dummy variable P_h to control the regional differences in migrants' entrepreneurial behaviour. ε_{ij} is the error term.

As discussed in the previous section, migrant entrepreneurship is a self-selection behaviour, which may lead to self-selection bias and result in the inconsistent estimation. Migrant entrepreneurship is not only influenced by socio-economic integration and observable variables, such as education attainment, gender, age, family composition and other variables, but also impacted by unobservable variables, such as personal capability, risk preference and other variables. The higher the level of personal capability, the more likelihood of holding risk-hiking preference,

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therefore the more probability of starting a business. Furthermore, there are reverse causality between socio-economic integration and migrant entrepreneurship, resulting in endogeneity problems with the socio-economic integration variable due to the unobservable variables. In order to resolve the endogeneity issues and obtain consistent estimators, the two-stage Heckman model and the instrumental variable (IV) method are employed for estimation.

The steps of progressing the two-stage Heckman model are as follows. First, we estimate the probit model to capture factors influencing high socio-economic integration of migrants, we incorporate independent variables such as personal, household and city characteristics in the estimation. The inverse mills ratio for each observed value is calculated. The second step is to include the inverse mills ratio into the regression equation and to obtain a consistent estimator.

$$\Pr\left(High\ integration = 1_{|X_{ij}}\right) = \emptyset(\alpha_0 + \alpha_1 X_{ij} + \varepsilon_{ij}) \tag{3}$$

$$\Pr\left(Entrepreneurship = 1_{|y_{ij}}\right) == \emptyset(\beta_0 + \beta_1 Intergation_{ij} + \beta_2 X_{ij} + \beta_3 \widehat{lambda}_{ij} + \beta_4 City_j + I_d + P_h) \tag{4}$$

Previous studies usually use community or village level indicators as instrumental variables for individual level indicators (Wang & Zhang, 2017; Xu et al., 2019). However, due to data limitations, it is difficult to find IV at the community or village level. Following the previous study (Zong et al., 2015; Zou & Deng, 2021), we take the proportion of the socio-economic integration of other migrants in their group as IV variable. Based on the above analysis, the IV probit model extended is as follows:

$$y_{ij}^* = \beta_0 + \beta_1 \widehat{Intergation}_{ij} + \beta_2 X_{ij} + \beta_3 City_j + I_d + P_h + \mu_{ij} \tag{5}$$

$$Intergation_{ij} = \alpha_0 + \alpha_1 Group_integration_{jp} + \alpha_2 X_{ij} + \alpha_3 City_j + I_d + P_h + \delta_{ij} \tag{6}$$

$$\Pr\left(y_{ij} = 1\right) = \Pr\left(y_{ij}^* > 0\right) \tag{7}$$

$Group_integration_{jp}$ denotes the instrumental variable, δ_{ij} is the error term, and the other variables remain the same as those in formula (1). In general, the group variables should correspond to the exogenous identification. The commonly used group variables are gender, age, education and region (Zou & Deng, 2021). Accordingly, householders are grouped into four groups based on gender (male and female), educational attainment (junior high school and below, senior high school, college and above), age (<= 25, 25-35, 35-45, and >= 45 years), and regions (Eastern China, Central and Western China). Therefore, a total of 48 groups are identified.

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Furthermore, we use the intermediary effect test to verify the underlying mechanism (Wen et al., 2004). Proceed as follows:

$$\Pr\left(Intermediary_{ij}=1\right)=\emptyset(\beta_0+aIntergation_{ij}+\gamma_2X_{ij}+\gamma_3City_j+I_d+P_h) \quad (8)$$

$$\Pr\left(Entrepreneurship=1\right)=\emptyset(\beta_0+C'Intergation_{ij}+bIntermediary_{ij}+\beta_2X_{ij}+\beta_3City_j+I_d+P \quad (9)$$

$Intermediary_{ij}$ represents the mediating variable, which are the situation that migrants' perception of difficulties (household do not encounter any difficulties in the destination city), willingness to settle, localised social capital and risk preference. The other variables are the same as in previous equations. Equation (2) represents the effect of socio-economic integration on migrant entrepreneurship; Equation (8) represents the impact of socio-economic integration on mediating variables; Equation (9) represents the impact of socio-economic integration on migrant entrepreneurship through mediating variables.

Finally, we also include the interactive terms to test for the regulatory effect and heterogeneity analysis, estimations results will be presented in the subsequent sections.

5 Empirical findings and Robustness check

5.1 The measurement of migrant socio-economic integration

Before factor analysis, all data are standardised using the extreme value method. The KMO value is 0.7930 and the P value of the Bartlett test of sphericity is 0.000. The results indicate that the scale is reliable. Five components are extracted, which explain 61.29% of the total variance. As shown in Table 2, we extract three dimensions from the factor loading of the five components. Personal monthly income, medical insurance, participation in social security and residence permit application are assigned as the first dimension, which is economic integration. The local consultation and suggestion activities, the number of participations in organizational activities, differences in concepts, customs, health habits and local discrimination are all assigned as the 'social and cultural integration'. Urban preference, urban attention, integration intention, acceptance intention and self-identity are classified as 'psychological integration'.

