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SPECIALTY SECTION  
This article was submitted to  
Environmental Economics and  
Management,  
a section of the journal  
Frontiers in Environmental Science

RECEIVED 11 July 2022  
ACCEPTED 08 August 2022  
PUBLISHED 30 September 2022

CITATION  
Tang Y (2022), The effect of social  
capital on the career choice of  
entrepreneurship or employment in a  
closed ecosystem.  
*Front. Environ. Sci.* 10:991115.  
doi: 10.3389/fenvs.2022.991115

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# The effect of social capital on the career choice of entrepreneurship or employment in a closed ecosystem

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Restricted by China's "hukou" system, the population in any given area of the country is relatively constant, and its employability and workability are mutually determined, as in a closed ecosystem. Social capital (or "guanxi" in Chinese society) in China has the effects of reducing set-up costs for entrepreneurship or securing the job-seeking for employment. This paper uses equilibrium analysis and makes some modifications to Kihlstrom and Laffont's model to explore career choice mechanisms in China's context. It was found that when social capital only reduces the set-up costs for entrepreneurship, there exists one equilibrium point; individuals with more social capital will choose entrepreneurship, and those with less social capital will be workers or unemployed. When social capital simultaneously reduces the set-up costs for entrepreneurship and secures employment, four equilibrium points appear along with the strength of social capital, and the career options occur in the order of entrepreneurship, employment, entrepreneurship, and unemployment. The findings fill the gap that career choice is mainly determined by an individual's risk-aversion and contribute specifically to China's entrepreneurship and employment selection.

## KEYWORDS

equilibrium analysis, social capital, refugee effect, career choice, closed ecosystem

## 1 Introduction

Since 2014, the Chinese government has adopted mass entrepreneurship and innovation to stimulate sustainable economic growth. Some policies, such as "to encourage entrepreneurship to create more employment opportunities" are widely advocated for the coming years. Known as the two most important types of career choices, entrepreneurship and employment are equally important for China's economic development and social stability. However, the rates of both entrepreneurship and employment in some regions (such as Hunan province and Qinghai province) have not improved significantly even with the support of numerous stimulus policies.

Conversely, low-end entrepreneurship and even unemployment are increasing in some areas, particularly as the COVID-19 pandemic continues.

With contextualization in entrepreneurial studies, social factors such as customs, norms, and connections are involved to explain more specific entrepreneurial problems. In China, social capital, also referred to as “guanxi”, a Chinese expression of interpersonal connections, is widely seen in the country’s social and economic activities (Park and Luo, 2001; Chen and Chen, 2004; Barbalet, 2018). Its prevalence and increasing significance during China’s post-1978 shift toward a market economy has even been reinforced (Bian, 2018), especially in less developed areas (Guo et al., 2018). Taormina and Gao (2010) pointed out that guanxi is a type of dimension for relation study in China’s Confucian culture due to its function in reducing exchange costs and facilitating communication when confronted with hindrances from norms or laws. To foster guanxi among individuals, it is necessary to build relationships based on long-term associations and reciprocity (Bian, 2018). In addition to these benefits, social capital in China can also contribute to better trust and bring more implicit resources for newly established companies; it can also reinforce the depth of communication even among business cycles and government agencies as well. For this reason, social capital plays an important role in start-up activities in China (Alistair et al., 2008; Oppen et al., 2017; Ju et al., 2019). As concluded by Jing et al. (2018), in rural China, social capital can significantly improve entrepreneurial survival performance and innovative performance. Social capital is not only significant for entrepreneurship but is also important in job seeking and job development (Bian et al., 2012; Chung, 2019), including expanding job market resources, securing job retention, and even facilitating career paths.

China’s labor market has another specific characteristic due to the “hukou” system. Hukou is the household registration and residential permission system for China’s labor force. Legal hukou has a significant impact on social stratification and mobility in most areas because it implicitly brings with it much social welfare, such as buying houses, entering schools, or even enjoying social security guarantees (Lu, 2008; Chen and Hu 2021). Under the restrictions of hukou, most individuals cannot freely move outside of their permission areas. Entrepreneurial resources, including energy supply, financial support, technology innovation, etc. (Dong et al., 2021; Ren et al., 2022; Wang et al., 2022), are essentially constant and form a closed ecosystem for career choices. Accordingly, individuals may form a closed ecosystem in which entrepreneurship will only digest the labor demand locally (Huang et al., 2010), and those who cannot be digested in the ecosystem will always be left unemployed (Zhang, 2010).

