The Impact of the Digital Economy on Urban Entrepreneurial Vitality

Haiming Su*

Business school of Hunan University

*Corresponding author: 202006010220@hnu.edu.cn

Abstract. The digital economy is increasingly being recognized as a key driver for innovation and entrepreneurship in the age of information technology, making it crucial for the high-quality development of the Chinese economy. This study examines the impact of the digital economy on urban entrepreneurial vitality and investigates the underlying mechanisms by utilizing panel data from 282 prefecture-level cities in China spanning the period from 2011 to 2019. Our empirical findings demonstrate that the development of the digital economy has had a positive effect on urban entrepreneurial vitality, which is robust to various sensitivity tests. Our mechanism analysis indicates that expanding market space and reducing financing constraints are key channels through which the digital economy enhances urban entrepreneurial vitality. Further investigation reveals that the effect of the digital economy on urban entrepreneurial vitality is influenced by city size, level, and region, as well as industrial structure and export openness, indicating a heterogeneous effect across different cities.

Keywords: digital economy, information technology, panel data, sensitivity tests

1. Introduction

The 20th National Congress of the Communist Party of China stated that it is imperative to take technology as the primary productive force, comprehensively implement the innovation-driven development strategy, explore new fields and new tracks of development, continuously identify new sources of growth and create new drivers and advantages for development and improve the security system for entrepreneurship and employment. Meanwhile, under the dual stimulation of the government's active employment policies and the dividend of the digital economy, the number of new entrepreneurial entities in China has continued to increase, new business models and economic growth points have emerged, and more employment opportunities and modes have been provided for society, resulting in sustained entrepreneurial vitality[1]. According to the "Youth Entrepreneurial City Vitality Report (2021)", over 44 million new start-up companies were established in China from 2011 to 2020. High-quality entrepreneurial activities are widely recognized as an engine for improving people's livelihoods and promoting economic growth. As a core indicator to measure the entrepreneurial enthusiasm of a country or region, entrepreneurial vitality is widely accepted by the academic community[2]. Existing studies have explored the impact of individual traits such as entrepreneurs' knowledge and experience[3] and gender roles[4] on entrepreneurial vitality and intentions from a micro perspective, and the impact of factors such as population agglomeration[5], environmental comfort[6], and digital infrastructure[7]on entrepreneurial vitality from a macro perspective.

With the continuous advancement of digitization and globalization, the global governance system is undergoing significant changes. The digital economy, as the core force of a new round of industrial reform, is becoming an important driving force for promoting industrial restructuring and achieving sustainable and high-quality economic development[8]. Currently, China has successively introduced a series of major plans and policy guidelines, continuously striving to "expand and strengthen the digital economy, and explore new spaces for economic development". The "Outline of the 14th Five-Year Plan for National Economic and Social Development and Vision 2035 of the People's Republic of China " proposes to "develop new advantages in the digital economy, accelerate digital development, and build a digital China." As the first national-level special plan in the field of digital economy in China, the "14th Five-Year Plan for the Development of the Digital Economy" has also

formed an important task and action guide for China's digital economic development, with the aim of enhancing the overall strength of China's digital economy and promoting its high-quality development. Existing research has shown that the digital economy is the core driving force for promoting innovation in emerging technologies and regional development in various fields[9], and it is the foundation for China's industrial transformation and upgrading, which is beneficial to achieving efficiency improvement and economic structure optimization[10, 11]. Therefore, with the digital economy increasingly becoming an important driving force for promoting high-quality development at the national and regional levels,how digital economy will affect urban entrepreneurial vitality has become an urgent issue to be answered.

