How Does Industrial Structure Upgrade Affect Entrepreneurship?

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***Abstract*—Management academics are increasingly recognizing the profound implications of industrial structural shifts, particularly as economies worldwide transition toward technology-intensive and service-oriented sectors. Against the backdrop of rapid globalization and technological advancement, industrial structure upgrading has reshaped labor markets, entrepreneurial opportunities, and risk perceptions. Entrepreneurship, a critical driver of innovation and economic resilience, faces both challenges and opportunities in this evolving landscape. This study aims to empirically analyze the multifaceted relationship between industrial structure upgrading and entrepreneurship, with a focus on identifying mediating mechanisms and heterogeneous effects in developed versus developing contexts. Using cross-sectional data from 141,402 individuals across 43 countries (2020), we employ logistic regression and mediation analysis to investigate the impact of structural shifts on entrepreneurial activity. Key findings reveal that industrial upgrading suppresses entrepreneurial enthusiasm, particularly in developing economies, mediated by reduced market opportunities, increased entry barriers, and labor market polarization. Positive mediators include labor efficiency gains and improved social welfare, though these are often outweighed by negative factors in underdeveloped regions. The study underscores the need for balanced policies that harmonize industrial transformation with entrepreneurial incentives, offering actionable insights for policymakers to foster sustainable economic growth while mitigating unintended disincentives to entrepreneurship.**

***Keywords*—entrepreneurship, industrial structure upgrade, developed countries, developing countries**

I. Introduction

There is no doubt that the occupational choice of whether to be an entrepreneur or a worker matters a lot to a country's economic growth and employment. Entrepreneurship has been regarded as a national strategy in China since the slogan "Entrepreneurship and Innovation" put forward in 2014. Many researches had revealed that individual capital (Kaushik *et al.*, 2023; Wei *et al.*, 2024), institution (Clarysse *et al.*, 2023; Sahasranamam and Nandakumar, 2020), finance (Chen *et al.*, 2023), culture (Soloviov, 2018) can influence the entrepreneurship. Nevertheless, little research has been done to look at the part of (Kaushik and Tewari, 2023; Stuetzer *et al.*, 2016) industrial structure change. In past centuries, many countries had undertaken industrial structural upgrades which not only brought a lot of new ideas through technology and knowledge, but opportunity and challenge in commercial and service market, and factor market, especially for the labor market.

Identifying entrepreneurial opportunities is the basic condition for being an entrepreneur (Asante and Affum-Osei, 2019). Shane (2000) pointed out that entrepreneurial opportunities rather than entrepreneurs themselves should become the core area of entrepreneurial research. As we know, there are different entrepreneurial opportunities from the sunset industries to sunrise industries. Therefore, industrial structure affects entrepreneurship through identifying the industrial entrepreneurial opportunities. The first is the decisive role played by reality (Matricano, 2020). A viable, profit-seeking, potential business that introduces a novel new product or service to the market, enhances an already-existing product or service, or replicates a successful product or service in a less-than-saturated market is known as an entrepreneurial opportunity (Singh, 2001). The second dimension comes from the performance of the individual in reality. Under this dimension, opportunities are the result of individual differences such as education, social cognition and psychological qualities. Many researchers distinguish the factors of "identification opportunity" from a personal perspective. For example, Mahfud *et al.* (2020) studies the impact of entrepreneurial social capital on entrepreneurial performance. Reuber *et al.* (2020) consider the assessment of opportunities in international entrepreneurship as an individual-level cognitive activity. However, the role of reality is essential for identification opportunity. The effect of opportunities on entrepreneurship always occurs first on market opportunities, followed by the identification of opportunities by individuals. This article mainly studies the first type of opportunity, the market entrepreneurial opportunity brought by new products, new technologies or new business models in the process of changing industrial structure. In the era of interconnection of various industries, changes in industrial structure will generate externalities through technology and knowledge spillovers within and between industries especially the development of the Internet has accelerated the spillover of tacit knowledge, which provides more entrepreneurial opportunities, for example, smart city is a source for entrepreneurial opportunities (Barba and Arias, 2019); entrepreneurial opportunity pursuit through new business model (Di Muro and Turner, 2018). On the other hand, the upgrading of the industrial structure will also eliminate backward production capacity, leading to the withdrawal of part of the original industries or sectors in the industry, and thus releasing a large number of economic factors to provide entrepreneurs with the resources needed for entrepreneurship, such as capital or manpower.

In addition to the opportunities are brought out in product market, the impact of industrial structure upgrade on entrepreneurship is also reflected in the labor market. Industrial structure upgrading will affect entrepreneurship through workers' employment. With the evolution of the

industrial structure, labor flows between industries. On the one hand, a large amount of low-quality surplus labor will be squeezed out, and on the other hand, there will be a huge demand for high-quality labor. As a result, the coexistence of "job vacancies" and "labor surplus" occurred during this period, the so-called "structural unemployment". If the skills mastered by some workers do not match the new jobs, the structural unemployment will occur. Therefore, though technology can replace part of human work, simplify work and enrich work (Hirsch, 2016; Dworschak and Zaise, 2014), for example, the development of Cyber-Physical Systems (CPS) has changed the form of interaction between workers and machines (Waschul *et al.*, 2012), still some workers are forced to start businesses in order to earn a living. However, as the industrial structure changes, the increase of employment opportunities will increase the opportunity cost of entrepreneurship, one example is that the rise and rapid development of the tertiary industry drive employment in this industry. For example, a less noted fact is that the service-industry employment ratio, exhibited an interesting U-shaped pattern as the industrial structure changes, which is observed in US and China (Zhou and Pan, 2020). From this perspective, the upgrading of industrial structure will inhibit entrepreneurial activities.

In this paper, we set out to empirically explore the relationship between different economic structure and entrepreneurial initiative based on a cross-sectional data of 94328 individuals from 64 countries (2020). The results show that, first, there is less entrepreneurial enthusiasm in countries where the industrial structure is more advanced, and this effect is more noticeable in undeveloped economies. Second, labor concentration in the secondary and tertiary industries, labor production efficiency, the level of basic welfare of the country and entrepreneurial entry barriers have a positive mediating effect on the effect of industrial structure upgrade on entrepreneurship. Needless to say, this paper far exceeds any previous paper regarding the role of economic structure on entrepreneurship in the breadth of its analysis. The main objective of this paper is to fill the void in the literature and provide a thorough examination of the impacts of structural upgrading on entrepreneurship. This paper is structured as follows: Section II presents a review of the literature and the influence mechanism and hypothesis. Section III provides a discussion of the research methods and data issues. Section IV presents the empirical findings and discussions, while Section V concludes.