(Table 2 is here)

Using the results of the factor analysis, we calculate the overall integration and its sub-

dimensions. As shown in Figure 2, migrants' overall integration is low (38.32). In the three sub-dimensions, economic integration is the lowest (19.29), psychological integration is the highest (73.25), and socio-cultural integration is at an intermediate level (39.92), as shown in Figure 2.

(Figure 2 is here)

5.2 The relationship between socio-economic integration and migrant entrepreneurship

First, we draw the scatter diagram to outline the relationship between socio-economic integration and migrant entrepreneurship at the urban level. Figure 3 shows that socio-economic integration level is negatively associated with migrants' entrepreneurship.

(Figure 3 is here)

We further examine the relationship between socio-economic integration level and migrants' necessity-based entrepreneurship and opportunity-based entrepreneurship, respectively. Figure 4 suggests that there is a negative relationship between socio-economic integration and migrants' necessity-based entrepreneurship, while the relationship is positive between socio-economic integration and migrants' opportunity-based entrepreneurship.

(Figure 4 is here)

It is notable that the scatter charts only reflects the preliminary investigations on the relationship between socio-economic integration and migrant entrepreneurship, and it is only captured at the urban level. The deeper relationship between the two core variables needs to be further verified by employing econometric techniques.

5.3 The results of benchmark regression

In the benchmark model, the dependent variable migrant entrepreneurship is a binary variable, we use probit estimation to capture the estimators, the results of the baseline regression are presented in Table 3. We start with the core explanatory variables and add control variables later. As shown in Table 3, the results in Column (1) show that socio-economic integration is negatively correlated with migrants' entrepreneurship, this is consistent with the preliminary results presented in the scatter plot. When control variables are included in the model, Column (4) shows that migrants' socio-economic integration is positively associated with their entrepreneurship. For one standard deviation increase in the socio-economic integration level of migrants, the probability of having

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entrepreneurial activities increases by 1.4 percent. We further employ necessity-based entrepreneurship and opportunity-based entrepreneurship in the regression. It is found that socio-economic integration has a significantly negative impact on migrants' necessity-based entrepreneurship, while it has a significantly and positively impacts on their opportunity-based entrepreneurship. For one standard deviation increase in the socio-economic integration level of migrants, the probability of migrants engaging in necessity-based entrepreneurial activities decreases by 1.3 percent, while the probability of engaging in opportunity-based entrepreneurship increase by 4.5 percent. The underlying mechanism has connection with the migrants' perception of difficulties, willingness to settle, localised social capital and risk preference, which will be verified in the following sections.

The results of other control variables in Table 3 are consistent with the results in existing literature (Li and Wu, 2014; Schmalz et al., 2017; Chen and Hu, 2019; Chen and Hu, 2021; Cheng et al., 2021b). They are not the main focuses of this paper, therefore there will be no further discussions on these factors.

(Table 3 is here)

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5.4 Robustness check

First, migrant entrepreneurship is not a random behaviour and it may be affected by their family background. For instance, parents' business experience may influence migrants' entrepreneurship choices. Thus, we additionally control this variable to improve the accuracy of the results. Columns 1, 2, and 3 in Table 4 show that socio-economic integration is still positive for migrant entrepreneurship, but the effect is predominantly evident in opportunity-based entrepreneurship rather than the necessity-based entrepreneurship. Second, there is a likelihood that empirical estimators captured by different estimation methods may vary. To reduce the possible bias caused by this, we use the logit model to conduct the robustness check. Estimation results are included in column 5, 6, and 7 in Table 4, affirming the same results captured by probit method. Third, given the fact that the proportion of migrants aged 60 and above who participated in entrepreneurship is very low, samples aged under 60 are selected for regression to reduce the disturbance caused by age. Columns 8, 9, and 10 in Table 4 also show the same estimated results as captured in the baseline regression. Through the employment of different techniques, it is confirmed that our estimation results are robust.

(Table 4 is here)

5.5 Resolve the endogenous problems

In order to resolve the selection bias and the endogenous problem, we further use the two- stage Heckman model and the IV probit model in the estimation, the unbiased estimators are as shown in Tables 5 and 6. Table 5 indicates that socio-economic integration extends a significant and positive effect on migrants' entrepreneurship. In terms of two entrepreneurial behaviours, socio-economic integration significantly and negatively influences migrants' necessity-based entrepreneurship, but it significantly and positively affects migrants' opportunity-based entrepreneurship.

(Table 5 is here)

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Before interpreting the regression results, we first test the effectiveness of the IV to ensure the reliability of the estimated results. The F statistics of the first stage regression are 416.76, 387.98 and 349.83 respectively, which are well above the empirical standard value of 10 (Staiger & Stock, 1997), passing the weak instrumental variable test. The coefficients of group integration in the first-stage estimation are 0.676, 0.642 and 0.601 respectively. All of them are significant. Therefore, the group integration is related to socio-economic integration and is found to be valid as an instrumental variable.