The existing literature mainly discusses the relationship between the development of the digital economy and entrepreneurial activities, while research on the impact of the digital economy on urban entrepreneurial vitality is relatively scarce, focusing mainly on the effects of digital economic development on regional economic development and employment. Previous studies have found that the development of the digital economy provides strong support for opportunity recognition, extensive recombination and acquisition of resources, cost control, and professional network building in the entrepreneurial process, thereby promoting entrepreneurship and enhancing regional entrepreneurial vitality[12-15]. Scholars have extensively explored the different mechanisms and pathways through which the development of the digital economy affects urban entrepreneurial vitality from various perspectives such as technological innovation and business environment optimization effects[16], FDI spillover effects and consumption expansion effects[17], innovation efficiency optimization [13], economies of scale, penetration effects, and cost reduction effects[18]. Empirical results have also shown that digital inclusive finance has a positive promoting effect on the vitality of entrepreneurship[19], and the digital economy can not only promote the improvement of regional innovation capabilities but also have positive spatial spillover effects on other regions[9]. Overall, the digital economy as a new type of economic development has profound and complex impacts on entrepreneurial activities and has positive implications for regional development. There is still a significant lack of empirical research on the impact of the digital economy on urban-level entrepreneurial vitality, and it is necessary to further analyze the specific mechanism of digital economy affecting urban entrepreneurship.

The marginal contributions of this paper are as follows. Firstly, this paper draws on existing literature to provide a comprehensive measurement of the relationship between digital economy and entrepreneurial vitality at the city level. It deeply explores how the digital economy stimulates the entrepreneurial enthusiasm of agents without separating the two, thereby extending the research that has been done previously. Secondly, this paper attempts to characterize the impact mechanisms of the digital economy on urban entrepreneurial vitality from two perspectives: market space expansion and alleviation of financing constraints. This helps to fill the gap in existing literature on the exploration of the impact mechanisms of the digital economy on urban entrepreneurial vitality. Finally, this paper further examines the impact of digital economy development on urban entrepreneurial vitality by considering the heterogeneity of the industrial structure, export openness, urban scale, level, and geographical location in the context of China's urban development. It provides a good empirical basis for realizing the promotion of urban entrepreneurial vitality through digital economy, and offers some reference for the implementation of different entrepreneurial policies in different cities.

2. Theoretical Mechanisms and Research Hypotheses

2.1 The Direct Impact of the Digital Economy on Urban Entrepreneurial Vitality

According to Organism Integration Theory (OIT), human behavior motivation is a continuous organism composed of different types of intrinsic motivation and different degrees of external motivation. The degree to which individual needs are satisfied affects the type of motivation exhibited,

such that when external factors such as changes in the environment or rules satisfy internal needs, individuals will exhibit stronger autonomous motivation and engage in proactive behavior.

Under intrinsic motivation, behavior is highly autonomous and individuals experience great psychological satisfaction from their actions. This is mainly because individuals believe that their behavior is valuable, enjoyable, and competent. Thus, from an internal motivation perspective, the digital economy provides entrepreneurs with a rich platform for information acquisition and precise analysis, which enhances the accuracy of their entrepreneurial decision-making and communication. At the same time, the technological market promotes frequent interaction among traders, leading to the emergence of learning effects among them. These learning effects further drive traders to achieve technological breakthroughs based on their in-depth understanding of new technologies and knowledge, leading to the creation and development of innovative entrepreneurial opportunities. Therefore, the development of the digital economy promotes the widespread application of digital technology and provides an optimized path for the allocation of entrepreneurial resources, which helps to achieve extensive recombination and integration of entrepreneurial resources[15]. This enhances the entrepreneurial ability of individuals and also improves their perception of entrepreneurial success.

From an external motivation perspective: firstly, the digital economy has strong social interaction and is conducive to the formation of a demonstration effect that strengthens the success of entrepreneurship. This stimulates the entrepreneurial enthusiasm of entrepreneurial subjects and enhances their autonomous motivation. The continuous development of the digital economy, the emergence of cutting-edge industries such as "new retail" and "new consumption", provide external driving force for the upgrading and transformation of the circulation industry structure, significantly accelerating the construction of the circulation enterprise ecosystem. The diffusion mechanism of innovation simultaneously promotes efficient allocation of information resources and rapid iteration of innovation diffusion, while networked organization brings industrial agglomeration at multiple levels and shortens the innovation distance between enterprises. Entrepreneurs can observe and imitate high-quality local enterprises, use local advantages in digital economic development to find alternatives or complementary products for entrepreneurship[17], and obtain more information and resources to further understand the market, capture business opportunities, and improve their chances of success.