II. The Influence Mechanism and Hypothesis

The classic component of industrial structural change is industrial structural upgrading (Zhou and Pan, 2020; Peneder, 2003; Hartwig, 2012). Theoretically, Industry upgrade refers to the process of resource reallocation within the same industry, while industrial structure upgrade refers to the process of resource transfer from inferior industry to senior industry, which is the process of resource reallocation among industries. The three industries in the national economy and the internal structure of the secondary industry are the two facets from which the research on upgrading the industrial structure is conducted. The most famous research achievement of the former is the "Petty-Clark theorem", that is, with the improvement of per capital national income, the process of labor transfer from the primary industry to the secondary industry and the tertiary industry. As further research, it is proposed that the trend from labor-intensive industry to capital and technology intensive industry about evolution trend of the industrial structure within the secondary industry (Baolin, 2009) The three main industries' change tendencies serve as the primary source of the indicator of industrial structure upgrading in this article. The effects of industrial structure on entrepreneurship have been the subject of numerous studies. Based on these papers, we sorted out and proposed that industrial structure upgrade can influence entrepreneurship' performance from 3 paths. (1) Through entrepreneurial opportunities; (2) Through labor market; (3) Through industrial distribution structure.

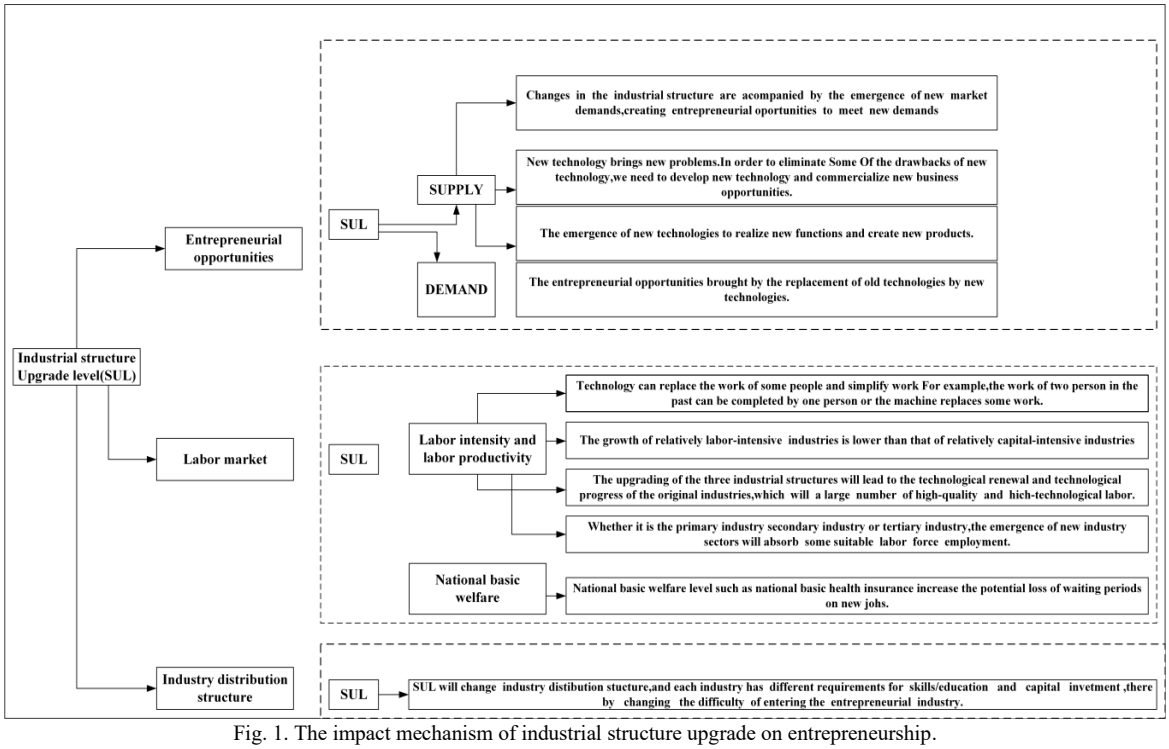

Fig. 1. The impact mechanism of industrial structure upgrade on entrepreneurship.

A. Entrepreneurial Opportunities

Identifying entrepreneurship opportunities is a prerequisite for starting entrepreneurial activities, and entrepreneurship opportunities have become the core topic of entrepreneurial process research. Entrepreneurial opportunities are often seen to increase with the upgrading of industrial structure. However, for a variety of reasons, modern industrial structure upgrades actually tend to stifle the emergence of entrepreneurial prospects: (1) Technological barriers. With the upgrading of industrial structure, the application of new technologies and processes becomes increasingly common. These technologies and processes often require high R&D costs and expertise, which poses a significant challenge for startups. They may lack sufficient funds and resources to invest in these advanced technologies, thereby being excluded from market competition. (2) Market concentration. Industrial upgrading is usually accompanied by an increase in market concentration. Large enterprises expand their scale through mergers, collaborations, and other means, increasing their market share. This makes it difficult for new entrants to find a foothold in the market, as they must compete with these established giants. (3) To promote the upgrading of industrial structure, the government may introduce a series of new regulations and policies. These policies may impose higher requirements on the establishment and operation of new businesses, such as stricter environmental protection standards, higher safety regulations, etc. These requirements may increase the cost and difficulty of entrepreneurship. Thus, we propose the following hypothesis 1:

H1. Industrial structure upgrade will reduce entrepreneurship by providing less entrepreneurial opportunities.

For individuals, identifying entrepreneurial opportunities is a comprehensive consideration, because possibilities can be found in a variety of research fields, including psychology, social science, and cognitive science, in addition to the economics fields (Matricano, 2020). Entrepreneurs' experience skills (Shahzad *et al.*, 2021), social network (Riaz *et al.*, 2024), psychological quality (Kuratko *et al.*, 2021), etc. will affect the recognition of opportunities.

B. Labor Market

1) Employment structure

Case 1, upgrading the industrial structure will squeeze out some job opportunities. First of all, the upgrading of industrial structure is accompanied by technological progress. Technology can replace the work of some people and simplify work (Hirsch, 2016; Dworschak and Zaise, 2014). For example, the work of two people in the past can be completed by one person or the machine replaces some work, such as Cyber-Physical Systems (CPS). The development of CPS has changed the form of interaction between workers and machine (Waschull *et al.*, 2020) and employment opportunities have naturally decreased. Second, the upgrading of industrial structure seeks to raise the share of secondary and tertiary industries while decreasing the share of primary sector under specific technological advancement circumstances. In this process, the growth of relatively labor-intensive industries is lower than that of relatively capital-intensive industries (Tejani and Milberg, 2016), and employment opportunities will also decrease.

Case 2, upgrading the industrial structure will increase employment opportunities. The upgrading of the three industrial structures will lead to the technological renewal and technological progress of the original industries, which will absorb a large number of high-quality and high-technological labor (McMillan and Rodrik, 2011). What's more, whether it is the primary industry, secondary industry or tertiary industry, the emergence of new industry sectors will also absorb some suitable labor force employment. At the same time, under these two opposite effects, there will be structural unemployment. A large amount of low-quality surplus labor be squeezed out, with a huge demand for high-quality labor. As a result, the coexistence of "job vacancies" and "labor surplus" occurred during this period, the so-called "structural unemployment".

