

Study on the Impact of Digital Economy Enabling High-Quality Economic Development in Yunnan Province

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ABSTRACT

This article aims to explore the role of digital economy and its mechanism in promoting the high-quality development of Yunnan Province's economy. By constructing an evaluation index system and applying econometric methods, the current situation of the digital economy in Yunnan Province and its impact on the high-quality development of the economy are comprehensively analyzed. It is found that the digital economy has a significant positive contribution to the high-quality development of Yunnan Province's economy, and indirectly affects the high-quality development of the economy by enhancing the level of entrepreneurship. In addition, there is a non-linear relationship between the digital economy and high-quality economic development, and the promotion effect of the digital economy on high-quality economic development varies significantly across different levels of economic development. Based on these findings, the article puts forward policy recommendations such as comprehensively promoting the development of the digital economy and implementing a differentiated digital economy development strategy in order to promote the sustainable development of Yunnan Province and the wider region in the era of the digital economy.

KEYWORDS

Digital economy; High-quality economic development; TOPSIS entropy weight method; Panel Threshold Model

1. INTRODUCTION

In today's world, digital transformation has become a key driver of economic growth (Wu Fuxiang, 2021; Adnan Sose, 2023). Especially in China, the rapid development of the digital economy has not only reshaped the traditional economic structure (Zhang Zhigang, 2024), moreover, it has injected new vitality and direction into the high-quality development of the economy (Chen zhao, 2022). Located in the southwestern border of China, Yunnan Province, with its unique geographic advantages and rich natural resources, offers unique conditions for the growth of the digital economy. However, in the face of the booming digital economy, how Yunnan Province can seize the opportunity to fully utilize the potential of the digital economy in order to promote the high-quality development of the regional economy has become an urgent issue to be resolved.

This study aims to deeply explore the role and mechanism of digital economy in promoting the high-quality development of Yunnan Province's economy. By constructing a scientific and practical evaluation index system, as well as applying advanced econometric methods such as the panel threshold model, this study comprehensively analyzes the current situation of the digital economy in Yunnan Province and its impact on the high-quality development of the economy. First, the article

reviews the relevant theoretical foundations of digital economy and high-quality economic development, and analyzes the characteristics of and challenges to the development of digital economy in light of the actual situation of Yunnan Province. Subsequently, through empirical research, it reveals the direct and indirect impacts of the digital economy on the high-quality development of Yunnan Province's economy, as well as the possible spatial spillover effects. Based on these findings, the article puts forward a series of targeted policy recommendations, hoping to provide theoretical and practical references for the sustainable development of Yunnan Province and the wider region in the era of digital economy, and to further contribute wisdom to the realization of efficient, balanced and sustainable development of the regional economy.

2. LITERATURE REVIEW

2.1. Relevant Studies on the Digital Economy

Since Don Tapscott first proposed the concept of digital economy in 1996, it has become a key driver of global economic development. Especially at the 2016 G20 Hangzhou Summit, digital economy was clearly defined as a system of economic activities with digitalized knowledge and information as the core production factors, which provided a solid foundation for subsequent research. With the continuous progress of digital technology, the connotation of the digital economy has also been expanding, from the initial framework of "two-ization" to the current "four-ization" framework proposed by the "Report on the Development of China's Digital Economy (2022)", which indicates that the digital economy has already penetrated into a wide range of areas such as production, society and governance. The digital economy has penetrated into many fields, such as production, society and governance, and has had a far-reaching impact on the economy and society.

In terms of research on measuring the level of the digital economy, despite the challenges, scholars at home and abroad have carried out rich explorations. For example, Wang Ruyi et al. (2018) and Wan Xiaoyu et al. (2022) reflect in detail the infrastructure and application practices of the digital economy by constructing a three-dimensional measurement system covering digital infrastructure, digital industry and its integration and application. Xu Xianchun et al. (2020), on the other hand, provides a new perspective for quantifying the contribution of the digital economy to the national economy by calculating indicators such as the structural coefficient of industry value added. Wang Zhe et al. (2021) constructed the TIMG index from four aspects: digital technology, infrastructure, market and governance, which not only provides a comparison of the degree of development of the digital economy in global economies, but also provides an important reference for understanding the global impact of the digital economy.