Secondly, as a new economic model, the digital economy provides a favorable institutional environment for the enhancement of entrepreneurial vitality. The digital government, which is based on the application of digital technology and the core of digital services, can rely on online regulatory platforms to participate in the rectification and governance of the digital business ecosystem, establish a suitable innovation environment, and create a competitive environment conducive to the development of start-up digital enterprises. On the one hand, the construction of a digital government helps to enhance the local government's emphasis on local digital development, and thus increase digital fiscal spending and investment; on the other hand, it strengthens policy guidance for the development of digital industries and introduces a series of policies to support new forms and models of digital economy, providing a good "hardware" guarantee for entrepreneurial development. Based on the above analysis, this article proposes the following hypothesis:

Hypothesis 1(H1): ***Under the premise of other factors remaining constant, the digital economy has a positive impact on urban entrepreneurial vitality.***

2.2 The Mechanism by which the Digital Economy Impacts Urban Entrepreneurial Vitality

The digital economy enhances the breadth and depth of economic activity between regions, promotes the integration of regional economies and industries, and deeply explores entrepreneurial opportunities, improving entrepreneurs' accessibility and accuracy in reaching the market and expanding market space and value creation, thus stimulating urban entrepreneurial vitality.

Firstly, the digital economy promotes the upgrading of the industrial chain by penetrating and integrating digital technology and industry, giving rise to numerous new industries, technologies,

business models, and products, and expanding the scope and field of entrepreneurship. Simultaneously, the digital economy and traditional industries continue to integrate, accelerating the open innovation of business models and prompting most industries to move towards digital development. For example, as the digital economy deeply integrates with the real economy, a new business system represented by "production services + business models + financial services" has emerged.

Secondly, in the digital economy era, the platform ecosystem gradually integrates production, circulation, services, and consumption, providing a good cooperative environment for multi-party value co-creation, promoting the organic combination of online and offline resources, forming an open, shared, coordinated, and co-created ecological value system, and expanding the profit space of various stakeholders. On the one hand, digital platforms make enterprise boundaries become a penetrable structure, serving as an important carrier for the overall planning and allocation of digital economy resources, promoting multi-party economic cooperation and group aggregation, achieving technological innovation and digital services, and promoting open and distributed innovation by enterprises. On the other hand, digital technology weakens the geographic and organizational boundaries of economic activities between regions, economic sectors, and industries through cross-temporal and spatial communication, creation, and replication, effectively eliminating the element supply-demand contradictions and spatial restrictions that hinder the improvement of regional innovation capabilities, thereby providing a broader market space for entrepreneurial subjects.

Thirdly, the digital economy provides powerful support for resource acquisition and entrepreneurial network building in the entrepreneurial process[14], empowering entrepreneurial subjects to better identify and develop entrepreneurial opportunities, avoid ineffective resource waste, and further expand market space through innovative change. In order to overcome the inefficiency of products and services, entrepreneurial subjects often identify creative entrepreneurial opportunities by utilizing the resource pool advantages of the technology market, innovatively combining technological resources, and then developing creative entrepreneurial opportunities. The digital economy, through the continuous penetration of information technology and the creation of vertical and horizontal complementary assets, will reset the mechanism for capturing enterprise innovation value, further enhancing the vitality and motivation of technological innovation. Digital technology enables limited resources to achieve optimal and effective supply under given conditions, reduces ineffective supply and obsolete capacity, avoids resource waste and mismatch, and further expands market space for entrepreneurial subjects. Therefore, this article proposes the second research hypothesis:

Hypothesis 2(H2): ***The*** digital ***economy will enhance urban entrepreneurial vitality by expanding market space.***

The digital economy has filled the gaps of traditional financial institutions through digital finance, providing stable technological support for expanding the scope and reach of financial services and improving financial efficiency[20]. This has alleviated financing constraints and boosted entrepreneurial vitality through the use of information technologies such as big data.