Second, we use the Wald test to test the endogeneity of the group integration. The results show that except for the P-value in Column (1), the other two estimations are statistically significant at 1% level. Therefore, Columns (2) and (3) in Table 6 show that socio-economic integration is significantly and negatively associated with migrant necessity-based entrepreneurship, but positively associated with migrant opportunity-based entrepreneurship. Unfortunately, results presented in Column (1) in Table 6 are not statistically significant. Instead, we use the previous results in Table 3 related to migrant entrepreneurship, the findings still are robust.

(Table 6 is here)

6 Further analysis

6.1 The underlying mechanism

In this section, we address the internal mechanism of socio-economic integration affecting necessity-based entrepreneurship and opportunity-based entrepreneurship.

The first underlying mechanism is migrants' perception of difficulties. To measure this, we use the question in the survey, asking 'at present, what are the main difficulties for your family?'. Those who answered 'there are no difficulties' are given a value of 1. All other answers are encoded as 0. We assume that migrants with better socio-economic integration will encounter less difficulties in the local cities. Columns (1) and (2) in Table 7 indicate that socio-economic integration has a positive effect on migrants' family encountering no difficulties in the local cities, but these perceived no difficulties would have a negative effect on migrants' necessity-based entrepreneurship. Therefore, the perception of no difficulties is an underlying mechanism of socio-

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economic integration on migrants' necessity-based entrepreneurship. The second channel is linked to the willingness to settle down. It is measured by two questions in the survey, 'In the future, do you intend to stay in this city for a period of time?' and 'If you intend to stay, how long will you expect to stay?' Those who answer 'yes' and 'intend to settle down' are encoded as 1, and the others are encoded as 0. Columns (3) and (4) show that socio-economic integration has a positive effect on migrants' settlement intention, but settlement intention is negatively associated with migrants' necessity-based entrepreneurship. Thus, the settlement intention is another channel of socio-economic integration on migrant' necessity-based entrepreneurship.

The third underlying mechanism has a connection with localised social capital. We use the survey question 'In the destination city, who do you spend most of your spare time with' to measure this variable. Those who spend most of spare time with urban locals (people hold a local urban *hukou*) are encoded as 1, and others are 0 (Cheng et al., 2021b). Columns (5) and (6) present that socio-economic integration has a positive effect on migrants' localised social capital, and the localised social capital is significantly and positively associated with migrants' opportunity-based entrepreneurship. Accordingly, localised social capital is an important channel for socio-economic integration affecting migrants' opportunity-based entrepreneurship. The last mechanism evidenced via our investigation is migrants' risk preference. We use the question 'who did you migrate with at that time?' to quantify this variable. Those who migrates alone are recorded as 1, the others are recoded as 0. Columns (7) and (8) indicate that socio-economic integration has a positive effect on migrants' risk preference, and risk preference is significantly and positively associated with migrants' opportunity-based entrepreneurship. Accordingly, risk preference is another important channel for socio-economic integration affecting migrants' opportunity-based entrepreneurship. We find that all Sobel tests pass the significance test. Therefore, it is evidenced that the above underlying channels are effective.

(Table 7 is here)

6.2 Regulation effect of urban external environment

The impact of socio-economic integration on migrants' entrepreneurial decisions will also be influenced by the external environment. The regulatory effect of the external environment of the city is also considered, that is, the level of marketisation and informatisation on the relationship

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between socio-economic integration and migrant entrepreneurial decision-making. The level of marketisation is measured by the ratio of urban GDP to fiscal budget expenditure, and the level of information is measured by the first principal component of the number of landline users, the mobile phone users and the broadband users (Zhou et al., 2020).

Table 8 mainly presents the regulatory effect of urban marketisation level and information level. The results in Column (1) show that the interaction term between socio-economic integration and marketisation level is not statistically significant. Columns (2) and (3) show the positive regulatory effect of marketisation level on necessity-based entrepreneurship, and its negative regulatory effect on opportunity-based entrepreneurship respectively. A higher level of marketisation provide more channels and incentive mechanisms for entrepreneurial activities, thus further promoting migrant to engage in entrepreneurship (Zhou et al., 2020). Despite that marketisation will also lead to vicious competition and increase the cost of entrepreneurship. Column (4) indicates that the level of informatisation also presents a positive regulatory effect on the relationship between socio-economic integration and migrants' entrepreneurship. Column (6) indicates the positive regulatory effect of information level on opportunity-based entrepreneurship. The high level of informatisation reduces the market transaction cost and provides entrepreneurial incentives (Zhou et al., 2020), especially for opportunity-based entrepreneurship, which is highly dependent on the level of informatisation.