2.2. Relevant Studies on the High-Quality Development of Yunnan Province's Economy

Theoretically, since China's 19th National Congress, academics have discussed in depth the connotation of high-quality development, which is regarded internationally as a multidimensional concept that encompasses factors of production, income distribution, social environment, and so on. Domestic scholars such as Jin Pei (2018) and Zhang Junkuo et al. (2019) have proposed a definition of high-quality development centered on meeting the people's growing demand for a better life. In terms of measurement methods, researchers have adopted a variety of methods to comprehensively reflect the dimensions of high-quality development, and the work of Shi Fu and Ren Baoping (2018) and Wei Min and Li Shuhao (2018), among others, provides a more comprehensive measurement of high-quality development by constructing a multi-dimensional evaluation system.

2.3. The Effect of the Digital Economy on High-Quality Economic Development

Studies on the impact of the digital economy on the high-quality development of the economy have shown that the digital economy is not only the driving force of new economic forms, but also the key to promoting the optimization of economic structure and industrial upgrading. Empirical studies by Tang Wenjin et al. (2019) and Li Zhiguo et al. (2021) have shown that the digital economy can significantly promote the high-quality development of the economy, and in particular the digitalization of the industry plays a more prominent role in promoting industrial structure upgrading and high-quality economic development is more prominent. These research results provide a solid theoretical and empirical foundation for understanding the value of digital economy and its contribution to economic and social development.

3. THEORETICAL ASSUMPTION

The digital economy, as a key component of the modern economic system, has significantly contributed to the high-quality development of the economy through its core technologies. It enhances enterprise production efficiency, optimizes market information matching, and promotes economic structural transformation by stimulating regional entrepreneurship and industrial upgrading. The digital economy reduces transaction costs, improves the efficiency of economic operations, and leverages the development of industries such as information technology (IT) services to bring about significant social spillover benefits, such as boosting employment and consumption, as well as enhancing the quality of economic development. In the area of financial services, the digital economy has provided efficient and low-cost services to people at different income levels, helping to narrow the urban-rural gap, promote coordinated regional development and enable more people to share the fruits of development. At the same time, the digital economy also reduces financing costs by intelligently matching borrowers and lenders, and provides support for scientific and technological innovation, despite the fact that scientific and technological innovation itself suffers from high capital demand and high risk. Based on this, we propose the hypothesis:

H1: The development of digital economy has positively contributed to the high-quality development of Yunnan Province's economy.

In today's digital era, the digital economy is emerging as a key driver of economic growth. We find that digital technologies have not only changed traditional business models, but also provided new opportunities and challenges for entrepreneurial activities. Studies have shown that there is a significant positive correlation between the development of the digital economy and economic growth, especially by lowering the threshold of entrepreneurship and increasing the success rate of entrepreneurship, the digital economy promotes the dissemination of knowledge and innovation, which is crucial for the high-quality development of the economy. Based on the endogenous growth theory, technological progress and the accumulation of human capital are the core elements that drive long-term economic growth, and the digital economy accelerates both processes by enhancing the level of entrepreneurship. The real economic phenomenon also confirms this, as the popularization of e-commerce platforms and the application of cloud computing and big data analysis tools have provided unprecedented support for entrepreneurs. Therefore, a combination of theoretical analysis and real-world observation. Based on this, we propose the hypothesis:

H2: The digital economy can have a positive effect on high-quality economic development by enhancing entrepreneurship.

In examining the impact of the digital economy on the high-quality development of Yunnan Province's economy, we noted a potential nonlinear relationship, which prompted us to use a threshold model for our analysis. The difference in development paths between Yunnan Province and the eastern seaboard suggests that the digital economy may play a special role in the province's economic growth. According to the nonlinear economic growth theory, key factors such as

technological progress and human capital may have different impacts at different stages of development. Yunnan Province's regional characteristics, such as tourism resources and biodiversity, may combine with the digital economy to produce synergistic effects. In addition, differences in the adoption of digital technologies by different industries, as well as policy support from local governments, may trigger threshold effects at different levels of economic development. Based on this, we propose the hypothesis:

H3: There is a non-linear relationship between the digital economy and the high-quality development of Yunnan Province's economy.