First, digital inclusive finance has improved capital allocation and raised the level of financial services for high-quality economic development by leveraging digital technology advantages, lowering the threshold and cost of financial services to ease financing constraints. On the one hand, the development of digital technology allows financial services to break through geographical limitations, improve accessibility, and alleviate the exclusion effect of financial services. On the other hand, the digital economy can effectively reduce the operating costs of financial institutions, enhance operational efficiency, and greatly expand the coverage of financial services. At the same time, digital inclusive finance reduces clients' financial costs by reducing investments in labor and physical assets, thus lowering enterprise financing costs.

Second, based on the theories of information asymmetry and transaction costs, moral hazard and adverse selection problems are important factors affecting the availability of credit for entrepreneurs. The digital economy can effectively reduce search and coordination costs directly related to

transaction costs, and deepen entrepreneurial activities. On the one hand, digital finance can effectively integrate financial resources by developing relevant business platforms, alleviate information asymmetry, and build a good docking bridge for financial supply and demand, effectively matching the capital allocation needs of both parties and optimizing credit decisions. On the other hand, the development of the digital economy effectively improves the phenomenon of opaque and asymmetric market information, expands the business boundaries of market entities, safeguards the legitimate rights and interests of enterprises in market activities, and is crucial for creating a fair and transparent market environment[16]. In addition, the use of digital payments and digital wealth management can significantly enhance the security of financial asset transactions[21], limit the default and opportunistic behaviors of both parties to some extent, and improve the commercial sustainability of inclusive finance[22]. Therefore, this article proposes the third research hypothesis:

Hypothesis 3(H3): ***The*** digital ***economy will enhance urban entrepreneurial vitality by reducing financing constraints.***

3. Index Construction, Data Sources, and Identification Strategy

3.1 Index Construction

3.1.1. Dependent Variable Selection

Urban entrepreneurial vitality is an important indicator for measuring the degree of entrepreneurial activities in a region. In this article, we adopted the number of new registered enterprises per 10,000 people in a city as a measure of urban entrepreneurial vitality, based on previous research[2, 23], denoted as "*entre*".

3.1.2. Independent Variable Selection

Considering the availability of data at the urban level, this research adopts the method of Zhao Tao et al. (2020)[23] and selects internet penetration rate (number of broadband internet access users per 100 people), relevant employment situation (proportion of employees in computer services and software industries to employees in urban units), relevant output situation (per capita total volume of telecommunications services), and mobile phone penetration rate (number of mobile phone users per 100 people) to represent the level of internet development at the city level. The China Inclusive Finance Index, calculated by Peking University, is used to represent the level of digital financial development in cities. The comprehensive index of digital economy development is calculated by principal component analysis and denoted as "*dige*".

3.2 Model Design

$$entre_{it} = \alpha_0 + \alpha_1 dige_{it} + \alpha_2 Z_{it} + \mu_i + \delta_t + \varepsilon_{it} \quad (1)$$

$entre_{it}$ represents the entrepreneurial vitality of city i at time t, while $dige_{it}$ represents the level of digital economy development in city i at time t. To address the endogeneity problem caused by omitted variables, we introduced control variables (Z_{it}), the level of economic development (*pgdp*), measured by per capita GDP[17]. Population density (*pnd*), expressed as the population per unit area[24]. The degree of financial development (*fin*), represented by the ratio of the year-end balance of loans of urban financial institutions to regional GDP[17]. The degree of openness to foreign investment (*fdi*), represented by the ratio of actual foreign direct investment to regional GDP[16]. The urbanization rate (*urban*), represented by the ratio of urban population to regional population[25].The latter three terms in equation (1) are individual fixed effects, time fixed effects, and random error terms, respectively. The key coefficient of interest is α_1 , which reflects the direction and degree of the impact of the digital economy on urban entrepreneurial vitality.