For individuals, an increase in job opportunities will increase the opportunity cost of entrepreneurship, and conversely, it will reduce the cost of entrepreneurial opportunities. Therefore, whether the upgrading of the industrial structure will increase entrepreneurship depends on which situation the country belongs to. In more developed countries with a more perfect industrial structure, the upgrading of the industrial structure generally brings more job opportunities, while in less developed countries, the upgrading of the industrial structure will squeeze out employment opportunities. Alba-Ramirez (1994), Earle and Sakova (2000), Santarelli and Vivarelli (2007) and Faggio and Silva (2014) show that some self-employment spells due to lacking of employment opportunities.

So we propose the hypothesis 2a as below:

H2a. In regions where economic condition is underdeveloped, the upgrading of industrial structure has a greater effect on employment opportunities reduction, so employment opportunities decrease, and thus entrepreneurship increases. The opposite is true where economic condition is developed.

2) Basic social welfare

With the continuous optimization of the labor structure, the social insurance system has become more complete, which may have some influence on entrepreneurship. Due to a lack of national basic health insurance, working-age adults in some nations only have access to employer-provided health insurance, which could lead to "job lock." To put it another way, employees can be hesitant to start their own business or change professions due to the possibility of losing their specific insurance plans, waiting periods for new positions, and interruptions in their health insurance continuity. Liu and Zhang (2018) tests that the implementation of national basic health insurance in China will reduce people's dependence on work insurance, thus improving people's entrepreneurial enthusiasm. Fairlie *et al.* (2011) employs difference-in-difference methods to estimate this conclusion and notes that employer-provided health insurance is the main source of health insurance for working-age persons in the US, which can be a barrier to entrepreneurship. The development of the insurance system has a great impact on entrepreneurship. So we propose the hypothesis 2b as below:

H2b. The individuals have larger possibilities to start a business where the countries have more advanced industrial structures with the complete basic insurance system.

C. Industry Entry Barriers

It is obvious that the difficulty of entering the industry will affect the choice of entrepreneurs. Lofstrom *et al.* (2014) categorize high- and low-barrier industries according to capital investment and skills/education measures. A low-barrier industry is one that does not heavily rely on owner education or financial capital, while a high-barrier industry has an average owner financial investment in the top one-third of all industry groups and/or an average number of years of formal education for its owners in the top one-third. The industrial structure upgrading process transfers resource elements from low-to high-efficiency departments, and the proportion of industries with higher entry barrier is increased. This leads to a continual increase in the share of higher-productivity industrial departments (Dong *et al.*, 2010). The structure of the difficulty of entering an entrepreneurial industry will change with the continuous optimization of the industrial structure. Due to low entry barriers and high demand for entry (Chen *et al.*, 2023), start-up is easier in emerging economies than in developed ones. The scale of industry entry barriers has a direct impact on whether or not someone decides to launch their own business, and changes in the industry structure occur in tandem with upgrades to the structure. So the hypothesis 3 is proposed as below:

H3. The countries with higher industrial upgrading level have the greater proportion of industries with entry barriers for entrepreneurship, so the people will be not willing to become entrepreneurship. This performance is more obvious in developed countries

III. Data and Methodology

A. Description of Data

The Global Entrepreneurship Monitor (GEM) collects data primarily from the Adult Population Survey (APS) and the National Experts Survey (NES). The Global Entrepreneurship Monitor was launched in 1999 and was jointly implemented by Babson College in the United States and London Business School in the United Kingdom. To date, the Global Entrepreneurship Monitor has covered about 100 economies, collecting data from both the individual and country levels. Specifically, the 64 economies are spread across six continents - Asia, Europe, Africa, South America, North America, and Oceania - and include 25 developed and 39 developing countries (as shown in Fig. 1.) GEM partners with more than 300 academic and research institutions to survey more than 300 individuals annually in various countries. The Adult Population Survey (APS) focuses on entrepreneurial characteristics, motivations, and aspirations, and assesses societal attitudes toward entrepreneurship, while the National Expert Survey (NES) focuses on individual entrepreneurial contexts at the national level.

Given the lag in the disclosure of official data in GEM (official data for 2021 will not be available until 2025) and data completeness issues, in this paper, we select partial data for 141,402 individual numbers from 43 countries and regions in 2020 as the base sample. The data for the individual samples mainly include information on individual entrepreneurial initiative, income, household size, skills, and other personal characteristics. For the entrepreneurship country-level data, this paper uses the expert interview scoring data of 2020 NES in GEM. The national economic development data, such as GDP, the value and share of the three industries, and the unemployment rate, we uniformly use the international units, which are all from the World Bank database.

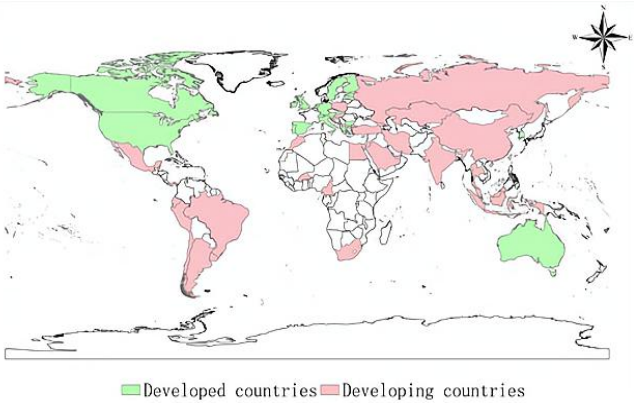

Fig. 2. Distribution of sample countries by continent.

B. Empirical Methods and Variables

1) Benchmarking model

The dependent variable in our study is a discrete choice variable with only a binary model of choosing to start a business and not to start a business. The cumulative distribution function of the logistic distribution is then the connection function F(x, β):

$$P(y=1|x)=F(x,\beta)=\Lambda(x'\beta)=\frac{\exp(x'\beta)}{1+\exp(x'\beta)} \quad (1)$$

where x represents the explanatory variables and represents the coefficient matrix. For the nonlinear discrete model, estimated using MLE (Maximum Likelihood Estimation), the probability density of the i observation is

$$f(y_i|x_i,\beta)=\begin{cases}\Lambda(x_i'\beta), \ if\ y_i=1\\ 1-\Lambda(x_i'\beta), \ if\ y_i=0\end{cases} \quad (2)$$

Sum the logarithms to get the log-likelihood function for the entire sample:

$$LnLnL(\beta|y,x)=\sum_{i=1}^{n} y_i ln[\Lambda(x_i'\beta)]+\sum_{i=1}^{n}(1-y_i)\,ln[1-\Lambda(x_i'\beta)] \quad (3)$$

Let the probability of "y=1" be p, then the probability ratio is

$$\frac{p}{1-p}=\exp(x'\beta) \quad (4)$$

"y=1" means choosing to start a business, "y=0" denotes the decision to not launch a business, and a probability ratio of m indicates that the likelihood of deciding to launch a business is m times that of not doing so.