4. RESEARCH DESIGN

4.1. Model Construction

4.1.1. Benchmark model construction

In order to test the impact effect of digital economy development on the high-quality development of Yunnan Province's economy, the benchmark regression model is established according to the direct transmission mechanism as follows:

$$EHD_{i,t} = \alpha_0 + \alpha_1 DE_{i,t} + \alpha_2 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

Where i denotes the city (prefecture), t denotes the year, $EHD_{i,t}$ is the level of high-quality economic development of city (prefecture) i at time t , and EHD is the indicator of the level of digital economic development of the city (prefecture) at the time, and the vector $X_{i,t}$ represents the collection of a series of control variables. Considering that in reality there may be unobservable factors such as sudden events and economic cyclical fluctuations that may affect the high-quality development, time fixed effects are added to the model; considering that there may be unobservable factors that do not change over time among different provinces, individual fixed effects μ_i are added to the model for the city (prefecture) i that do not change over time; $\varepsilon_{i,t}$ denotes the random perturbation term. α_0 denotes the intercept term, and α_1, α_2 denotes the coefficients of each variable coefficients.

4.1.2. Transmission mechanism analysis

In order to verify whether the development of the digital economy promotes the high-quality development of the economy through the mediating variable entrepreneurship level, the mediating effect test model is established as follows:

$$EP_{i,t} = \beta_0 + \beta_1 DE_{i,t} + \beta_2 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

$$EHD_{i,t} = \gamma_0 + \gamma_1 DE_{i,t} + \gamma_2 EP_{i,t} + \gamma_3 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (3)$$

Where $EP_{i,t}$ denotes the level of entrepreneurship in city (prefecture) i in period t ; β_0, γ_0 denotes the intercept term and $\beta_1, \beta_2, \gamma_1, \gamma_2$ denotes the variable coefficient; the rest of the settings are the same as in equation (1).

4.1.3. Panel threshold model construction

In order to analyze the impact of digital economy on the high-quality development of the economy of each state and city in Yunnan Province under different levels of economic development, the panel threshold model is established as follows:

$$EHD_{i,t} = \sigma_0 + \sigma_1 DE_{i,t} I(GDP_{i,t} \leq \theta_1) + \sigma_2 DE_{i,t} I(\theta_1 \leq GDP_{i,t} \leq \theta_2) + \sigma_3 DE_{i,t} I(GDP_{i,t} \geq \theta_2) + \sigma_4 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (4)$$

Where $I(\cdot)$ denotes the indicative function, GDP denotes the economic development level of city (prefecture) i in period t ; θ_1, θ_2 denotes the threshold, σ_0 denotes the intercept term, and $\sigma_1, \sigma_2, \sigma_3, \sigma_4$ denotes the variable coefficients; the rest of the settings are the same as in equation (1).

4.2. Variable Description and Measurement

4.2.1. Explained variable: the level of high-quality economic development in Yunnan Province (EHD)

Starting from the five development concepts, five primary indicators of innovation, coordination, greenness, openness and sharing and 23 secondary indicators corresponding to them are selected, and the index of high-quality economic development of all prefectures and cities in Yunnan Province calculated by entropy weighting method is used as a measure of high-quality economic development. In this paper, with reference to Wang Jun's index selection, the economic high-quality development index of 16 prefectures in 2015-2021 is calculated by TOPSIS entropy weight method from the 5 first-level indicators of innovation, coordination, green, openness and sharing and their corresponding 11 second-level indicators, and the specific basic indicators are shown in Table 1.

Table 1. Indicators of the level of high-quality economic development

Level 1 indicators	Level 2 indicators	Level 3 indicators	Unit	Causality
Innovations	Technology Input	R&D Investment	%	+
	Technology Market Turnover	Ratio of technology market turnover	%	+
Coordination	GDP per capita	Ratio of inter-provincial GDP to year-end population	Ten thousand yuan	+
	Urban-rural income gap	Thiel Index	/	-
	Advanced Industrial Structure	Ratio of tertiary sector value to secondary sector value	/	+
Green	Carbon Dioxide Emission per Capita	Carbon dioxide emissions to year-end population	Tons/Person	-
	Energy consumption per unit of GDP	Ratio of total energy consumption to GDP	Tons/Yuan	-
Openness	Foreign Investment	FDI to GDP	%	+
Sharing	Income Distribution	Average Wages of Employed Workers	Tons/Yuan	+
	Consumption Expenditure	Per capita consumption expenditure	Tons/Yuan	+
	Welfare level	Per capita investment in education and healthcare	Tons/Yuan	+