(Table 8 is here)

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6.3 The influence of migrant heterogeneity of entrepreneurs

In addition to the effects of the external macro environment, the existence of migrant heterogeneity also deserves attention, such as heterogeneity in human capital, psychical capital, and experience capital. Therefore, we examine individual heterogeneity through the examination of these three aspects. Human capital is measured by the education achievement. Migrants who have a college degree or above are considered to have a higher level of human capital. Psychical capital is measured by the ratio of respondent's average monthly gross income o total expenses. Migrants who have that ratio higher than 2.313 (the average level) are considered to have a higher level of psychical capital. Experience capital is measured by parents' past migration and business experience and was asked in the survey: 'Before your first migration, did your parents have any migrant work/business experience?' Migrants who answer yes are considered to have a higher level of experience capital.

Columns (2) and (3) in Table 9 show that the stimulation of human capital will reverse the impact of socio-economic integration on necessity-based entrepreneurship from negative to positive, while it changes the impact of socio-economic integration on opportunity-based entrepreneurship from positive to negative. That is to say, for highly educated migrants, when the socio-economic integration level is higher, they tend to get involved in a necessity-based entrepreneurship rather than opportunity-based entrepreneurship. Columns (5) and (6) in Table 9 show that a higher level of primitive accumulation in material capital would increase the impact of socio-economic integration on necessity-based entrepreneurship, but it would extend a negative impact on the association between socio-economic integration and opportunity-based entrepreneurship. Columns (8) and (9) in Table 9 suggest that experience capital can strengthen the impact of socio-economic integration on necessity-based entrepreneurship, but it weakens the impact of socio-economic integration on opportunity-based entrepreneurship.

(Table 9 is here)

7 Conclusion

Entrepreneurship plays a key role in facilitating the economic growth all over the world. Based on the 2017 China Migrants Dynamic Survey (CMDS), and using the baseline regression model,

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Heckman two-stage model and the IV Probit model, it is evidenced that migrants' socio-economic integration is positively associated with their entrepreneurship. For one standard deviation increases in the socio-economic integration level of migrants, the probability for migrants engaging in entrepreneurial activities increases by 1.4 percent. Further study indicates that socio-economic integration is negatively correlated with migrants' necessity-based entrepreneurship, while it is positively associated with migrants' opportunity-based entrepreneurship. The underlying mechanism of socio-economic integration on migrants' necessity-based entrepreneurship is achieved through changing migrants' perception of difficulties in the local cities and their willingness to settle. The internal mechanism of socio-economic integration on migrants' opportunity-based entrepreneurship is through changing localised social capital and migrants' risk preference. The further analysis finds out that the level of marketisation has a positive regulatory effect on the association between socio-economic integration and migrants' necessity-based entrepreneurship, but it has a negative regulatory effect on the relationship between socio-economic integration and migrants' opportunity-based entrepreneurship. However, the level of information has a positive regulatory effect on the correlation between socio-economic integration and migrant opportunity-based entrepreneurship. Heterogeneity analysis shows that when a highly educated migrant worker exhibits a higher level of socio-economic integration, they are more inclined to engage in necessity-based entrepreneurship rather than opportunity-based entrepreneurship. A higher level of primitive accumulation in material capital and experience capital would strengthen the impact of socio-economic integration on necessity-based entrepreneurship, but it also have a negative impact on the interconnection between socio-economic integration and opportunity-based entrepreneurship.

The policy implications of our research suggest that the governments need to take more actions to promote the socio-economic integration of migrants and increase the probability of entrepreneurship, particularly for opportunity-based entrepreneurship. In addition, further measures need to be taken to improve the level and quality of entrepreneurship, by creating conditions and opportunities for migrants to better communicate and interact, and by opening channels to allow migrants to provide advice and suggestions freely. It is also suggested that disadvantages migrants encountering in the job market need to be eliminated, such as *hukou*-based discrimination, and the

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high threshold of urban *hukou* registration, embracing different cultural ideas with inclusivity. In the process of urbanisation, the government should equalise the benefit and entitlement of migrants with that of urban residents and promote the non-differentiated public services. Given the findings that the external urban environment can regulate the impact of socio-economic integration on migrants' entrepreneurial decision-making, government regulatory measures should be aligned with market regulatory measures to promote migrants' entrepreneurship. Meanwhile, governments need to stimulate the development and application of urban digitisation to enhance the level of urban informatisation. Besides, governments should also actively improve the business environment in the local market, creating an active atmosphere for business activities, especially organising entrepreneurship training and education for necessity-based entrepreneurs. The final policy implication suggests that governments need to formulate differentiated borrowing policies in accordance with different types of entrepreneurships.

This paper has some limitations. Due to the data constraints, some other underlying mechanism such as non-cognitive ability cannot be verified. In addition, our data is cross-sectional data, the dynamic relationship between socio-economic integration and migrant entrepreneurship needs further analysis.