3.3 Data Sources and Descriptive Statistics

This article uses a sample of 282 prefecture-level cities in China from 2011 to 2019. The data sources are mainly from the "China City Statistical Yearbook", and missing data were supplemented by manually checking the statistical bulletins of each city. Samples with serious missing data in key variables were removed. To avoid the influence of outliers on the regression accuracy, this paper truncated the top and bottom 1% of all variable values. The descriptive statistics of each indicator are shown in the table below.

Table 1 Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
dige	2467	0.600	0.039	0.554	0.954
entre	2538	4.831	0.620	2.789	7.614
pgdp	2538	10.695	0.576	8.773	13.056
pnd	2538	5.746	0.916	1.629	7.968
fdi	2538	0.017	0.017	0.000	0.192
fin	2538	1.561	3.294	0.025	44.898
urban	2538	0.394	0.206	0.083	0.999

4. Empirical analysis

4.1 Benchmark model regression

Table 2 Benchmark regression

	(1)	(2)	(3)	(4)	(5)	(6)
dige	0.264	0.561***	0.561***	0.594***	0.587***	0.541***
	(0.183)	(0.181)	(0.181)	(0.182)	(0.182)	(0.184)
pgdp		0.280***	0.279***	0.272***	0.268***	0.277***
		(0.027)	(0.027)	(0.028)	(0.028)	(0.029)
pnd			0.026	0.028	0.028	0.037
			(0.070)	(0.070)	(0.070)	(0.071)
fdi				0.736*	0.741*	0.750*
				(0.390)	(0.390)	(0.390)
fin					-0.003	-0.003
					(0.004)	(0.004)
urban						0.328**
						(0.158)
_cons	2.760*	-2.570*	-2.711*	-2.915*	-2.814*	-2.730*
	(1.436)	(1.497)	(1.544)	(1.547)	(1.556)	(1.555)
City FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
N	2538	2538	2538	2538	2538	2538
adj. R^2	0.913	0.916	0.916	0.917	0.916	0.917

Table 2 presents the regression results of the impact of the digital economy on urban entrepreneurial vitality. After sequentially incorporating the control variable set (Z_{it}), the regression results show that the digital economy (*dige*) has a significant positive impact on urban entrepreneurial vitality (*entre*). Therefore, research hypothesis 1(H1) is preliminarily confirmed. Economic development level (*pgdp*), population density (*pnd*), financial development level (*fin*), degree of openness to foreign investment (fdi), and urbanization rate (*urban*) are all factors influencing urban entrepreneurial vitality. The reasons may be that on the one hand, the new urbanization construction

promotes the two-way flow of personnel, economy, industry, and other factors between urban and rural areas, which not only improves the economic development level of rural areas but also stimulates the enthusiasm of a wide range of returnees to start businesses, thereby enhancing the overall entrepreneurial vitality of cities. On the other hand, FDI can often create new markets and entrepreneurial opportunities through active knowledge spillover effects, stimulating the emergence of entrepreneurial activities.

4.2 Robustness analysis

The benchmark regression results indicate that the digital economy has a significant promoting effect on urban entrepreneurial vitality. In order to ensure the reliability of the core conclusions, this research conducts robustness tests by replacing the core explanatory variables, replacing the measurement of the dependent variable, conducting quantile regression, and replacing the model.

4.2.1. Replacement of variables

The measurement of the digital economy is replaced. In the previous section, the principal component analysis method was used to calculate the indicators. Here, following the method of Zhou Lei (2022)[26], the entropy method is used to standardize the data of the five indicators, and the dimensionality reduction processing is carried out. The resulting digital economic index is denoted as "*dige2*".