4.2.2. Explanatory variable

(1) Core explanatory variables: digital economy development level (DE)

Given the current literature on the definition and measurement of the digital economy, as well as the consideration of the availability of data at the state and municipal level in Yunnan Province, this paper constructs the digital economy development index from four aspects of digital industrialization, industrial digitization, digital governance and digital infrastructure and uses the entropy weight method to measure, and ultimately obtains the index of the level of development of the digital economy in the period of 2015-2021, with a specific base indicators are shown in Table 2.

Table 2. Index of the level of development of the digital economy

Level 1 indicators	Level 2 indicators	Level 3 indicators	Unit	Causality	
Digital Industrialization	Industry Scale	Total Telecommunication Business	Billions	+	
		Software Product Revenue Scale	Billions	+	
		Information Service Revenue Scale	Billions	+	
	Industry Type	Number of ICT Listings	Unit	+	
		Number of Internet Top 100 Enterprises	Unit	+	
		Number of Electronic Information Industry Manufacturing Enterprises	Unit	+	
Industrial Digitization	Agricultural Digitization	Proportion of Administrative Villages with Internet Broadband Services	%	+	
		Rural Broadband Access Users	Trillion units	+	
		E-commerce Volume of Agricultural Products	Billions yuan	+	
	Industrial Digitization	Proportion of industrial applications of the Internet	%	+	
		Number of computers per 100 people in industrial enterprises	Unit	+	
		Integration index of dualization	/	+	
		E-commerce turnover of industrial enterprises	Billions yuan	+	
	Digitization of Services	Share of Enterprises with E-commerce Transaction Activities	%	+	
		E-commerce Transaction Value	Billions yuan	+	
		Input of Internet-related Service Industry	Billions yuan	+	
		Digital Inclusive Finance Index	/	+	
	Digital Governance	Governance Environment	Number of Microblogs of Governmental Organizations	Unit	+
			Number of Government Microblogs	/	+
			Number of Digital Intellectual Property Transaction Contracts	Unit	+
Digital Infrastructure	Level of new infrastructure development	Fixed Investment in Electronic Information Industry	Billions yuan	+	
		Number of Mobile Phone Base Stations	Trillion units	+	
		Number of IPV4 Addresses	Trillion units	+	

(2) Control variables

A) Fiscal decentralization degree (Finadp), expressed as the ratio of budgeted revenue to budgeted expenditures; B) Urbanization level (Urban), expressed as the logarithm of the population density of each state and city in Yunnan Province; C) Financial development level (Finance), expressed as the ratio of institutional deposit and loan balances to the gross domestic product (GDP); D) Openness to trade (Open), expressed as the weight of import and export as a percentage of GDP; E) Input of social fixed assets, expressed as the weight of investment in social fixed assets as a percentage of GDP.

Openness of trade is expressed as the proportion of import and export volume to GDP; F) Input of fixed assets of the whole society is expressed as the proportion of investment in fixed assets of the whole society to GDP.

(3) Mediating variable: level of entrepreneurship

Referring to Chlosta et al. (2012), we use the number of private firms and self-employed businesses to capture the level of entrepreneurship in an economy, denoted EP.

(4) Threshold variable: GDP development level of each state and city in Yunnan Province

Since the different levels of economic development of each state and city in Yunnan Province will lead to differences in all aspects of each state and city, whether it is infrastructure, or the development of other industries will be limited by the level of economic development, so the level of economic development of each state and city is used as a threshold variable.

4.3. Data Sources and Descriptive Statistics

The state-level data used in this paper mainly come from the China Urban Statistical Yearbook, China County Statistical Yearbook, and Yunnan Provincial Statistical Yearbook from 2014 to 2021. Individuals come from the China Academy of Information and Communication Research and Yunnan Provincial Bureau of Statistics, etc. Table 3 shows the descriptive statistics of the main variables.