Establishing an entrepreneurial model for upgrading the industrial structure: Establishing an entrepreneurial model for upgrading the industrial structure:

$$Ln\frac{p_i}{1-p_i} = \alpha + \beta_0 SAL_j + \beta_1 X_i + \beta_2 X_j + \varepsilon \quad (5)$$

where SUL_j denotes the level of industry sophistication in country j, X_i denotes a series of individual-level control variables, X_j denotes country-level control variables, and ε denotes a disturbance term.

2) Variables

a) Entrepreneurial performance (SUB)

In this paper, the indicator "whether the individual is actively involved in entrepreneurial activities" in the questionnaire is used as a dependent variable to express the entrepreneurial performance of the individual and is expressed as a dichotomous variable (yes=1, no=0).

b) Structural Upgrading Level (SUL)

The progressive transition from low-level to high-level industries is the most notable aspect of upgrading the industrial structure. An essential tool for quantifying changes in industrial structure is the vector angle [37]. Therefore, this paper adopts the vector angle to measure the level of industrial structure upgrading, drawing on the method of Fu (2010). The details are as follows.

First, the value added of agriculture, industry and services. The ratio of value added of each component to GDP is used as a component in the space vector to form a set of three-dimensional vectors X0 = (x1, 0, x2, 0, x3, 0).

Secondly, the set of basic unit vectors X1 = (1,0,0), X2 = (0,1,0), X3 = (0,0,1) are chosen as the basis vectors, and the angles between the industrial structure space vector X and them are calculated sequentially. θ_j (j = 1,2,3) calculate the angle between the industrial structure space vector X0 and them in turn. In Eq. (6), Xj, i denotes the ith component of the base unit vector group Xj; X0, i denotes the ith component of vector X0.

$$\theta_j = \arccos\left[\frac{\sum_{i=1}^{3}(x_{j,i}\cdot x_{0,i})}{\sqrt{\sum_{i=1}^{3}(x_{j,i}^2)}\cdot\sqrt{\sum_{i=1}^{3}(x_{0,i}^2)}}\right], j = 1,2,3 \quad (6)$$

Third, the weights of the angle θ_j are determined to calculate the industrial structure upgrading index. In Eq. (6) w_j is θ_j. In order to facilitate comparison with studies using cross-country data, the weight W3 of (tertiary industry) $\theta 3$ is set to 1, and the weights W1, W2 and W3 of θ_j (j=1, 2 and 3) are set to 3, 2 and 1 in turn.

$$SUL = \sum_{j=1}^{3} \theta_j . w_j \quad (7)$$

Based on Eq. (6) and the monotonically decreasing nature of the inverse cosine function, it is clear that in the process of industrial structure change characterized by the evolution of low-level industries to high-level industries, if the proportion of primary industries decreases relatively faster and the proportion of secondary and tertiary industries increases relatively faster, θ_j will be relatively larger. Therefore, the larger the weighted summation SUL of θ_j is, the higher the level of industrial structure upgrading is. The index (SUL) takes into account the influence of the relative change of each industry on the structural advancement of the industrial structure (θ_j),and thus can portray the level of industrial structural upgrading from an overall perspective.

c) Industrial Structure Rationalization Level (SRL)

Referring to the method of Yao *et al.* (2019) this paper defines SRL index as follows:

$$SRL_i = \ln\left(\frac{\frac{I_i}{GDP}}{\frac{L_i}{L}}\right) \quad (8)$$

$$SRL = \sum_{i=1}^{3}\left(\frac{I_i}{GDP}\right) * \left|\ln\left(\frac{\frac{I_i}{GDP}}{\frac{L_i}{L}}\right)\right| \quad (9)$$

where SRLi stands for the ith industry rationalization level. The SRL index is the overall rationalization level of the industrial structure, I_i represents the output value of the ith industry,

L_i represents the employment number of the ith industry, and L represents the total employment number. A lower absolute value of the SUL signifies a higher level of industrial structure rationalization.

d) Labor intensity of secondary and tertiary industries (HHI)

Combined with the construction method of the Herfindahl-Hirschman index of industrial concentration, we construct HHI as following:

HHI = (Employment in the secondary industry/total employment)^2 + (Employment in the tertiary industry/total employment)^2

The percentage of the labor force employed in secondary and tertiary industries in the employment structure increases with the HHI index.

e) Other variables

Consistent with previous research, our empirical study includes a range of micro- and macro-level control variables.

We account for age, family size, gender, skills, experience, and educational attainment at the individual (micro) level. Entrepreneurs' mental health and well-being have a significant impact on their decision-making (Stephan, 2018). Therefore, we also control for business connections and courage in the face of business failure.

At the country (macro) level, we control for the country's GDP, life expectancy, etc.; Entrepreneurial framework, and each indicator in A02-D04 corresponds to a relevant question in the entrepreneurial environment framework.

Table 1. Descriptive statistics for variables

Variables	Definition	Obs	Mean	Std. Dev.	Min	Max
SUB	"Reports new start-up effort (independent or job)"(Yes=1; No=0)	139173	0.174	0.379	0	1.000
SUL	Industrial structure upgrade level	139173	7.440	0.269	6.700	7.785
SRL	Industrial structure rationalization level	139173	0.224	0.293	0.085	2.535
HHI	Labor intensity of secondary and tertiary industries	139173	0.400	0.096	0.202	0.639
developed	National development level (developed country=1; undeveloped country=0)	139173	0.488	0.500	0	1.000
age	Age (year)	136323	41.300	14.186	18.000	96.000
gender	Gender (male=1; female=2)	141402	1.490	1.500	1.000	2.000
skill	You personally have the knowledge, skill and experience required to start a new business.	141402	3.185	1.610	−2.000	5.000
opportl	In the next six months, there will be good opportunities for starting a business in the area where you live?	141402	2.605	1.656	−2.000	5.000
knowentr	How many people do you know personally who have started a business or become self-employed in the past 2 years? Would it be none, one, few or many people?	141402	0.949	1.120	−2.000	3.000
fearfail	You would not start a business for fear it might fail	141402	3.004	1.655	−2.000	5.000
hhsize	How many members make up your permanent household, including you?	141402	3.564	2.419	1.000	100.000
incom33	GEM income recorded into thirds (Lowest 33%tile=1; Middle 33%tile=2; Upper 33%tile=3)	112809	1.649	0.478	1.000	3.000
uneduc	educational attainment	137869	10.936	5.399	0	23.000
A04	Entrepreneurial Finance environment	138492	9.538	1.888	5.946	13.345
B02	Government Policy environment	138492	4.778	1.039	2.667	7.409
C03	Government Entrepreneurship Programs environment	138492	5.341	1.023	3.229	7.053
D03	Entrepreneurship Education environment (primary and secondary education)	138492	2.840	1.128	1.436	6.486
lgdp	Logarithm of GDP	136263	26.702	1.462	22.725	30.691
lexpelife	Life expectancy (year)	139173	77.784	5.409	59.731	83.427
Cincome	National income level (high income=1; middle-high income=2; middle -low income=3; low income=4)	141402	1.244	0.604	1.000	3.000
gini	GINI coefficient	98303	34.943	6.435	24.000	53.500
urbanization	urban population/total population	139173	74.009	15.903	30.607	100.000
lpop	Logarithm of population	139173	17.006	1.416	13.354	21.057
arable	arable land proportion	139173	16.518	12.486	0.241	51.947
birthrate		139173	12.653	6.732	5.300	39.271
sexratio	male population/female population	136263	1.065	0.315	0.860	2.656
SUL1	pin+2*sin+3*tin	139173	2.134	0.201	1.573	2.535