In the classical work of Kihlstrom and Laffont (1979), the career choice of individuals whether to be employed on a salary from a company or to initiate their own start-up

(entrepreneurship) can be explained by a labor market equilibrium model (referred to as the K-L model). In the K-L model, the set of agents who have been identified with  $[0, 1]$ , and agent has von Neumann Morgenstern utility function  $u(I, \alpha)$ , where  $I$  represents income. Following this model, it is clear that the first and second derivatives  $u'$  and  $u''$  exist and are continuous. For the reason that  $u' > 0$  and  $u'' < 0$ , all agents are risk averse or indifferent to risk. In a competitive market, the model shows that there exists an equilibrium point that separates two career choices: the more risk-averse agents become employees while the less risk-averse agents become entrepreneurs. This pioneering research has inspired numerous discussions around who will preferentially choose a career as an employee and who will prefer to be an entrepreneur (Turro et al., 2016; Parker, 2018; Yang and Wen, 2020; de Blasio et al., 2021), and whether an individual’s risk aversity is one of the attributes for selecting entrepreneurship or employment (Choi et al., 2019; Bonilla and Vergara, 2021). Other factors that can affect the choice of career have also been introduced. According to Poschke (2008), the major determinant is education, and he confirmed that in an equilibrium model the level of education determines a U-shaped career choice: the individuals with the lowest and the highest levels of education are more likely to choose entrepreneurship. However, Van der Sluis et al. (2008) reviewed articles related to education and the decision to follow entrepreneurship and found that the impact of education on selecting entrepreneurship is insignificant. Using data from China, Chu and Wen (2019) conducted an empirical study and found that college education decreases self-employed-type entrepreneurial choices but increases boss-type activities. In this case, opportunity entrepreneurship and necessity entrepreneurship have been distinguished in China’s context.

Different from the mathematical modeling analysis by Kihlstrom and Laffont (1979) and Poschke (2008), Thurik et al. (2008) adopted an empirical study approach, in which the entire economic system only has agents that comprise employees or entrepreneurs, with each highly impacted by the other. On one hand, when new entrepreneurs are expelled as “refugees” from the employment market, a high unemployment rate will produce a high entrepreneurship rate; on the other hand, when the production function needs more labor input, a high entrepreneurship rate could create more employment demand. Therefore, in the studies by Thurik et al. (2008) and Aubry et al. (2015), career choice is affected by two types of effects: the refugee effect and the entrepreneurial effect. These two effects were verified by Dong et al. (2012), using data from the Chinese mainland.

For the reason that the refugee effect and the entrepreneurial effect cannot be drawn from the K-L model, some detailed career choice situations such as low-end entrepreneurship and unemployment have not been explained. In addition, the K-L model applies to an open system and thus cannot reflect the situation under China’s hukou system. Therefore, in this paper

the traditional K-L model is modified by adding social capital and confining the scope to a closed ecosystem, to better reflect the reality of China's employment and entrepreneurial choices and also to explore internal relations and career choice mechanisms.

Unlike traditional studies, which have shown that risk aversion is an important factor for career choice, this paper demonstrates that social capital, or *guanxi* in China's context, is a very important determinant. Whether social capital can reduce the set-up costs for entrepreneurship or secure employment for jobseekers, there will be an equilibrium both for an individual's utility and for the labor market in a closed ecosystem such as that restricted by China's hukou system. The Schumpeter effect and the refugee effect will appear along with the strength of an individual's social capital.

This paper is organized as follows: in Section 1, I introduce the background, some concepts, and the motivation to conduct this study. In Section 2, I describe the basic model based on the K-L model. Section 3 explores the existence and uniqueness of equilibriums of both utilities and labor forces for two kinds of careers. In Section 4, the effects of social capital on this equilibrium are discussed. Section 5 comprises the conclusion and implications of this study.

## 2 Basic model

The basic model is a modified version of the K-L model. Referring to the K-L model, I assume there is a closed system (in which the population is a constant) with a set of agents (who face career choices in the market) defined by the interval  $\alpha \in [0, 1]$ ; a higher value represents a greater aversion to risk. Each agent has an initial physical asset denoted by  $A$  and an initial income denoted by  $I \in [0, \infty]$ , where  $I$  is continuous. Any individual  $\alpha$  has a von Neumann–Morgenstern utility function  $u(I, \alpha)$ , so all agents are risk averse or indifferent to risk. Also, assuming the Arrow (1971) and Pratt (1964) absolute risk-aversion measure (see the K-L model) is non-decreasing in  $\alpha$ , i.e., if  $\alpha$  exceeds  $\beta$ , then:

$$r(I, \alpha) = -u''(I, \alpha)/u'(I, \alpha) \geq -u''(I, \beta)/u'(I, \beta) = r(I, \beta) \quad (1)$$

for all  $I \in [0, +\infty]$ .

Additionally, the technology function  $y(\cdot)$  is introduced, where  $y = g(L, \tilde{x})$  represents the individual entrepreneurship function,  $y$  is the output, and  $L$  is the labor input (employed by entrepreneurship, no less than 0),  $\tilde{x} \in [0, \bar{x}]$  and is independently identically distributed. Note that  $L$  is the employed population, and both entrepreneurs and workers are included in  $y(\cdot)$ , thus in an equilibrium system, the population of workers should equal to the employed workers by all entrepreneurs. Otherwise, there will be surplus population (unemployed or non-employer).