Table 3. Descriptive statistical results for the main variables

Variable	Obs	Mean	Std.Dev.	Min	Max
EQD	112	0.115	0.023	0.073	0.163
DE	112	0.112	0.021	0.073	0.162
Finadp	112	0.278	0.162	0.072	0.816
Urban	112	4.581	0.725	2.788	6.003
Finance	112	5.621	0.439	4.532	6.775
Open	112	0.066	0.098	0	0.44
Input	112	4.718	2.584	1.019	16.121
EP	112	0.139	0.156	-0.426	0.767
EGDP	112	9774.084	1994.251	6159.977	13775.39

The results show that the mean value of the economic quality development index (EQD) is 0.115, the maximum value is 0.163, the minimum value is 0.073, and the standard deviation is 0.023, indicating that there are large differences in the quality of economic development among different cities and municipalities in Yunnan Province, which is similar to the findings of Zeng Yi et al (2019). The digital economy development index (DE) and entrepreneurship level (EP) are also characterized by "small mean value and large standard error". From the perspective of control variables, there are also significant differences in the degree of fiscal decentralization (Finadp), the level of urbanization (Urban), the level of financial development (Finance), the degree of trade openness (Open), and the investment in fixed assets of the whole society (Input).

5. EMPIRICAL INVESTIGATION

5.1. Regression to the Base Line

Table 4 reports the results of the benchmark regression on the impact of digital economy on the high-quality development of Yunnan Province's economy. Column (1) uses only the digital economy (DE) as an explanatory variable, and the estimated coefficient of the digital economy is significantly positive, which initially proves that the development of the digital economy has a significant

contributing effect on the high-quality development of Yunnan Province's economy. On this basis, columns (2) (3) sequentially add a portion of control variables, and the results show that the estimated coefficient of digital economy is significantly positive, indicating that the digital economy promotes high-quality development at the state and municipal level in Yunnan Province, and the regression results in columns (4) (5) (6) control for the time and province fixed effects and add the control variables, and the impact of the digital economy on the high-quality development of Yunnan Province economy in column (6) The coefficient is 0.331 and passes the significance test at the 1% level, indicating that the digital economy has a significant positive effect on improving the high-quality development of Yunnan Province's economy. Meanwhile, the coefficient of the degree of fiscal decentralization (Finadp) is significantly negative, indicating that the excessive pursuit of the growth of fiscal budgetary revenue may reduce the high-quality development of the economy of the state and city. The coefficients of urbanization level (Urban) and all-society fixed asset input (Input) are positive and both pass the significance test at the 1% level, indicating that the expansion of urbanization and all-society fixed asset input help to improve the quality of regional economic development. The level of financial development (Finance) and trade openness (Open) both pass the test of significance, so they can not promote the high-quality development of the economy of the prefectures in Yunnan Province. The above empirical results support hypothesis 1.

Table 4. The Direct Impact of the Digital Economy on Yunnan Province's High-Quality Development

Variable	EHD					
	(1)	(2)	(3)	(4)	(5)	(6)
DE	0.422***	0.359***	0.344***	0.436***	0.337***	0.331***
	(6.961)	(5.259)	(5.045)	(7.084)	(4.655)	(4.636)
Finadp		-0.012	-0.010		-0.021*	-0.025**
		(-1.327)	(-1.071)		(-1.667)	(-1.981)
Urban		0.005**	0.006**		0.082***	0.079***
		(2.007)	(2.490)		(2.895)	(2.748)
Finance		0.004*	-0.002		0.004	-0.007
		(1.890)	(-0.725)		(1.203)	(-1.537)
Open			0.020			0.011
			(0.957)			(0.376)
Input			0.002***			0.003***
			(2.616)			(2.774)
_Cons	0.057***	0.023*	0.046***	0.056***	-0.321**	-0.257*
	(9.306)	(1.656)	(2.735)	(8.959)	(-2.513)	(-1.968)
Tear FE	NO	NO	NO	YES	YES	YES
City FE	NO	NO	NO	YES	YES	YES
N	112	112	112	112	112	112
R²	0.513	0.438	0.575	0.456	0.486	0.521
Note: p-values in parentheses *** p<0.01, ** p<0.05, * p<0.10						