IV. Result and Discussion

The empirical analysis is divided into two parts. The first is to look into how upgrading the industrial structure affects the performance of entrepreneurs. Secondly, we analyze this influence through three transmission mechanisms.

A. Basic Results

With entrepreneurial performance as the dependent variable and industrial advancement level as the independent variable, we made the following four regressions:

1)Regression without control variables;

2)Include some control variables for personal characteristics;

3)Include some control variables for the country's macroeconomic environment;

4)Include some control variables for the country's entrepreneurial environment.

The basic results are shown in Table 2.

Entrepreneurial performance is significantly impacted negatively by the development of the industrial structure, that is, the more advanced the industrial structure of a country/economy is, the worse the realization of entrepreneurship is (Columns 1–4 in Table 2). With the increase of control variables, the effect of industrial structure upgrade on entrepreneurial performance is weakened, which indicates that personal characteristics, national economic environment, and entrepreneurial environment have a significant impact on entrepreneurial performance. From the odds ratio, for every additional unit of the industrial structure advanced index, the odds of deciding to launch a business are 0.424 times the odds of deciding not to launch a business (Column 4 in Table 2).

From the perspective of personal characteristics, age and fear of entrepreneurial failure have an inhibitory effect on individual entrepreneurship; gender is male, having entrepreneurial skills and personal connections can promote entrepreneurship (Columns 2–4 in Table 2). From a national macroeconomic perspective, the GDP and national income

level have a negative effect on entrepreneurial performance (Columns 3–4 in Table 2). From the perspective of the national entrepreneurial environment, the national financial market environment, entrepreneurial education during university, the regulatory environment for entrepreneurial access, and the cultural and social environment promote entrepreneurship (Column 4 in Table 2). The impact of these variables on entrepreneurship is consistent with expectations. Unexpectedly, the level of business and management education providing preparation for entrepreneurship, and the level of easy entering new market has a negative effect on entrepreneurship.

Table 2. Basic regression results

VARIABLES	(1) SUB	Odds Ratio	(2) SUB	Odds Ratio	(3) SUB	Odds Ratio	(4) SUB	Odds Ratio
SUL	−1.161***	0.313	−0.830***	0.012	−0.325***	0.722	−0.308***	0.735
	(0.0233)		(0.0282)		(0.0480)		(0.0580)	
age			−0.0224***	0.001	−0.0181***	0.982	−0.0182***	0.982
			(0.0006)		(0.000784)		(0.0008)	
gender			−0.148***	0.014	−0.150***	0.860	−0.149***	0.862
			(0.0159)		(0.0213)		(0.0213)	
suskilll			0.392***	0.010	0.360***	1.434	0.361***	1.435
			(0.0068)		(0.0086)		(0.0087)	
knowentr			0.342***	0.010	0.297***	1.345	0.293***	1.340
			(0.0070)		(0.0098)		(0.0098)	
fearfaill			−0.116***	0.005	−0.103***	0.903	−0.104***	0.902
			(0.0050)		(0.0070)		(0.0067)	
uneduc			0.0391***	0.004	0.0332***	1.034	0.0323***	1.033
			(0.0043)		(0.0060)		(0.0061)	
lgdp					−0.249***	0.780	−0.271***	0.762
					(0.0112)		(0.0120)	
arable					−0.0107***	0.989	−0.0103***	0.990
					(0.0013)		(0.0014)	
jini					0.0326***	1.033	0.0390***	1.400
					(0.0019)		(0.0021)	
birthrate					0.107***	1.113	0.107***	1.113
					(0.0035)		(0.0036)	
A04							0.0517***	1.053
							(0.0125)	
B02							−0.0918***	0.912
							(0.0201)	
C03							−0.0414***	0.960
							(0.0149)	
D03							0.0228***	1.023
							(0.0147)	
Constant	7.058***		4.054***		4.540***		4.887***	
	(0.173)		(0.208)		(0.506)		(0.5980)	
Observations	139,173		130,856		94,328		94,328	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B. Robustness Test

We adopt two methods to test the robustness. The first method is to change the regression model. The second method is to construct other industrial structure advanced indexes.

1) Changing the regression model

In the aforementioned basic regression, we obtained results using a Logit model, and therefore we switched the model to a Probit model to test for robustness. The results are shown in Table 3. In the Probit model, after controlling for individual, country, and industry variables consistently, we found that SUL still has a significant negative impact on SUB, which is consistent with our previous conclusion. Therefore, we believe that the robustness test has been passed.

Table 3. Different regression model results

VARIABLES	(1) Logit model	(2) Probit model
	SUB	SUB
SUL	−0.308***	−0.119***
	(0.0580)	(0.0312)
Personal characteristics	YES	YES
Macroeconomic	YES	YES
Entrepreneurship Framework	YES	YES
Observations	94,328	94,328

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2) Restructuring the industrial structure upgrading index

Table 4. Replacement industrial structure upgrading index regression results

VARIABLES	(1) SUB	(2) SUB
SUL	−0.308***	
	(0.0580)	
SUL1		−0.179**
		(0.0738)
Personal characteristics	YES	YES
Macroeconomic	YES	YES
Entrepreneurship Framework	YES	YES
Observations	94,328	94,328

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This article adopts two new construction methods to replace the industrial structure advanced index. First of all, our SUL index represents the structural relationship between the output value ratio of the primary, secondary, and tertiary industries. The higher the output value of the secondary and tertiary industries, the higher the industrial structure. The structure of the SUL1 is the proportion of primary industry output value + the proportion of secondary industry output value*2 + the proportion of tertiary industry output value*3, which has the same meaning as SUL. The higher the

proportion of secondary and tertiary industry output value, the higher the industrial structure. Under the same individual control variables and national control variables, the empirical results are shown in Table 4.