Note that the fostering of social capital requires long-term associations and reciprocity in China and having more

connections will reduce the exchange cost. Therefore, for entrepreneurship, the set-up cost function  $F(\alpha)$  is negatively correlated with the agent  $\alpha \in [0, 1]$ , where  $\alpha$  represents the value of social capital strength.

Also, the technology function of  $g(L, x)$  is adopted, in which  $g$  is the output and  $x$  is the value taken by a nondegenerate random parameter  $\tilde{x}$  with the support of  $[0, \tilde{x}]$ ,  $0 < \tilde{x} < +\infty$ . The income function for entrepreneurship is therefore defined by:

$$I_E = A + \pi - F(\alpha) \quad (2)$$

Where  $w$  is the wage paid for employment; when an entrepreneur  $\alpha$  pays the wage  $w$  and employs  $L(w, \alpha)$  workers,  $\pi = g(L, \tilde{x}) - wL$  is the profit obtained by the entrepreneur, but it is random.

The income function for employment can be specified as:

$$I_L = A + w \quad (3)$$

Also, according to agents' utility functions, denoted as  $Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha)$  for entrepreneurs and  $u(A + w)$  for workers, note that agent  $\alpha$  will choose to be an entrepreneur when:

$$Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha) \geq u(A + w) \quad (4)$$

Or he will choose to be a worker (when equality happens, the agent will be indifferent as an entrepreneur or a worker).

As mentioned earlier, in a closed ecosystem, the labor forces will reach equilibrium when the labor market clears. When this happens, the total number of workers demanded by entrepreneurship equals the number supplied by the market, with the equilibrium wage of  $w^*$ , and the market can be described as:

$$\int L(w^*, \alpha) d\alpha = 1 - \alpha \quad (5)$$

and  $L(w, \alpha) \in [0, (A - F(\alpha))/w]$ .

## 3 The existence and uniqueness of equilibrium

Equilibrium analysis is widely used in economics research (Cheng et al., 2021; Duan et al., 2021; Wen et al., 2022). In Sections 3.1 and 3.2, the existence of points where utility and labor market equilibrium is reached will be explored.

### 3.1 The equilibrium of utility

In Section 2,  $Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha) \geq u(A + w)$  was set as the criteria to be an entrepreneur, and the following is to judge whether there exists the certainty equivalent wage  $w^*$  which makes agent  $\alpha$  indifferent between two careers. So, there is the utility function:

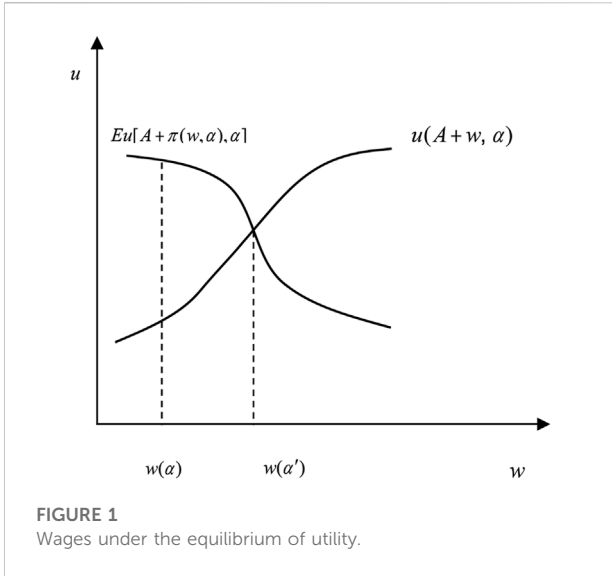


FIGURE 1 Wages under the equilibrium of utility.

$$Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha) = u(A + w) \quad (6)$$

Which can be rewritten as:

$$P(w) = Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha) - u(A + w) \quad (7)$$

When  $w > w'$ , under the precondition of  $(A - F(\alpha))/w \geq L \geq 0$  and  $(A - F(\alpha))/w' \geq L \geq 0$ , we have:

$$\begin{aligned} \max Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha) &\leq \max Eu(A + g(L, \tilde{x}) \\ &- w'L - F(\alpha), \alpha) \\ &= Eu(A + g(L, \tilde{x}) - w'L - F(\alpha), \alpha) \end{aligned} \quad (8)$$

Which proves that  $P(w)$  is monotonically decreasing.

Also, when  $w \rightarrow 0$ ,

$$Eu(A + g(L, x) - wL - F(\alpha), \alpha) - u(A + w, \alpha) > 0 \quad (9)$$

and when  $w \rightarrow \infty$ ,

$$g(L, x) - wL - F_E(\alpha) \leq \max g(L, x) \rightarrow 0 \quad (10)$$

The intermediate value theorem implies the existence of a positive  $w^*$  that satisfies  $Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha) = u(A + w)$ , and the existence and uniqueness of  $w^*$  has verified the monotonicity of  $P(w)$ . The utility functions for the two parties are illustrated in Figure 1.