5.2. Intermediary Effect

For column (1), the results show that the digital economy has a positive and significant contribution to the high-quality development of the economy in the states and cities of Yunnan Province; for column (2), taking the entrepreneurship level (EP) as the mediating variable, the coefficient of the digital economy on the entrepreneurship level is positive with a significance level of 1%, indicating that the development of the digital economy has a positive impact on the improvement of entrepreneurship level. The regression coefficients of entrepreneurship level and digital economy on urbanization level (Urban) are also significantly positive, and the coefficients on fiscal

decentralization degree (Finadp) are significantly negative, indicating that the digital economy can indirectly promote the rationalization of fiscal decentralization degree by positively affecting entrepreneurship level. In addition, for every one unit increase in the digital economy, the level of human capital will increase by 1.587 units, while promoting the high-quality development of Yunnan Province's economy by 0.331 units. Therefore, from Table 5, it can be seen that there is a significant mediating effect of entrepreneurship level in the impact of digital economy on the high-quality development of Yunnan Province's economy, which is consistent with Hypothesis 2, indicating that there is an indirect impact of digital economy on the high-quality development of Yunnan Province's economy.

Table 5. Results of the Impact of Digital Economy on the Role Mechanism of High-Quality Development in Yunnan Province

	(1)	(2)
	EQD	EP
DE	0.331***	1.587**
	(4.636)	(-2.060)
Finadp	-0.025**	-1.205*
	(-1.981)	(-1.943)
Urban	0.079***	0.438
	(2.748)	(0.454)
Finance	-0.007	-0.010
	(-1.537)	(-0.092)
Open	0.011	0.385
	(0.376)	(0.628)
Input	0.003***	-0.007
	(2.774)	(-0.364)
Cons	0.112***	-1.293
	(8.378)	(-0.290)
Tear FE	YES	YES
City FE	YES	YES
N	112	112
R²	0.521	0.402

5.3. Threshold Effect

5.3.1. Threshold effect test

It is necessary to ensure that the sample data in the threshold effect of the premise, in order to determine the specific threshold value of the threshold variable and the threshold interval. Using the "Bootstrap" (Bootstrap) for 1000 simulations, the test results are shown in Table 6. From the test results, the data passed the 1% significance test of the double threshold effect, and the p-value of the triple threshold effect was 1.0, which did not pass the 10% significance test, indicating that there is a relationship between the level of digital economic development and the high-quality development of the economy of the states and municipalities, and the threshold model should be established. The results of the estimation of the threshold are shown in Table 7.

Table 6. Threshold inspection

	Model	F value	P value	Crit 1	Crit 5	Crit 10
DE	Single	158.90	0.0000	22.2514	22.2514	22.2514
	Double	61.39	0.0000	6.8104	6.8104	6.8104

The thresholds of economic development are derived from the modeling, which are 10270.765 and 7864.878 and pass the test of significance, thus dividing the entire sample into regions with low levels of economic development ($GDP \leq 7864.878$), regions with medium levels of economic development ($7864.878 \leq GDP \leq 10270.765$) and regions with high levels of economic development ($GDP \geq 10270.765$).

Table 7. Threshold estimates

Model	Threshold	Lower	Upper
Th-1	9920.4120	9681.1750	9990.1850
Th-21	10270.7654	10058.0008	10291.3608
Th-22	7864.8783	7690.1867	7915.4857

5.3.2. Threshold model estimation

In order to study the impact of the digital economy on the high-quality development of China's economy under different levels of economic development in China, it is necessary to further determine it through threshold regression.

Table 8. Threshold regression results

EQD	Coefficient	Std. err.	t	P>t
Finadp	-0.023	0.037	-0.65	0.520
Urban	0.040	0.056	-0.72	0.471
Finance	0.003	0.008	0.34	0.734
Open	-0.044	0.035	-1.26	0.212
Input	-0.001	0.001	-0.34	0.732
_ cat#c.DE				
0	0.246	0.053	-4.64	0.000
1	0.071	0.048	-1.46	0.147
2	0.219	0.044	4.95	0.000
N	112			
rho	0.939			

From the results of Table 8, when the economic development is at a low level ($GDP \leq 7864.8783$), the region with medium level of economic development ($7864.8783 \leq GDP \leq 10270.7654$) and the region with high level of economic development ($GDP \geq 10270.7654$), the elasticity coefficients are 0.246 and 0.071, respectively, which are significantly different, and both of them pass the 5 percent significance test, indicating that there is a significant threshold effect of the digital economy on the high-quality development of the economy, which verifies hypothesis 3 that there is a nonlinear relationship between the two.