The measurement of urban entrepreneurial vitality is replaced. Referring to the research of Xiao (2022)[5], the entrepreneurship index of the newly established enterprises in the prefecture-level cities published by the Enterprise Big Data Research Center of Peking University is used to measure the urban entrepreneurial vitality. Compared with the number of newly established enterprises in the prefecture-level cities, the entry score of newly established enterprises is more continuous and comparable, which can accurately depict the changes in different levels of urban entrepreneurial vitality within the research period.

After replacing the variables, the regression analysis is carried out again. The results in Table 3 show that the robustness test results are basically consistent with the benchmark regression results, which proves that the core conclusion of this research is reliable.

4.2.2. Replacement of model

The benchmark regression model characterizes the effect of the digital economy on urban entrepreneurial vitality when it is within the mean interval, but ignores the influence of the digital economy on the entire conditional distribution of urban entrepreneurial vitality. This may lead to the difficulty of accurately estimating the impact of the digital economy on urban entrepreneurial vitality. This study further selects the panel quantile regression model to test whether there are differences in the impact of the digital economy on urban entrepreneurial vitality at different quantile points, fully reflecting the distribution of the explanatory variables and not being affected by extreme values. Based on this, more abundant information about the impact of the digital economy on urban entrepreneurial vitality is explored.

Therefore, this study examines the heterogeneity of the impact of digital economic development on urban entrepreneurial vitality at the 0.25th, 0.5th, and 0.75th quantile points. The regression results in Table 3 show that there are significant differences in the impact of the digital economy on urban entrepreneurial vitality at different quantile points. The coefficient fitting value of the digital economy increases with the increase of the quantile. This indicates that the digital economy has a stronger promoting effect on cities with higher entrepreneurial vitality. On the one hand, this further illustrates the gain spiral effect of the digital economy on urban entrepreneurial vitality. With the adoption and integration of digital technology into existing industries, new markets and opportunities are created, leading to an increase in entrepreneurship activities and the development of new products and services. This, in turn, leads to further growth and innovation, creating a self-reinforcing cycle of entrepreneurial vitality at the city level. On the other hand, promoting the development of the digital economy in cities with high entrepreneurial vitality can further exert a radiation-driven effect on

entrepreneurship in the local and surrounding areas. The robustness of the model is further tested by conducting quantile regression. In addition, we also used the OLS model to prove that the digital economy can effectively promote the prosperity of urban entrepreneurial vitality.

Table 3 Robustness test

	entre	*entre2*	*Q=0.25*	*Q=0.5*	*Q=0.75*	*OLS*	
	(1)	(2)	(4)	(5)	(6)	(7)	(8)
dige2	1.208***					4.587***	2.535***
	(0.172)					(0.160)	(0.145)
dige		0.686***	2.454***	2.729***	2.805***		
		(0.209)	(0.194)	(0.216)	(0.189)		
pgdp	1.113***	0.152***	0.578***	0.585***	0.533***		0.587***
	(0.025)	(0.030)	(0.029)	(0.027)	(0.018)		(0.019)
pnd	0.004	0.094	-0.119***	-0.093***	-0.059***		-0.094***
	(0.094)	(0.074)	(0.013)	(0.010)	(0.011)		(0.009)
fdi	-2.728***	1.536***	-0.353	-1.530***	-2.946***		-1.027**
	(0.513)	(0.414)	(0.644)	(0.484)	(0.514)		(0.487)
fin	0.042***	-0.002	0.012***	0.010***	0.007***		0.011***
	(0.005)	(0.004)	(0.002)	(0.002)	(0.002)		(0.002)
urban	3.082***	0.137	0.070	-0.027	0.110**		0.024
	(0.193)	(0.167)	(0.066)	(0.064)	(0.046)		(0.044)
trans	0.041***	0.037***	0.004	0.004	0.006**		0.006***
	(0.008)	(0.006)	(0.002)	(0.003)	(0.003)		(0.002)
_cons	-8.545***	-3.134*	-1.259***	-1.197***	-0.667***	4.279***	-1.230***
	(0.580)	(1.753)	(0.299)	(0.282)	(0.180)	(0.020)	(0.185)
City FE	Yes	Yes	Yes	Yes	Yes		
Time FE	Yes	Yes	Yes	Yes	Yes		
N	2467	2538	2538	2538	2538	2467	2467
adj. R^2	0.850	0.918	0.899	0.899	0.899	0.449	0.649