Let's move to the variable of social capital in China, or guanxi, which can both facilitate resource acquisition and decrease set-up costs. For any given agent, if they are endowed with less social capital, they will face higher set-up costs, so the expected value from entrepreneurship will decrease. On the other hand, if they, as an entrepreneur, pay higher initial wages to their workers, the expected value will accordingly decrease. For the workers, a higher wage will

definitely increase their utility. Reflecting on  $Eu(A + g(L, \tilde{x}) - wL - F(\alpha), \alpha)$  and  $u(A + w)$ , the former expression is decreasing and the latter is increasing, so one  $w^*$  will exist that realizes the equilibrium [see Figure 1, intersection at  $w(\alpha')$ ].

Therefore, no matter whether social capital is considered, there exists the certainty equivalent wage  $w^*$  which makes agent  $\alpha$  indifferent to the choice between entrepreneurship and employment.

### 3.2 The equilibrium of the labor market

As shown in the basic model, in a closed ecosystem such as that formed by the hukou system, the number of workers demanded by entrepreneurship equals the number supplied by the market, so the market is determined by:

$$\int L(w^*, \alpha) d\alpha = 1 - \alpha \quad (11)$$

I define  $(\{\Delta, \Gamma\}, w) = (\{0, \hat{\alpha}^*\}, (\hat{\alpha}^*, 1], w(\hat{\alpha}^*))$ .

For the reason that  $L(w, \alpha) > 0$  and when  $\hat{\alpha} < \hat{\alpha}'$   $w(\hat{\alpha}) \geq w(\hat{\alpha}')$ , then:

$$\begin{aligned} \int_0^{\hat{\alpha}'} L(w(\hat{\alpha}'), \alpha) d\alpha &= \int_0^{\hat{\alpha}} L(w(\hat{\alpha}'), \alpha) d\alpha \\ &+ \int_{\hat{\alpha}}^{\hat{\alpha}'} L(w(\hat{\alpha}'), \alpha) d\alpha > \int_0^{\hat{\alpha}} L(w(\hat{\alpha}), \alpha) d\alpha \end{aligned} \quad (12)$$

Thus, the labor demand  $\int_0^{\hat{\alpha}} L(w(\hat{\alpha}), \alpha) d\alpha$  at  $w(\hat{\alpha})$  is increasing at  $\hat{\alpha}$ . From the labor supply at  $w(\hat{\alpha})$ ,  $1 - \hat{\alpha}$  is a strictly decreasing function of  $\hat{\alpha}$ . Therefore, it can be concluded that  $\int L(w^*, \alpha) d\alpha = 1 - \alpha$  holds because of increasing  $\int_0^{\hat{\alpha}} L(w^*, \alpha) d\alpha - (1 - \alpha)$  at  $\alpha$ , and there exists only one specific  $\hat{\alpha}$  that satisfies the equation of  $\int L(w^*, \alpha) d\alpha = 1 - \alpha$ .

In that case, when social capital is considered and for  $Eu(A + g(L, x) - wL - F_E(\alpha), \alpha) - u(A + w - F_L(\alpha))$  is decreasing. Accordingly, there will be  $w(\hat{\alpha})$  that satisfies the equations of  $\int L(w^*, \alpha) d\alpha = 1 - \alpha$  and  $w(\hat{\alpha}) > w(\alpha^*)$ . It should also be noted that social capital is set in the interval of  $\alpha \in [0, 1]$ , where  $\alpha$  represents the value of social capital strength. Therefore,  $\int L(w^*, \alpha) d\alpha = 1 - \alpha$  can be rewritten as  $\int_{\alpha}^1 L(w^*, \alpha) d\alpha = \alpha$  to better describe the situation. For the difference of  $w(\hat{\alpha})$  and  $w(\alpha^*)$ , those with more social capital will choose to be entrepreneurs, while those with less social capital may choose to be workers. Under this situation, the entrepreneurs will employ the number of  $L(w(\alpha^*), \alpha)$  workers.

From the labor market analysis, it can be concluded that an equilibrium wage exists that can satisfy the equation of  $\int_{\alpha}^1 L(w^*, \alpha) d\alpha = \alpha$ , i.e., the equilibrium of the labor market holds.

## 4 Results

### 4.1 The effects of social capital on the equilibrium

As shown in Section 3, when the effects of social capital are ignored, the career choice among individuals is mainly affected by risk aversion, and the equilibriums of both utility and the labor market can be met at a certain wage level. Also from Section 3, we know that when social capital exists, either utility equilibrium or labor market equilibrium could be realized for the given agents, but it remains unknown whether a constant wage exists that can satisfy both types of equilibrium. When social capital is considered, and to explore the equilibrium for utility and labor markets, this discussion is divided into two parts. The first part focuses on the situation in which entrepreneurs are capable of using their social capital to reduce set-up costs, while workers have no effective social capital to safeguard their employment. The second part discusses the situation in which social capital can simultaneously reduce the set-up costs for entrepreneurs and secure employment for workers.