The existence of the threshold effect indicates that the impact of the digital economy on the development of economic quality in Yunnan Province is nonlinear, and this relationship is affected by the threshold value of a specific economic level. Specifically, when the value of the economic level is below the first threshold, the economy may be in a rapid growth stage, in which the enhancement of the digital economy has a significant positive effect on the development of economic quality in Yunnan Province. However, when the value of the economic level is between the two thresholds, it may indicate that the economy is in a period of adjustment, in which an increase in the level of economic development may not have a significant impact on the high-quality development of Yunnan's economy, possibly because the economy needs to address other structural issues at this stage. Finally, when the value of the level of economic development exceeds the second threshold, the economy may have entered a mature stage, at which point the increase in the level of economic development once again has a significant positive impact on the economy of the states and cities of

Yunnan Province, possibly because the economy has already resolved the problems of the previous stages and is able to more effectively utilize the enhancement of the digital economy to drive the quality of the economy.

In particular, Figure 1 illustrates the threshold value of the level of economic development (GDP) under the double threshold, where the value corresponding to the lowest point of the likelihood function is the threshold value.

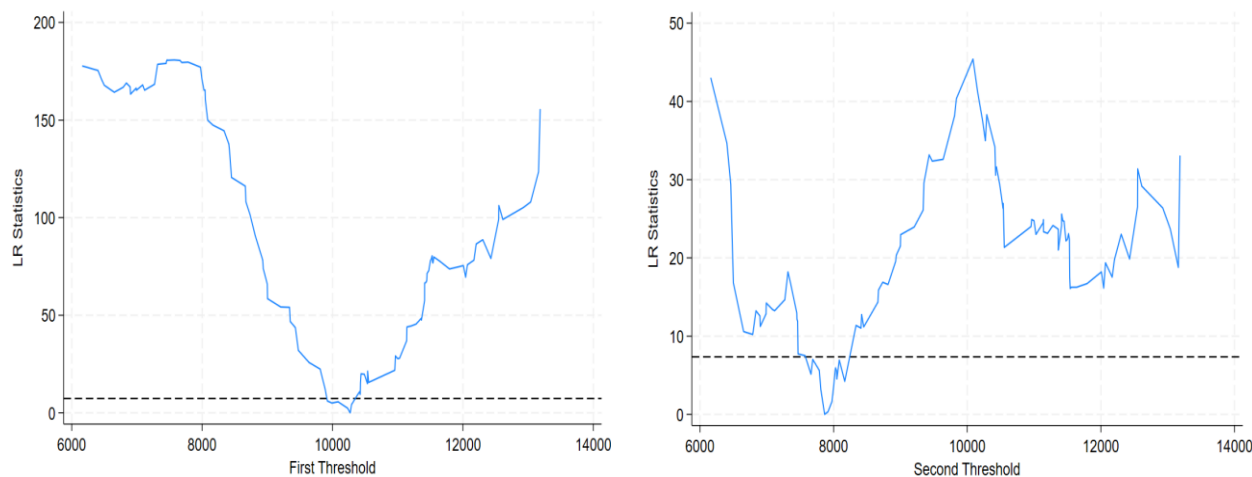


Figure 1. Two-threshold test for GDP per capita

6. CONCLUSIONS AND OUTLOOK

6.1. Research Conclusion

This paper explores the impact of digital economy on the high-quality development of Yunnan Province's economy in terms of direct action mechanism, indirect action mechanism and nonlinear relationship by constructing the metrics of digital economy and high-quality development of Yunnan Province's economy and adopting the panel data of 16 cities and towns in Yunnan Province from 2015 to 2021, and utilizing the panel fixed effect model, the mediation effect model and the panel threshold model. The main conclusions are as follows: First, the digital economy can significantly promote the high-quality development of the economy, which is of great significance in promoting the rapid development of China's economy; second, the digital economy can indirectly affect the high-quality development of the economy by improving the level of entrepreneurship in the region; third, the digital economy has a non-linear role in promoting the high-quality development of the economy of all the states and cities of Yunnan Province, and the promotion of the digital economy has a significant difference in different states and cities at different levels of economic development. Third, the digital economy has a non-linear effect on the high-quality development of the economy in different states and cities of Yunnan Province, and the promotion effect of the digital economy on the high-quality development of the economy is obviously different at different levels of economic development.