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Table 1 Descriptive statistics results

Variable	Definition	Mean	SD
	Dependent variables		
Entrepreneurial choice	Entrepreneurship=1, employees=0	0.3846	0.4865
Necessity-based entrepreneurship	Self-employed workers=1, employees=0	0.3467	0.4759
Opportunity-based entrepreneurship	Employers=, employees=0	0.0860	0.2804
	Personal & Household & Mobility characteristics		
Female	Male=1, Female=0	0.5697	0.4951
Age	The age of migrant	35.6103	9.7391
Junior	Junior high school or below	0.5884	0.4921
High	High school	0.2250	0.4176
College	College or above	0.1866	0.3896
Rural *hukou*	Rural *hukou*=1, others=0	0.7828	0.4123
Communist	Communist identity=1, others=0	0.0478	0.2133
Ethnicity	Han=1, others=0	0.9278	0.2588
Household income	Monthly household income level	7439.079	5870.202
Spouse migration	Parter lives in destination=1, other=0	0.7214	0.4483
Child migration	Children live in destination=1, other=0	0.5032	0.5000
Homeownership	Homeowner=1, renter=0	0.2378	0.4257
Length of stay	Length of flow time (Year)	6.0508	5.8847
Intraprovincial mobility	Intra-provincial mobility=1, Inter-provincial mobility=0	0.5012	0.5000
	City characteristics		
LnperGDP	Per GDP (Yuan), log value	11.1944	0.4922
Industrial structure	The proportion of tertiary industrial output value	0.5162	0.1206
Marketisation level	Ratio of urban GDP to expenditure in the financial budget	6.4328	2.2462
Information level	The first principal component of the number of fixed telephone users, mobile phone users and Internet broadband access users	9.24e-10	1
Lnwage	Average wage of urban on-the-job workers (Yuan), log value	11.1599	0.2398

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LTD	Loan deposit ratio of national banking system	0.7525	0.1918
Lnhousing_price	Sailing price/sailing area of commercial housing (Yuan/m^2), log value	9.0114	0.6037

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Table 2 Factor loading results of migrants' socio-economic integration

Items	Components					Communalities
	F1	F2	F3	F4	F5	
X1 Monthly personal income	0.0128	0.1000	0.0947	0.2213	0.5985	0.5737
X2 Medical insurance	0.0610	0.0587	0.8248	0.1194	0.0979	0.2887
X3 Frequencies participated in local activities	0.0722	0.0243	0.0941	0.8157	0.0259	0.3193
X4 Local consultation and suggestion activities	0.0691	0.0297	0.0962	0.8168	-0.0069	0.3178
X5 Urban preference	0.8030	0.0344	0.0214	0.0213	0.0661	0.3487
X6 Urban attention	0.7982	0.0226	0.0365	0.0817	0.0878	0.3467
X7 Integration intention	0.8299	0.0927	0.0546	0.0516	0.0209	0.2967
X8 Acceptance intention	0.7815	0.1629	0.0381	0.0558	-0.0540	0.3552
X9 Local discrimination	0.2491	0.6948	-0.0134	0.0415	-0.1194	0.4390
X10 Differences in customs	-0.0477	0.6710	0.1333	-0.0149	0.0877	0.5218
X11 Differences in health habits	0.1707	0.7264	0.0168	0.0574	0.0253	0.4390
X12 Self-identity	0.6021	0.1505	0.0247	0.0290	-0.1627	0.5869
X13 Participation in Social security	0.0387	0.0114	0.8553	0.0616	-0.0387	0.2615
X14 Residence permit application	0.0449	-0.0441	0.0129	-0.0604	0.8176	0.3238
Eigenvalue	3.05472	1.53721	1.46420	1.42225	1.10287	
Variance contribution rate	0.2182	0.1098	0.1046	0.1016	0.0788	
Cumulative variance proportion	0.2182	0.3280	0.4326	0.5342	0.6129	

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Table 3 The baseline regression results

Variables	(1) Probit Entrepreneurship	(2) Probit Necessity-based	(3) Probit Opportunity-based	(4) Probit Entrepreneurship	(5) Probit Necessity-based	(6) Probit Opportunity-based
Socio-economic integration	-0.038***	-0.077***	0.054***	0.014***	-0.013***	0.045***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Male				0.068***	0.059***	0.040***
				(0.002)	(0.002)	(0.002)
Age (Aged below 25=ref.)						
Aged between 25 and 35				0.117***	0.101***	0.067***
				(0.004)	(0.004)	(0.004)
Aged between 35 and 45				0.154***	0.134***	0.082***
				(0.004)	(0.004)	(0.004)
Aged over 45				0.150***	0.137***	0.066***
				(0.005)	(0.004)	(0.004)
Education (Junior high school or below=ref.)						
High school				-0.035***	-0.043***	0.004*
				(0.003)	(0.003)	(0.002)
College or above				-0.106***	-0.123***	-0.016***
				(0.004)	(0.004)	(0.003)
Rural hukou				0.005*	0.016***	-0.013***
				(0.003)	(0.003)	(0.002)
Ethnicity				0.031***	0.029***	0.013***
				(0.005)	(0.005)	(0.004)
Party				-0.027***	-0.030***	-0.007*
				(0.006)	(0.006)	(0.004)
Spouse migration				0.135***	0.136***	0.036***
				(0.003)	(0.003)	(0.003)
Child migration				0.043***	0.035***	0.025***
				(0.003)	(0.003)	(0.002)