### 4.2 The effect of social capital on entrepreneurship

In this part, it is assumed that entrepreneurs have social capital while workers have no social capital to secure their jobs. Considering the effects of social capital, for  $dr(I)/d(I) < 0 \rightarrow \partial L/\partial \alpha > 0$ , the employable capability from entrepreneur agent is correlated with the strength of their social capital and risk-aversion inclination. If an agent has more social capital and is a risk-seeker, they will have a greater intention to hire more workers. Additionally,  $dr(I)/d(I) > 0 \rightarrow \partial L/\partial \alpha < 0$  signifies that if an agent is risk averse, their intention to hire workers decreases.

As described in Section 3, when wage  $w(\hat{\alpha})$  is the minimum wage and  $w(\hat{\alpha}) > w(\alpha^*)$ , an entrepreneur cannot support that high level wage, so they will reduce employment. In other words, the wage  $w(\hat{\alpha})$  cannot satisfy the labor market equilibrium, which can be expressed as:

$$\int_{\hat{\alpha}}^1 L(w(\hat{\alpha}), \alpha) d\alpha - \hat{\alpha} < 0 \tag{13}$$

For the difference between actual employment and potential workers,  $\hat{e}$  is denoted as the equilibrium employment rate. Therefore, at  $\hat{\alpha}$ ,

$$0 < \hat{e} = \int_{\hat{\alpha}}^1 L(w(\hat{\alpha}), \alpha) d\alpha / \hat{\alpha} < 1 \tag{14}$$

When  $0 < \hat{e} \leq 1$ ,  $1 - \hat{e}$  is the unemployment rate the agents face. An individual who chooses to be a worker will face the utility function  $\hat{e} \cdot u(A + w(\hat{\alpha})) + (1 - \hat{e}) \cdot u(A) < u(A + w(\hat{\alpha}))$ , and

given that the population is a constant in a closed ecosystem, the worker faces the risk of being unemployed. Accordingly, an entrepreneur faces the utility function of  $Eu(A + \tilde{\pi}(w(\hat{\alpha}), \hat{\alpha}) - F(\hat{\alpha})) = u(A + w(\hat{\alpha}))$ , which is larger than the utility of being a worker. As a result, it can be concluded that at  $w(\hat{\alpha})$ , an agent will prefer to be an entrepreneur.

Considering the effects of social capital, I chose the agent  $\hat{\alpha} - \epsilon (\epsilon \rightarrow 0)$ , who faces an employment rate  $e(\hat{\alpha} - \epsilon) = \int_{\hat{\alpha} - \epsilon}^1 L(w(\hat{\alpha}), \alpha) d\alpha / (\hat{\alpha} - \epsilon)$ . Obviously,

$$\int_{\hat{\alpha} - \epsilon}^1 L(w(\hat{\alpha}), \alpha) d\alpha / (\hat{\alpha} - \epsilon) > \int_{\hat{\alpha}}^1 L(w(\hat{\alpha}), \alpha) d\alpha / \hat{\alpha} > \hat{e} \tag{15}$$

holds, indicating that an individual  $\hat{\alpha} - \epsilon$  who chooses to be an entrepreneur will increase the employment rate. Therefore, the expected utility for the worker will be increased accordingly.

I now move on to the discussion of utility for an entrepreneur at a given wage of  $w(\hat{\alpha})$ .

As indicated in (6),  $Eu(A + g(L, x) - wL - F(\hat{\alpha})) = u(A + w(\hat{\alpha}))$  holds, so then:

$$\begin{cases} u(A + w(\hat{\alpha})) > u(A + w(\hat{\alpha} - \epsilon)) \\ u(A + w(\hat{\alpha} - \epsilon)) = Eu(A + \tilde{\pi}(w(\hat{\alpha} - \epsilon), \hat{\alpha} - \epsilon) - F(\hat{\alpha} - \epsilon)) \\ Eu(A + \tilde{\pi}(w(\hat{\alpha} - \epsilon), \hat{\alpha} - \epsilon) - F(\hat{\alpha} - \epsilon)) > Eu(A + \tilde{\pi}(w(\hat{\alpha}), \hat{\alpha} - \epsilon) - F(\hat{\alpha} - \epsilon)) \end{cases} \tag{16}$$

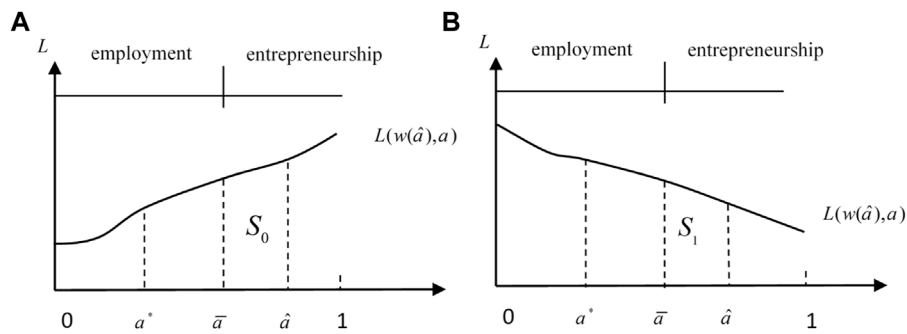
From (16), the agent  $\hat{\alpha} - \epsilon$  as an entrepreneur has lower utility than the agent  $\hat{\alpha}$  as an entrepreneur when at a given wage of  $w(\hat{\alpha})$ . The workers have utility values expressed as  $e \cdot u(A + w(\hat{\beta})) + (1 - e) \cdot u(A)$ , therefore it can be concluded that  $\bar{\alpha} < \hat{\alpha}$  exists that satisfies:

$$Eu(A + \tilde{\pi}(w(\hat{\alpha}), \bar{\alpha}) - F(\bar{\alpha})) = e(\bar{\alpha})u(A + w(\hat{\alpha})) + (1 - e(\bar{\alpha})) \cdot u(A) \tag{17}$$

This indicates that it is indifferent to be an entrepreneur or a worker for any agent  $\bar{\alpha}$ . Also, it can be found that  $e(\bar{\alpha})$  is the employment rate when the employment reaches equilibrium at the minimum wage value of  $w(\hat{\alpha})$ , and  $\alpha^* < \bar{\alpha} < \hat{\alpha}$  is the situation in which more agents will adjust their career choice based on utility value.

Next,  $1 - e(\bar{\alpha})$  was set as the risk that an agent faces when they decide to be a worker. For  $\alpha^* < \bar{\alpha} < \hat{\alpha}$ , it can be divided into two intervals:  $[\alpha^*, \bar{\alpha}]$  and  $[\bar{\alpha}, \hat{\alpha}]$ .

According to the K-L model, the agents from  $[\bar{\alpha}, \hat{\alpha}]$  will be workers. However, in the present model, the agents facing the risk of unemployment  $1 - e(\bar{\alpha})$ , so they will be excluded from employment and then choose to be entrepreneurs. For the reason that the would-be workers are forced to choose entrepreneurship (or the impact of the unemployment rate on entrepreneurship), they are more similar to refugees from employment markets, so in economics this situation is described as the “refugee effect” (Thurik et al., 2008; Ghavidel et al., 2011). For the interval  $[\bar{\alpha}, \hat{\alpha}]$ , the number of  $\int_{\bar{\alpha}}^{\hat{\alpha}} L(W(\hat{\alpha}), \alpha) d\alpha$  workers will be created, thus



**FIGURE 2**  
The refugee effect and the Schumpeter effect under social capital for entrepreneurship.

the entrepreneurial effect or the Schumpeter effect appears in this situation, by which more innovative entrepreneurship appears to create more job vacancies (Aubry et al., 2015; Ferreira et al., 2017). Both effects are shown in Figure 2, where  $S_0, S_1$  is the number of jobs created by the Schumpeter effect. In Figure 2A, the situation of risk-seeking in relation to income is measured, so  $L(w(\hat{\alpha}), \alpha)$  is increasing. In Figure 2B, the situation of risk aversion in relation to income is measured, so  $L(w(\hat{\alpha}), \alpha)$  is decreasing. Affected by social capital, agents staying at the interval of  $[\bar{\alpha}, 1]$  are entrepreneurs, while individuals staying at the interval of  $[0, \bar{\alpha}]$  are workers or unemployed agents. So, a single equilibrium point  $\bar{\alpha}$  exists, and this reflects the boundary of the two types of careers.

### 4.3 The effect of social capital on employment

When social capital as a factor can both decrease the set-up costs for entrepreneurship and secure employment for workers,  $\alpha$  can also be used to signify the ability of agents to secure their jobs, i.e., holders of higher  $\alpha$  will be preferably employed. With the aid of social capital, the utility of agents from the interval of  $[\bar{\alpha}, \hat{\alpha}]$  will be improved, and the former entrepreneurs created by the refugee effect will be substituted by the workers. Less entrepreneurship will lead to less employment requirements, so those agents with lower social capital cannot be sure of getting a job. The term  $\alpha' = \hat{\alpha} - \int_{\hat{\alpha}}^1 L(W(\hat{\alpha}), \alpha) d\alpha$  is used to express those agents who cannot be employed in their one-time career choice, which gives:

$$\int_{\hat{\alpha}}^1 L(W(\hat{\alpha}), \alpha) d\alpha = \hat{\alpha} - \alpha' > \hat{\alpha} - \bar{\alpha} \quad (18)$$

After the one-time choice, career choices vary in intervals  $[0, \alpha']$ ,  $(\alpha', \bar{\alpha}]$ ,  $(\bar{\alpha}, \hat{\alpha}]$ , and  $(\hat{\alpha}, 1]$ . Obviously, the agents that stay at  $(\hat{\alpha}, 1]$  will choose entrepreneurship, and they are always risk-takers. Impacted by the Schumpeter effect

from  $(\hat{\alpha}, 1]$ , employment will increase by  $S_0$  presented across the interval  $(\alpha', \bar{\alpha}]$ , and all agents in this interval have no risk of being a worker due to their higher social capital. However, affected by lower social capital, agents that stay at the interval of  $[0, \alpha']$  cannot compete with other agents who have higher social capital, so they must make the next career choice.