6.2. Policy Recommendations

6.2.1. Comprehensively promote the development of digital economy and advance the construction of digital China

First, the government should increase investment and support for digital technology, formulate relevant support policies such as the introduction of talents and tax subsidy preferences, expand information technology research and development platforms, and continuously accelerate the process

of digital industrialization and industrial digitization. Secondly, the government should pay attention to the construction and improvement of information infrastructure such as big data, and lay out new infrastructure in a targeted and forward-looking manner, so as to drive the transformation and upgrading of the manufacturing industry and enhance the core competitiveness with technology. Finally, gather intellectual resources from universities and research institutions, break through key core technologies in the digital field, create a digital development platform, give priority to encouraging and guiding enterprises to smoothly realize open digital transformation, and provide strong support for the construction of a new development pattern of structural optimization and transformation of kinetic energy.

6.2.2. Implement district-differentiated and dynamic digital economy development strategies to enhance regional innovation level

Due to the differences in resource endowments and economic development levels between states and cities in Yunnan Province, the impact of the digital economy on the high-quality development of the economy brought about by the level of economic development is more prominent, so it is necessary to formulate a digital economy development strategy in accordance with local conditions in order to eliminate the digital economy development gap between regions. To this end, it is important to seize the intermediate influencing factor of the digital economy for the high-quality development of Yunnan Province's economy - the level of entrepreneurship. Through the enhancement of the entrepreneurship level, the innovation momentum of the digital economy in different regions will be stimulated, so that the enhancement of the entrepreneurship level will become a technological tool to effectively minimize the imbalance of regional economic development.

REFERENCES

- [1] Ge Heping, Wu Fuxiang. Digital Economy Empowering High-quality Development of Economy: Theoretical Mechanism and Empirical Evidence [J]. *Nanjing Social Science*, 2021(1):10.
- [2] Chen Zhao, Hu Ling. Digital economy, innovation activity and export technology complexity [J]. *Journal of Hunan University of Finance and Economics*.
- [3] Xin Jinguo, Ji Xiaoyan, Zhang Chengyue. Comprehensive Evaluation of Digital Economy Development in Zhejiang Province [J]. *Statistical Science and Practice*, 2019(7):5.
- [4] Wan Xiaoyu Luo Yanqing. Measurement of digital economy development level and its effect on total factor productivity [J]. *Reform*, 2022(1):18.
- [5] Xu Xianchun. Digital economy, digital technology and the role of data assets in economic and social development [J]. *Economic Research Reference*, 2020(24):4.
- [6] Wang Zhe, Chen Yinmo, Zhang Ming. Measuring Global Digital Economic Development: Characteristic Facts Based on TIMG Index [J]. *Financial Review*, 2021, 13(6):19.
- [7] Jin Bei. Economic research on "high-quality development"[J]. *China Industrial Economics*, 2018(4):14.
- [8] Zhang JK, Hou YZ, Liu PL, et al. Goal requirements and strategic paths for high-quality development [J]. *World of Management*, 2019, 35(7):7.
- [9] Shi Bo, Ren Baoping. Measurement and analysis of high-quality development of China's provincial economy [J]. *Economic Issues*, 2018(4):6.
- [10] Wei Min, Li Shuhao. A Study on the Measurement of China's High-quality Economic Development Level in the New Era [J]. *Quantitative Economics Technical Economic Research*, 2018, 35(11):18.
- [11] Li Zhiguo, Che Shuai, Wang Jie. Digital economy development and industrial structure transformation and upgrading: heterogeneity test based on 275 cities in China [J]. *Journal of Guangdong University of Finance and Economics*.