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Length of stay (Below one year=ref.)						
Between 1 and 10 years				0.033***	0.031***	0.012***
				(0.003)	(0.003)	(0.003)
Above 10 years				0.068***	0.061***	0.030***
				(0.004)	(0.004)	(0.003)
Intraprovincal mobility				0.059***	0.055***	0.030***
				(0.003)	(0.003)	(0.002)
Homeowner				0.049***	0.028***	0.048***
				(0.003)	(0.003)	(0.002)
LnperGDP				-0.058***	-0.050***	-0.037***
				(0.006)	(0.005)	(0.004)
Industrial structure				0.060***	0.069***	0.002
				(0.022)	(0.022)	(0.018)
LTD				-0.030**	-0.017	-0.030***
				(0.012)	(0.012)	(0.010)
Lnwage				0.064***	0.058***	0.037***
				(0.016)	(0.016)	(0.013)
Lnhousing_price				-0.028***	-0.039***	0.006
				(0.006)	(0.006)	(0.005)
Province dummies				Yes	Yes	Yes
Industry dummies				Yes	Yes	Yes
Pseudo R2	0.0011	0.0045	0.0173	0.3040	0.3291	0.2060
Observations	122,461	115,508	82,878	122,450	115,497	82,867

Note: *** 、**、* represent significance at the 1% level, 5% level and 10% level. Standard errors are shown in parentheses. The results are marginal effects in the Table.

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Table 4 Robustness check

Variables	(1) Probit Entrepreneurship	(2) Probit Necessity-based	(3) Probit Opportunity-based	(4) Logit Entrepreneurship	(5) Logit Necessity-based	(6) Logit Opportunity-based	(7) Entrepreneurship	(8) Age ≤ 60 Necessity-based	(9) Opportunity-based
Socio-economic integration	0.013***	-0.013***	0.045***	0.013***	-0.013***	0.044***	0.013***	-0.014***	0.045***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Personal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mobility characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-industry characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parents' business experience	Yes	Yes	Yes	No	No	No	No	No	No
Observations	122,450	115,497	82,867	122,450	115,497	82,867	121,092	114,183	82,040
R square	0.3042	0.3291	0.2066	0.3049	0.3303	0.2074	0.3042	0.3294	0.2060

Note: *** 、**、* represent significance at the 1% level, 5% level and 10% level. Standard errors are shown in parentheses. The results are marginal effects in the Table.

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Table 5 Heckman two-stage estimation of migrant entrepreneurship

Variables	(1) Heckman Entrepreneurship	(2) Heckman Necessity-based	(3) Heckman Opportunity-based
Socio-economic integration	0.026***	-0.012***	0.056***
	(0.004)	(0.004)	(0.003)
Personal characteristics	Yes	Yes	Yes
Family composition	Yes	Yes	Yes
Mobility attributes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes
Province-industry characteristics	Yes	Yes	Yes
lambda	-0.009***	-0.001	-0.008***
	(0.002)	(0.002)	(0.002)
Observations	122450	115497	82867
Pseudo R2	0.3041	0.3291	0.2064

Note: *** represents significance at the 1%. Standard errors are shown in parentheses. The results are marginal effects in the Table.

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Table 6 Instrumental variable (IV) estimation results

Variables	(1) IV-Probit Entrepreneurship	(2) IV-Probit Necessity-based	(3) IV-Probit Opportunity-based
Socio-economic integration	0.011	-0.269 ***	0.141 ***
	(0.050)	(0.046)	(0.048)
Personal characteristics	Yes	Yes	Yes
Family composition	Yes	Yes	Yes
Mobility attributes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes
Region-industry characteristics	Yes	Yes	Yes
Wald test of exogeneity	0.00	26.62	4.98
(P value)	0.9639	0.0000	0.0256
Observations	122450	115497	82867
First-stage regression results: Socio-economic integration			
Group integration	0.676***	0.642***	0.601***
	(0.036)	(0.0368)	(0.042)
Control variables	Yes	Yes	Yes
F-statistic	416.76	387.98	349.83
(P value)	0.0000	0.0000	0.0000
R-squared	0.2157	0.2135	0.2543

Note: *** 、**、* represent significance at the 1% level, 5% level and 10% level. Standard errors are shown in parentheses. The results are marginal effects in the Table.