5. Conclusion and Policy Implications

The digital economy is an important factor affecting urban entrepreneurial vitality. This research analyzed 282 prefecture-level cities from 2011 to 2019 to explore the impact of the digital economy on urban entrepreneurial vitality and further analyzed the pathways through which the digital economy affects urban entrepreneurial vitality. The research findings are as follows: First, the improvement of the development level of the digital economy will significantly enhance urban entrepreneurial vitality, and this result still holds after a series of robustness tests. Second, the promotion of the digital economy on urban entrepreneurial vitality is mainly achieved through two pathways: expanding market space and alleviating financing constraints. Third, there is heterogeneity in the positive stimulating effect of the digital economy on urban entrepreneurial vitality, which is influenced by industry structure, export openness, and urban characteristics.

This research provides some empirical evidence for the promotion of urban entrepreneurial vitality by the digital economy and provides policy implications for enhancing urban entrepreneurial vitality. First, we should adhere to innovation-driven development and continuously develop the digital economy ecosystem. By promoting the integration and deep development of data resources, we can create a cluster of digital emerging industries. At the same time, we should increase innovation and entrepreneurship protection measures to promote technological iterative innovation and industrial digital transformation, and create a supportive environment for identifying opportunities for urban entrepreneurial entities. Second, we should use digital empowerment to continuously improve the digital governance and entrepreneurship support management system, enhance the level of government digitalization and operation efficiency, and improve the level of social capital. Cities can

strengthen digital economic infrastructure, enhance the transparency of regional economic operations, protect intellectual property rights and patent copyrights, and promote cooperation and sharing among innovation subjects, creating a good business environment for entrepreneurial entities to reduce financing constraints and entrepreneurial costs. Third, in developing the digital economy, cities should fully recognize the differences in urban development and promote the balanced development of the digital economy in different regions. Based on the influence of industry structure, export openness, urban size, level, and regional heterogeneity, as well as the inherent resources of cities, cities should develop scientific and reasonable development strategies to achieve coordinated development of the digital economy and entrepreneurial vitality.

References

[1] Gong, Y. Analysis of the important discourse of Xi Jinping's innovation-driven development strategy and the relationship between structural employment [J]. Journal of Hohai University (Philosophy and Social Sciences), 2020,22(6): 1-7.

[2] Ye, W. P., Li, X. C., & Chen, Q. Y. The impact of floating population on urban entrepreneurial activity: Mechanism and evidence[J]. Economic Research, 2018,53(6): 157-170.

[3] Liu, C., & Xia, J. C. Corporate system reform, human capital, and entrepreneurial choice [J]. Finance & Trade Economics, 2021,42(8): 113-129.

[4] Wang, Y. J., & Yang, D. L. (2021). The influence of gender role beliefs on gender differences in entrepreneurial behavior[J]. Population & Economics, 2021(4): 126-142.

[5] Yu, X., & Xu, Y. The impact of population agglomeration on entrepreneurial activity: Effects and paths considering agglomeration dynamics[J]. China Population, Resources and Environment, 2022,32(9): 151-163.

[6] Zhao, K. J., & Li, N. Research on the impact of environmental comfort on urban entrepreneurial activity in China [J]. Urban Development Research, 2022,29(8): 1-6.