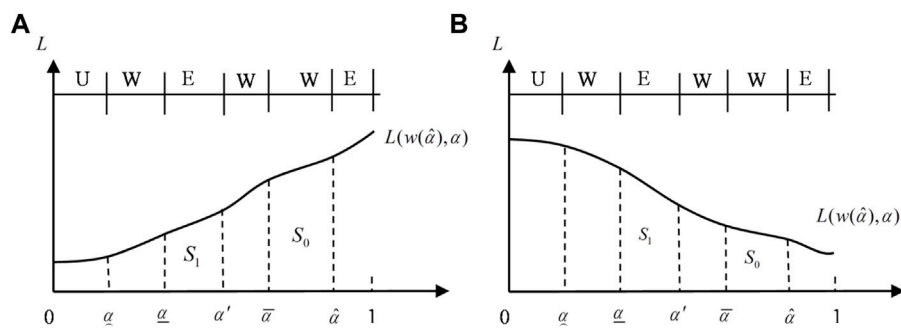
Also, given the constant population in a closed ecosystem, the agents in an interval will have three career options. The first is entrepreneurship for a living, also known as necessity entrepreneurship (O'Donnell et al., 2021; Dencker et al., 2021). The second is employment arising from the entrepreneurial effects of the above-mentioned necessity entrepreneurship. The third is unemployment, because the agents have no resources to secure their career.

With regard to the interval of  $[0, \alpha']$ , if there are no agents engaging in entrepreneurship, there will be no employment. For workers, if their utility is higher than  $u(A)$ , they will be willing to be employed. Thus, this gives the equilibrium:

$$Eu(A + \tilde{\pi}(w(\hat{\alpha}), \alpha) - F(\alpha)) = u(A) \quad (19)$$

As shown in the proof in 3.1, the intermediate value theorem implies the existence of a positive  $\underline{\alpha}$  ( $0 < \underline{\alpha} < \alpha'$ ) that satisfies  $Eu(A + \tilde{\pi}(w(\hat{\alpha}), \underline{\alpha}) - F(\underline{\alpha})) = u(A)$ . Therefore, in the interval of  $(\underline{\alpha}, \alpha')$ , all agents will choose entrepreneurship, but this will be confined to necessity entrepreneurship. In this interval, some agents are those who are excluded from the one-time choice. Accordingly, the refugee effect appears in this interval. Also, the necessity entrepreneurship will create  $\int_{\underline{\alpha}}^{\alpha'} L(W(\hat{\alpha}), \alpha) d\alpha$  employment.

If agents exist who cannot be employed in the interval of  $(\underline{\alpha}, \alpha')$ , i.e., when  $\int_{\underline{\alpha}}^{\alpha'} L(W(\hat{\alpha}), \alpha) d\alpha < \underline{\alpha}$  holds, then  $\bar{\alpha} = \underline{\alpha} - \int_{\underline{\alpha}}^{\alpha'} L(W(\hat{\alpha}), \alpha) d\alpha$ . It can be seen that  $\alpha \in [\bar{\alpha}, \underline{\alpha}]$  are those agents who benefit from the Schumpeter effect and become employed, but the agents  $\alpha \in [0, \bar{\alpha}]$  cannot get employed because of the insufficient social capital in a closed ecosystem.



**FIGURE 3**  
Staggered career choices along with the strength of social capital.

This process is also expressed in Figure 3.  $L(w(\hat{\alpha}), \alpha)$  is increasing or decreasing depending on an agent's risk-seeking or risk-aversion tendencies (which are shown in Figures 3A,B). If  $\hat{\alpha} - \alpha' \geq \hat{\alpha} - \bar{\alpha}$  and  $\alpha' - \underline{\alpha} \geq \hat{\alpha} - \bar{\alpha}$ , the area of  $S_1$  or  $\int_{\underline{\alpha}}^{\alpha'} L(W(\hat{\alpha}), \alpha) d\alpha$  is the employment increased by the interval of  $(\underline{\alpha}, \alpha')$ , and  $S_0$  or  $\int_{\bar{\alpha}}^{\hat{\alpha}} L(W(\hat{\alpha}), \alpha) d\alpha$  is the employment increased by the interval of  $(\bar{\alpha}, \hat{\alpha})$ . When  $L(w(\hat{\alpha}), \alpha)$  is increasing (Figure 3A), the employment created by the Schumpeter effect from  $\alpha \in (\underline{\alpha}, \alpha')$  is smaller than the potential employment created by the potential entrepreneurs  $\in (\bar{\alpha}, \hat{\alpha})$ , i.e., the social capital has squeezed employment in this situation. The opposite situation happens when  $L(w(\hat{\alpha}), \alpha)$  is decreasing, and in this situation, social capital expands employment (see Figure 3B).