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Table 7 The potential mechanisms of socio-economic integration on migrant entrepreneurship

Variables	(1) Self-reported no difficulties	(2) Necessity-based Entrepreneurship	(3) Settlement intention	(4) Necessity-based Entrepreneurship	(5) Localized social capital	(6) Opportunity-based entrepreneurship	(7) Risk preference	(8) Opportunity-based entrepreneurship
Socio-economic integration	0.057***	-0.026***	0.213***	-0.026***	0.125***	0.131***	0.039***	0.045 ***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.004)	(0.002)
Self-reported no difficulties		-0.060***						
		(0.003)						
Settlement intention				-0.013***				
				(0.003)				
Localised social capital						0.043***		
						(0.002)		
Risk reference								0.008***
								(0.002)
Personal characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Family composition	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mobility attributes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region-industry characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sobel Test statistics		-0.0034***		-0.0027***		0.0017 ***		0.0003***
		(0.0002)		(0.0007)		(0.0003)		(0.0001)
Observations	115,508	115,508	115,508	115,508	82,878	82,878	82,878	82,878

Note: *** 、**、* represent significance at the 1% level, 5% level and 10% level. Standard errors are shown in parentheses. The same below.

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Table 8 The regulatory effect of urban marketisation level and information level

Variables	Entrepreneurship	Necessity-based entrepreneurship	Opportunity-based entrepreneurship	Entrepreneurship	Necessity-based entrepreneurship	Opportunity-based entrepreneurship
	(1)	(2)	(3)	(4)	(5)	(6)
Socio-economic integration	0.066**	-3.929***	2.219**	0.052***	-1.282***	0.356***
	(0.029)	(0.833)	(0.877)	(0.010)	(0.285)	(0.016)
Marketisation level	0.012***	0.048***	-0.018**			
	(0.004)	(0.007)	(0.008)			
Socio-economic integration* Marketisation level	-0.002	0.532***	-0.252**			
	(0.004)	(0.114)	(0.119)			
Information level				0.081***	0.024	0.097***
				(0.016)	(0.021)	(0.026)
Socio-economic integration*Information level				0.021**	0.016	0.033**
				(0.009)	(0.017)	(0.013)
Personal & Household &Mobility characteristics	Yes	Yes	Yes	Yes	Yes	Yes
City characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Province-Industry characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Observation	122450	115497	82867	122450	115497	82867

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Table 9 Heterogeneity analysis of entrepreneurs

Variables	(1) Entrepreneurship	(2) Necessity-based entrepreneurship	(3) Opportunity-based entrepreneurship	(4) Entrepreneurship	(5) Necessity-based entrepreneurship	(6) Opportunity-based entrepreneurship	(7) Entrepreneurship	(8) Necessity-based entrepreneurship	(9) Opportunity-based entrepreneurship
Socio-economic integration	-1.004***	-1.698***	0.797***	0.005	-1.964***	1.440***	0.054***	-1.087***	0.962***
	(0.101)	(0.116)	(0.149)	(0.012)	(0.397)	(0.538)	(0.011)	(0.213)	(0.276)
High educated	-0.311***	-0.355***	-0.085***						
	(0.016)	(0.018)	(0.024)						
High educated* Socio-economic integration	0.827***	1.210***	-0.539***						
	(0.093)	(0.108)	(0.136)						
High income to expenditure ratio				-0.064***	-0.049***	0.050***			
				(0.009)	(0.014)	(0.017)			
High income to expenditure ratio* Socio-economic integration				0.143***	1.692***	-0.775*			
				(0.019)	(0.339)	(0.447)			
Experience capital							0.052***	0.039***	0.113***
							(0.011)	(0.013)	(0.020)
Experience capital* Socio-economic integration							-0.016	0.816***	-0.475**
							(0.022)	(0.179)	(0.224)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observation	122450	115497	82867	122450	115497	82867	122450	115497	82867

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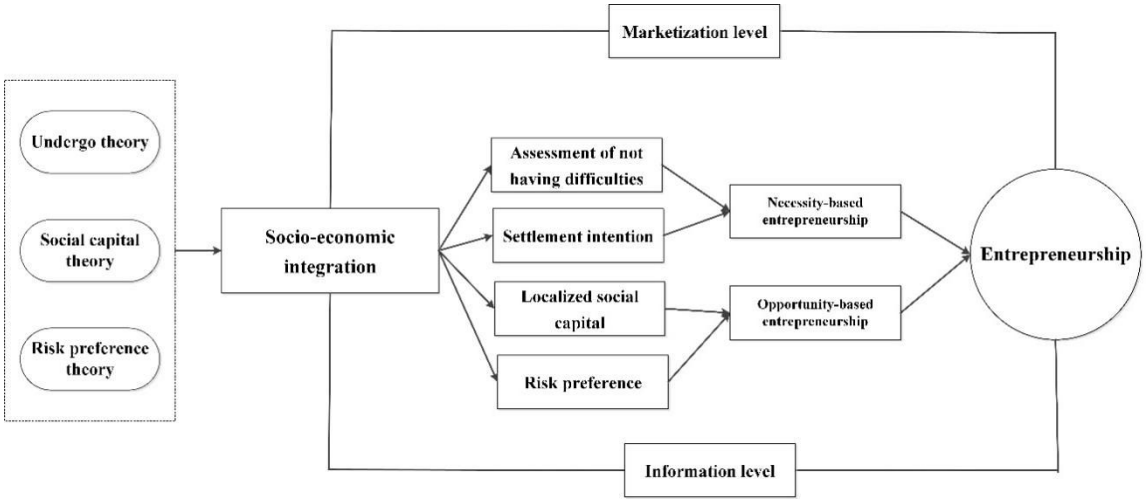