First of all, from the perspective of SUL1, which has the same meaning as SUL, the result is similar to that of SUL. The higher the industrial structure, the lower the entrepreneurial initiative (Column 2 in Table 4), which once again demonstrates the robustness of our results and verifies our hypothesis.

C. Heterogeneity Analysis

We perform the heterogeneity analysis from two levels of classification regression. From the individual level, we perform classification regression on gender and education background, and the results are shown in Table 5 Column 1−5. From the national level, we perform classification regression on the level of development, and the results are shown in Table 5 Column 6−7.

Judging from the classification regression results of gender (Columns 1−2 in Table 5) and years of education (Columns 3−5 in Table 5), the advancement of industrial structure has a significant negative effect on entrepreneurial performance, and the result is robust. For the female and high educational group, the effect is bigger.

Judging from the classification regression results of the national development level (Columns 6−7 in Table 5). In developed countries, the effect of industrial structure upgrade on entrepreneurship is not significant. In underdeveloped countries, industrial structure upgrade has a significant negative effect on entrepreneurship.

Table 5. Classification regression results

Classification	Gender		UNEDUC			National level	
SUB	(1) Male	(2) Female	(3) <3	(4) 3=<&<6	(5) 6=<&<=8	(6) Developed country	(7) Undeveloped country
SUL	−0.258***	−0.369***	−0.211**	−0.563***	−0.533***	4.608***	−0.788***
	(0.0783)	(0.0870)	(0.0932)	(0.1510)	(0.0933)	(0.5920)	(0.0822)
Personal characteristics	YES	YES	YES	YES	YES	YES	YES
Macroeconomic environment	YES	YES	YES	YES	YES	YES	YES
Entrepreneurship environment	YES	YES	YES	YES	YES	YES	YES
Observations	46,594	47,734	52,360	17,379	24,589	54,161	40,167

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

D. Heterogeneity Analysis

Baron and Kenny (1986) proposed a framework for mediated effects analysis (i.e., the BK framework) that has been widely used and cited. As of 2020, the framework has been cited in more than 70,000 scholarly articles covering a wide range of fields (DeSanctis and Poole, 1994), including technology, biology (Bracken, 2006), social psychology, and consumer behavior (Oliver, 1993). It provides a good idea to examine the mediating role of entrepreneurial opportunities, labor market changes, and industry entry barriers in industrial structure upgrading on entrepreneurial performance, so the BK framework is chosen as an analytical tool.

According to the BK framework, for variable M to become a "mediating variable", the following three conditions need to be met: first, changes in independent variable X should be able to significantly explain changes in intermediate variable M (i.e., the path a needs to be significant); second, changes in intermediate variable M should be able to significantly explain changes in dependent variable Y (i.e., path b needs to be significant); and finally, when controlling for the path a and path b, the changes in intermediate variable M should be significantly explained by changes in dependent variable Y (i.e., path b needs to be significant). Secondly, changes in the intermediate variable M should be able to significantly explain changes in the dependent variable Y (i.e., path b needs to be significant); and finally, when controlling for paths a and b, the significant association between the independent variable X and the dependent variable Y will no longer exist (i.e., path c needs to be insignificant). Therefore, the BK framework requires the estimation of the following three equations:

$$M = i^1 + aX + e^1 \quad (10)$$

$$Y = i^2 + c'X + e^2 \quad (11)$$

$$Y = i^3 + cX + bM + e^3 \quad (12)$$

Corresponding to the above determination conditions, the significance of coefficients a, b, and c' together determines the existence of mediating effects. In addition, the BK framework requires a further Sobel z-test for indirect paths to verify the statistical significance of the mediating effect, and the formula for calculating the test statistic is shown below:

$$z = \frac{(a \cdot b)}{\sqrt{b^2 s_a{}^2 + a^2 s_b^2}} \quad (13)$$

s_a and s_b denote the standard errors of coefficients a and b, respectively. According to the BK framework, the strongest evidence of mediation is when the indirect effect (path b) is significant and the direct effect (path c) is not, which is referred to as "full mediation". If both the indirect and direct effects are significant, this is called "partial mediation".

1) Entrepreneurial opportunities

In model (1), the regression coefficient of SUL on entrepreneurial opportunities is −0.403 and significant ($p < 0.01$), indicating that industrial structure upgrading has a significant negative effect on entrepreneurial opportunities. In model (2), the direct effect coefficient of SUL on entrepreneurial performance is −0.318 and significant ($p < 0.01$). In model (3), after adding entrepreneurial opportunity as a mediator variable, the coefficient of SUL on entrepreneurial performance slightly decreases to −0.281, which is still significantly negative, while the coefficient of entrepreneurial opportunity on entrepreneurial performance is

0.0937, which is significantly positive ($p < 0.01$). This result suggests that entrepreneurial opportunities partially mediate the relationship between industrial structure upgrading and entrepreneurial performance, as the direct effect of SUL on SUB remains significant but slightly weakened by the inclusion of entrepreneurial opportunities. This supports the hypothesis that industrial structure upgrading indirectly affects entrepreneurial performance by inhibiting the generation of entrepreneurial opportunities.

Table 6. Entrepreneurship opportunities as an intermediate variable regression results

VARIABLES	(1)opportl	(2)SUB	(3) SUB
SUL	−0.403***	−0.318***	−0.281***
	(0.0294)	(0.0588)	(0.0595)
opportl			0.0937***
personal characteristic	YES	YES	YES
Macroeconomic environment	YES	YES	YES
Entrepreneurship environment	YES	YES	YES
Observations	94,328	94,328	94,328

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2) Labor market structure

The mediating role of labor structure changes in the impact of industrial structure upgrading on entrepreneurship is empirically analyzed from three aspects: labor intensity in secondary and tertiary industries, labor market efficiency and basic social welfare level. Among them, the labor intensity of secondary and tertiary industries is represented by the HHI variable, and the larger the HHI value, the higher the labor concentration. Labor market efficiency is expressed by the industrial structure rationalization index SRL, and the larger the value of SRL, the lower the labor market efficiency. The basic social welfare level is represented by the average life expectancy, and the longer the life expectancy, the better the basic welfare level.

Under the control variables, Table 7 shows the regression results of labor force concentration in secondary and tertiary industries as a mediating variable. The results show that industrial structure upgrading (SUL) has a significant positive effect on labor concentration in secondary and tertiary industries, indicating that the higher the industrial structure, the higher the labor concentration in secondary and tertiary industries (see Column 1 of Table 7). The effect of labor concentration in secondary and tertiary industries on entrepreneurial performance varies across countries at different levels of development. In less developed countries, the effect of job reduction due to industrial structural upgrading is greater than the effect of new job creation, which reduces employment opportunities and increases entrepreneurial opportunities; in developed countries, the opposite is true, as industrial structural upgrading helps to create more jobs, but instead reduces entrepreneurial opportunities.