From the entire landscape, when social capital can both reduce the set-up costs for entrepreneurship and secure jobs, career choices will be staggered along with the strength of social capital. As shown in Figure 3,  $\alpha \in (\hat{\alpha}, 1]$  and  $\alpha \in (\underline{\alpha}, \alpha')$  choose entrepreneurship,  $\alpha \in (\alpha', \hat{\alpha})$  and  $\alpha \in [\bar{\alpha}, \underline{\alpha}]$  choose employment, and  $\alpha \in [0, \hat{\alpha})$  will face unemployment.  $\hat{\alpha}$ ,  $\alpha'$ ,  $\underline{\alpha}$ , and  $\bar{\alpha}$  are equilibrium points.

## 5 Conclusion and suggestions

This paper describes some modifications to the traditional K-L model, which was then used to explore the mechanism of career choice between entrepreneurship and employment. For the K-L model and some other scholars (Parker, 2018; Choi et al., 2019; Yang and Wen, 2020; Bonilla and Vergara, 2021), as based on the rule of risk aversion for individuals, it was found that a utility equilibrium and a labor equilibrium exists in the market, and agents who are more risk-seeking will prefer to be entrepreneurs, while the more risk-averse will be workers. Similarly, an equilibrium analysis by Posche (2008) confirmed that education is a significant factor in career choice. However, when social capital, or guanxi in China, which is rooted in the

country's Confucian culture and widespread in Chinese society, and the hukou system, a type of permission certificate that stops people moving freely around the country, are considered in a K-L model, the equilibrium analysis of career choice will show many differences, as outlined below.

For the prevention of free mobility by hukou, any given area will basically keep a stable population and is always seen as a closed ecosystem where people, no matter entrepreneurs or workers, are interactively digested by each other. When social capital (or guanxi) can only reduce the set-up costs for entrepreneurship but has no effect on workers, there is only one equilibrium point. Holders of greater social capital will choose entrepreneurship, while the holders of lower social capital will choose to be workers or will be unemployed.

When social capital can simultaneously reduce the set-up costs for entrepreneurship and secure workers' jobs, there will be at least four equilibrium points, with a staggered career choice along with the strength of social capital (from highest to lowest) of entrepreneurship, employment, entrepreneurship, and unemployment. This conclusion is different from Dong et al.'s (2021), who suggest that entrepreneurship and employment are dichotomies.

No matter whether social capital can only reduce the set-up costs for entrepreneurs or can both reduce the set-up costs for entrepreneurs and secure jobs for workers, there appears to be a Schumpeter effect through which more employment will be stimulated with incremental entrepreneurship. However, when social capital has the capability of securing jobs, some holders of lower social capital will be excluded from the first employment market and will then have to choose necessity entrepreneurship, so the refugee effect appears. This conclusion is in agreement with the study of Chu and Wen (2019), who stress that education decreases self-employed-type entrepreneurial choices but increases boss-type activities. My explanation is that education is a good channel through which to improve social capital because of its wider social space and stronger relations.

Under both the Schumpeter effect and the refugee effect, some holders of even lower social capital will be squeezed to choose low-end employment or even become unemployed. This could explain why in some less developed areas (such as Hunan province and Qinghai province), where guanxi is more unevenly distributed and the hukou system is even stricter, low-end entrepreneurship and unemployment are common.

These conclusions have many implications, such as the fact that social capital can consolidate both entrepreneurship and employment and improve the quality of career choices; individuals who have weak social capital are more vulnerable in the job market; and that closed ecosystems could result in a precarious employment rate. To smooth the employment market and improve career quality, the following suggestions are made. Noting that guanxi, China's social capital, is always based on long-term associations and reciprocity, individuals should positively expand their social interactions; establish long-term and stable relations with their relatives, classmates, or other peers; and be ready to "pay back" if they are asked for help by other parties. For the government, on one hand noting that nurturing social capital is essential, the government should initiate more educational or professional agencies to accommodate more people to establish or even strengthen their communications; on the other hand, the government should reduce the restrictions arising from the hukou system and open more job markets in different areas to compensate for the weakness of holders of lower social capital and increase the quantity and quality of employment and entrepreneurship.

This paper primarily focuses on the modification of the K-L model, with frequent use of equilibrium analysis. Further empirical research analysis should be conducted to test related conclusions. Here, the understanding of social capital in China is confined to saving costs and securing jobs, but the actual connotations of social capital, or guanxi, are more complicated in China's context. In the future, more mechanisms should be added to the K-L model, to better match reality.

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## Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material; any further inquiries can be directed to the corresponding author.

## Author contributions

The author confirms being the sole contributor of this work, and has contributed to the conception, model design, mathematical analysis, discussion and conclusion of the study.

## Funding

This paper was supported by National Social Science Fund of China (No. 21BGL199), Think Tank Major Project of Hunan Social Science Foundation (No.19ZWA44), The General Project of Hunan Social Science Achievement Appraisal Committee (No. XSP20YBZ057), The Research Project of Education Department of Hunan Province (No. 18B440).

## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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