Figure 1 The theoretical framework framework

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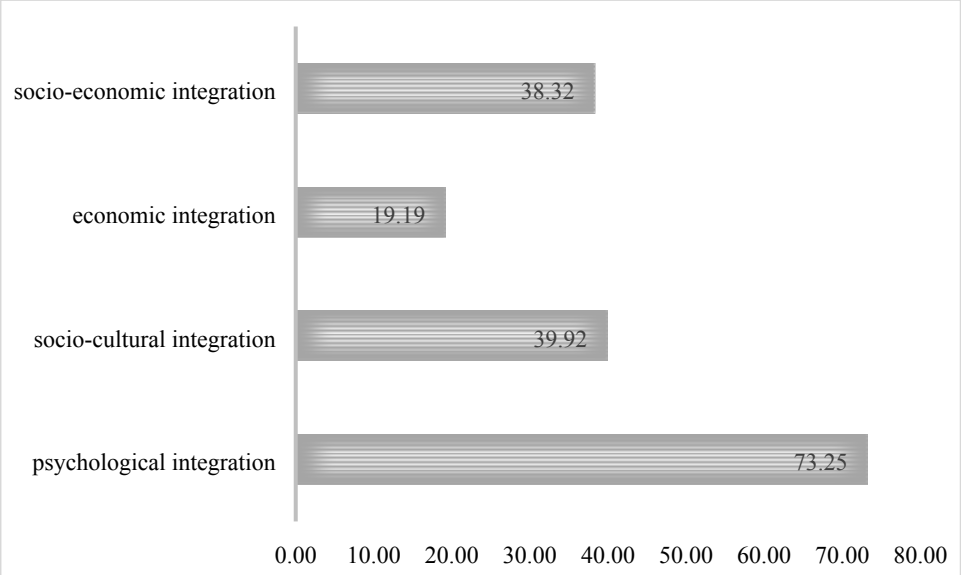

Figure 2 Migrants' socio-economic integration in urban China

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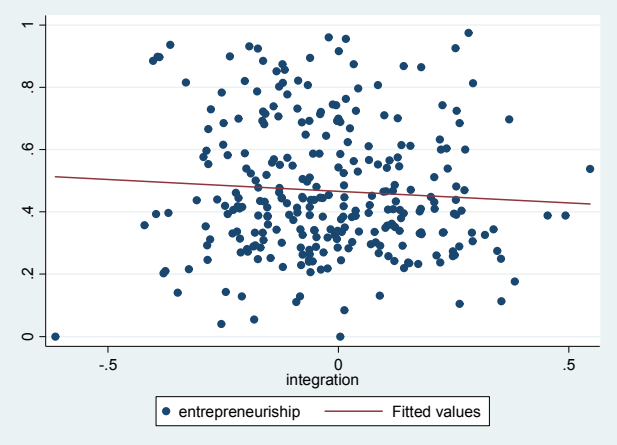

Figure 3 Socio-economic integration and migrant entrepreneurship

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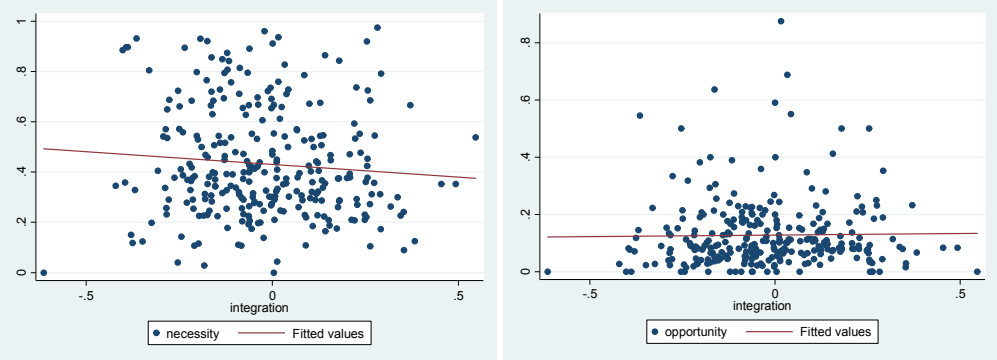

Figure 4 Socio-economic integration and migrant entrepreneurship (necessity-based vs. opportunity-based)

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