The effect of industrial structure upgrading on entrepreneurial performance changes after the introduction of the entrepreneurial opportunities variable, but remains significantly negative (Columns 2–4 of Table 7). This result supports our hypothesis that industrial structural upgrading usually reduces entrepreneurial opportunities in economically developed regions, while it increases entrepreneurial opportunities in less developed regions.

Table 7. HHI regression results as an intermediate variable

VARIABLES	(1) HHI(ALL)	(2) SUB(Developed countries)	(3) SUB(undeveloped countries)	(4) SUB(ALL)
SUL	0.295***	2.867***	−1.247***	−0.466***
	(0.0012)	(0.6650)	(0.1370)	(0.0977)
HHI		6.350***	3.437***	0.495**
		(0.9570)	(0.8800)	(0.2430)
personal characteristic	YES	YES	YES	YES
Macroeconomic environment	YES	YES	YES	YES
Entrepreneurship environment	YES	YES	YES	YES
Observations	94,328	54,161	40,167	94,328

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Based on the analysis of the data results in Table 8, the role of labor efficiency (SRL) as a mediating variable was examined. With control variables, the results show that industrial structure upgrading (SUL) has a significant positive effect on labor efficiency[1](see column 1 of Table 8), where the regression coefficient of SUL is 0.215 ($p < 0.01$), which indicates that the level of labor efficiency increases significantly with industrial structure upgrading. Labor efficiency (SRL) also has a significant positive effect on entrepreneurial performance (SUB), where the coefficient of SRL is 0.808 ($p < 0.01$) in Column 3 of Table 8, indicating that the improvement of labor efficiency contributes to the improvement of entrepreneurial performance.

In the model without the labor efficiency variable (Column 2 of Table 8), the effect of industrial structure upgrading on entrepreneurial performance is −0.318, which is significantly negative ($p < 0.01$). When the mediating variable of labor efficiency is added (Column 3 of Table 8), the effect of SUL on SUB becomes −0.531, which is still significantly negative, but the degree of the effect is enhanced. This suggests that industrial structure upgrading improves labor efficiency while crowding out employment opportunities, thus exerting an indirect positive effect on entrepreneurial performance. This result is consistent with the research hypothesis, suggesting that labor efficiency plays a partial mediating role in the impact of industrial structure upgrading on entrepreneurial performance.

Table 8. Regression results with SRL as an intermediate variable

VARIABLES	(1) SRL	(2) SUB	(3)SUB
SUL	0.215***	−0.318***	−0.531***
	(0.0062)	(0.0588)	(0.0593)
SRL			0.808***
			(0.0339)
personal characteristic	YES	YES	YES
Macroeconomic environment	YES	YES	YES
Entrepreneurship environment	YES	YES	YES
Observations	94,328	94,328	94,328

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[1] The smaller the SRL, the higher the labor productivity.

With control variables, the results show that industrial structure upgrading (SUL) has a significant positive effect on life expectancy (see Column 1 of Table 9), where the regression coefficient of SUL is 0.106 ($p < 0.01$), indicating that life expectancy is significantly longer with industrial structure upgrading. Life expectancy (lexpelife) has a significant negative effect on entrepreneurial performance (SUB), where the regression coefficient of life expectancy is −1.354 ($p < 0.01$) in Column 3 of Table 9, suggesting that increased life expectancy has a dampening effect on entrepreneurial performance.

In the model without the life expectancy variable (Column 2 of Table 9), the coefficient of industrial structure upgrading on entrepreneurial performance is −0.305, which is significantly negative ($p < 0.01$). With the inclusion of the mediating variable of life expectancy (Column 3 of Table 9), the coefficient of the effect of SUL on SUB becomes −0.180, which is still significant and negative, but the magnitude of its effect is weakened. This result supports the research hypothesis that the improvement of basic social security with the improvement of industrial structure will make individuals more cautious in their entrepreneurial choices and thus have an indirect negative effect on entrepreneurial performance.

Table 9. Regression results for life expectancy as an intermediate variable

VARIABLES	(1)lexpelife	(2)SUB	(3)SUB
SUL	0.106***	−0.305***	−0.180**
	(0.0005)	(0.0599)	(0.0781)
lexpelife			−1.354***
			(0.5220)
personal characteristic	YES	YES	YES
Macroeconomic environment	YES	YES	YES
Entrepreneurship environment	YES	YES	YES
Observations	94,328	94,328	94,328

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3) Industry distribution structure

Different from other intermediary variables, the impact of entrepreneurial entry barriers on entrepreneurial performance is a relatively complex issue. First, different barriers classification standards may produce different results. Second, the mediating effects of entry barriers may vary greatly when economies are divided by different standards. For example, if industry is the basic unit of dividing barriers, the industrial structure of countries with different development levels will vary greatly with the upgrading of industrial structure. Therefore, before examining the mediating role of entrepreneurial entry barriers in the impact of industrial structure upgrading on entrepreneurial performance, the entry barriers to entrepreneurship and the division of economies are explained.

First of all, refer to the method of Lofstrom *et al.* (2014), the high and low industry entry barriers selected in this article are classified based on the two elements of skills/education and capital investment. The low barrier industries neither collect financial capital nor conduct owner education; relative to all industry groups, high barriers on average, industry owners have made financial investments in high barrier industries, ranking in the top third, and/or the average number of years that owners have received formal education ranked in the top third. According to the results of the classification, the high-barrier industries are mostly distributed in the secondary and tertiary industries. Capital and technology are two important elements in entrepreneurial activities. When choosing to start a business, an individual may consider activities with technical guarantees for financing or activities with technology to seek financing. This classification is in line with our experience in capital and technical/educational barriers to entrepreneurial entry barriers. The entry barriers of the 12 industries where our sample is located are shown in Table 10. Secondly, according to the division of entrepreneurial barriers, we choose the developed/underdeveloped country to divide the economy into two categories.

Table 10. High and low barriers to entry of the 12 industries where the sample is located

Industry	Barriers to entry
agriculture, forestry, fishing	LOW
mining, construction	LOW
manufacturing	HIGH
utilization, transport, storage	LOW
wholesale trade	HIGH
retail trade, hotels & restaurants	LOW
information and communication	HIGH
financial inter-mediation, real estate activities	HIGH
professional services	HIGH
administrative services	HIGH
government, health, education, social services	LOW
personal/consumer service activities	LOW

Source: Refer to the method of Lofstrom *et al.* (2014)

Controlling for the variables, Table 10 presents the regression results with barriers to entrepreneurial entry as the mediating variable. Columns (1–3) correspond to the regression results for the full sample, Columns (4–6) show the results for the sample of developed countries, while Columns (7–9) exhibit the results for the sample of underdeveloped countries. From the regression results of the full sample, column (1) shows that the more developed the industrial structure is, the lower the entrepreneurial entry barriers are; In contrast, column (3) shows that entrepreneurial activity increases when the entrepreneurial barriers are raised, which is the opposite of the industrial structure effect. This reveals a complex mechanism of influence on industrial structure upgrading, in which the effect of lowering the entrepreneurial threshold may be offset by other factors. The regression results for developed countries show that industrial structure upgrading significantly increases entrepreneurial barriers to entry (Column 4 of Table 11), which is consistent with reality. In these countries, the transformation of industrial structure has led to the dominance of technology-intensive and capital-intensive industries, which has increased the skill and capital requirements for entrepreneurs, leading to a significant increase in barriers to entrepreneurship. However, column 5 of Table 11 shows that industrial restructuring has no significant effect on entrepreneurship per se.