[7] Wang, K., & Chao, X. J. The impact of new digital infrastructure on urban entrepreneurial activity[J]. Journal of Xi'an University of Finance and Economics, 2023: 1-13.

[8] Cheng, G. B., Wu, J. Q., & Li, Y. Digital economy, green technological innovation, and high-quality economic development [J]. Statistics and Decision,2022,38(23): 11-16.

[9] Liu, H. N., & Liu, W. L. Accurately measuring the innovation effect of the digital economy based on the digital spillover perspective [J]. Technology, Economy and Management Research, 2023(2): 1-6.

[10] Lin, C. L., & Cui, L. J.The development of the digital economy, technological innovation, and the upgrading of the circulation industry structure [J]. Business Economics Research, 2023(4): 119-122.

[11] Xu, H., & Qiu, C. G. Does the development of the digital economy enhance regional innovation capabilities? A spatial econometric analysis based on the Yangtze River Economic Belt[J]. Science & Technology Progress and Policy, 2022,39(13): 43-53.

[12] SONG A K. The Digital Entrepreneurial Ecosystem—a critique and reconfiguration[J]. Small Business Economics, 2019,53(3): 569-590.

[13] Guo, J. T., & Zhu, Y. X. The digital economy, regional innovation efficiency, and regional entrepreneurial vitality[J]. Journal of Harbin University of Commerce (Social Science Edition), 2022(1): 98-111.

[14] AMIT R, HAN X. Value Creation through Novel Resource Configurations in a Digitally Enabled World [J]. Strategic Entrepreneurship Journal, 2017,11(3): 228-242.

[15] Chen, M., & Zhang, W. Research on the Mechanism of the Impact of the Digital Economy on Economic Growth. Social Science[J], 2021(1): 44-53.

[16] Zou, Q., & Fan, L. Identification of the Causal Relationship between Digital Economy Development and Urban Entrepreneurial Activity [J]. Statistics and Decision-making, 2022,38(23): 17-22.

[17] Zhao, X., & Yi, C. Does Digital Economy Development Increase Urban Entrepreneurial Activity?[J]. Modern Finance and Economics (Journal of Tianjin University of Finance and Economics), 2022,42(11): 19-31.

[18] Li, Z., & He, H. Research on the Impact of Digital Economy on Entrepreneurial Activity: An Empirical Analysis Based on Provincial Panel Data and Spatial Durbin Model [J]. Price Theory and Practice, 2021(9): 18-22.

[19] Huang, M., & Zeng, F. Analysis of the Spatial Spillover Effect of Digital Inclusive Finance on Entrepreneurial Activity [J]. Soft Science, 2021,35(2): 14-18.

[20] Zhang, H., & Huang, F. Digital inclusive finance, factor flow efficiency, and coordinated economic development [J]. Statistics and Decision Making, 2023(4): 132-137.

[21] He, J., & Li, Q. The use of digital finance and farmers' entrepreneurial behavior [J]. Chinese Rural Economy, 2019(1): 112-126.

[22] Yue, Z., Zhou, Q., & Yang, X. Crowdfunding, information screening, and market efficiency: An empirical study based on Renrendai [J]. Economic Dynamics, 2016(1): 54-62.

[23] Zhao, T., Zhang, Z., & Liang, S. Digital economy, entrepreneurial activity, and high-quality development: Empirical evidence from Chinese cities [J]. Management World, 2020,36(10): 65-76.

[24] Shi, P., Cao, J., & Jia, J. The impact of digital economy on technology entrepreneurship in the Yangtze River Delta region: The intermediary role of incubation support [J]. Jianghuai Forum, 2022(2): 43-52.

[25] Qian, H., Tao, Y., Cao, S., et al. The theory and empirical evidence of China's digital finance development and economic growth [J]. Quantitative & Technological Economics Research, 2020,37(06): 26-46.

[26] Zhou, L., & Gong, Z. The promotion effect of digital economy level on urban green high-quality development [J]. Economic Geography, 2022,42(11): 133-141.