Moreover, Column 6 shows that even if technological and capital barriers to entrepreneurship exist, their impact on

entrepreneurial performance is not significant. This suggests that in developed countries, where entrepreneurship is constrained by higher thresholds, the direct contribution of industrial structure upgrading to entrepreneurship is limited. For underdeveloped countries, the regression results show that industrial structure upgrading significantly reduces entrepreneurial barriers to entry (Column 7 of Table 11). In these countries, the share of capital-intensive and technology-intensive industries is low, so higher levels of industrial structure reduce the technological and capital requirements for entrepreneurs. This is consistent with expectations. Moreover, Columns 8 and 9 show that despite the dampening of entrepreneurial activity due to higher entrepreneurial thresholds, industrial structure upgrading still generates a significant boost to entrepreneurial activity by lowering entrepreneurial barriers to entry. This further suggests that in underdeveloped countries, industrial structure optimization can promote entrepreneurship by reducing barriers to entrepreneurship.

To summarize, there are significant country differences in the impact of industrial structural upgrading on entrepreneurship, with developed countries showing an increase in barriers to entrepreneurship and underdeveloped countries showing a decrease in barriers, thus indirectly promoting entrepreneurial activity.

Table 11. Industry entry barrier as an intermediate variable regression results

Classification	(1)All countries	(2)All countries	(3)All countries	(4)developed countries	(5)developed countries	(6)developed countries	(7)undeveloped countries	(8)undeveloped countries	(9)undeveloped countries
VARIABLES	hiindubar	SUB	SUB	hiindubar	SUB	SUB	hiindubar	SUB	SUB
SUL	−0.464***	−0.324***	−0.287***	0.985	1.437**	1.253**	−0.317*	−0.459***	−0.446***
	(0.0687)	(0.0643)	(0.0644)	(0.6250)	(0.5860)	(0.5900)	(0.1670)	(0.146)	(0.147)
hiindubar			0.487***			0.579***			0.443***
			(0.0286)			(0.0488)			(0.0362)
personal characteristic	YES	YES	YES	YES	YES	YES	YES	YES	YES
Macroeconomic environment	YES	YES	YES	YES	YES	YES	YES	YES	YES
Entrepreneurship environment	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	94,328	94,328	94,328	54,161	54,161	54,161	40,167	40,167	40,167

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

V. Conclusion and Policy Implications

Entrepreneurship, as an important manifestation of technological progress and innovation, reflects the dynamism of factor flows in a country or region. It not only accelerates factor mobility, promotes employment and economic growth, but also enhances the flexibility and adaptability of individual employment. A favorable entrepreneurial environment plays a key role in individuals' decision-making. However, the probability of entrepreneurial success is relatively low and often accompanied by certain risks. At the level of policy guidance, wrong policy guidance may lead to blind entrepreneurship or entrepreneurial panic, which in turn leads to a mismatch of resources and limits the realization of individual potential. Therefore, with the accelerated pace of global economic transformation, research on the impact of industrial structure upgrading on entrepreneurship and its functioning mechanism is of great theoretical significance and practical value for formulating rational policies and helping individuals make entrepreneurial decisions.

Based on 2020 data, this study focuses on individual-level data, focuses on the analysis of industrial structure upgrading as the main independent variable, controls several factors related to the economic environment and entrepreneurial atmosphere, and constructs an analytical model of entrepreneurial influencing factors. Through empirical research, this paper aims to explore how industrial structure upgrading specifically affects entrepreneurial activities and to provide theoretical guidance and practical suggestions for policymakers and entrepreneurs.

In contrast, in developed countries, the advanced industrial structure often implies the rise of highly technology-intensive industries and services, which, despite bringing about an increase in production efficiency and labor productivity, may lead to the shrinkage of traditional industries in the short run and inhibit entrepreneurial activities in some low-tech fields. Markets in developed countries are already relatively saturated, and the upgrading of the industrial structure may instead intensify the concentration of resources, limiting the growth of low-threshold entrepreneurial opportunities and thus creating a disincentive for entrepreneurial activity. In this process, factors such as labor concentration in the secondary and tertiary industries, productivity, social welfare, and technological capital entrepreneurial entry barriers all play a positive mediating role; while entrepreneurial opportunities show a significant negative mediating effect. This suggests that the structure of the labor force and the concentration of labor in the secondary and tertiary industries directly affect entrepreneurial motivation and that the negative effect of employment opportunities on entrepreneurship is greater than the positive effects of other factors.

Based on the above analysis, this paper suggests that underdeveloped countries should fully tap the potential of industrial structure upgrading for entrepreneurship and adopt long-term effective policy measures rather than focusing only on short-term effects. Specifically, the policy recommendations include: (1) in the process of industrial transformation, not only should we pay attention to the changes in the proportion of secondary and tertiary industries, but we also strengthen the improvement of labor productivity, to enhance the role of productivity in entrepreneurship and promote high-quality economic growth; (2) the country should improve the overall entrepreneurial awareness of the workforce by increasing the penetration rate of tertiary education, to provide the necessary (3) Optimize the social

welfare system to reduce the "employment lock" effect and promote the mobility of labor and factors. To sum up, industrial structure upgrading should not only pay attention to the change of "quantity", but also focus on the improvement of "quality", guide entrepreneurial activities through reasonable policies, and give full play to the positive role of entrepreneurship in economic development. Increasing the prevalence of university and higher education not only enhances the overall quality of the labor force but also injects a steady stream of innovative vitality into the long-term development of society.

Although this paper has conducted useful research in exploring the impact of industrial structure upgrading on entrepreneurship, it still has certain limitations and needs to be further improved. First, this paper analyzes the cross-sectional data based on the 2020 GEM, and although it provides preliminary information for the study, the timeliness of the data are relatively limited. Future studies can use panel data across years to obtain richer research information. Second, this paper mainly examines the changes in the structure of output value of primary, secondary, and tertiary industries in the upgrading of industrial structure, without exploring in depth the internal upgrading of the secondary industry, especially the manufacturing industry, which also provides room for further exploration in future research.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Liang Yunling contributed to the study conception and design; Yan Xinuo and Xu Qi performed Material preparation, data collection and analysis; Yan Xinuo and Xu Qi wrote the first draft of the manuscript; all authors commented on previous versions of the manuscript; all authors had approved the final version.

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