



Digital Economy and Unified Market Construction Under the Advanced Computer Information Technology

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Abstract

The digital economy and the construction of a unified large market are both important topics in economic development, but there are few studies on the impact of the digital economy on the construction of a unified large market. This paper uses the econometric model analysis method to empirically explore the impact of the digital economy on the construction of a unified large market. The study found that the digital economy has a significant positive effect on the construction of the unified large market, and mainly promotes the development of the unified large market construction level through the improvement of the scale effect and the effect of optimal resource allocation. Through the heterogeneity analysis, it is found that the impact of the digital economy on the construction of a unified large market has regional heterogeneity and market-oriented development level heterogeneity. The digital economy has an important impact on the construction of a unified large market in the eastern and western regions of China, but has no significant impact on the central and eastern regions; the digital economy has a significant impact on regions with a medium level of marketization, while it has a significant impact on regions with low and high levels of marketization. The region has no significant effect. The research provides certain reference and guidance for the development of the digital economy and the construction of a unified national market.

Key words: *digital economy; marketization index; digital technology; econometric analysis model method*

1. Introduction

In the era of Uka, the uncertainty, instability, complexity and ambiguity of the international situation are becoming increasingly strong. The outbreak of the COVID-19 epidemic and the rapid spread of the Russia-Ukraine conflict have strongly proved this point, and all countries are facing great economic and social development challenges. In response to the impact of external uncertainties and improve economic resilience, China has adopted a series of strategic measures. In 2020, China proposed to build a new development pattern with the domestic major cycle as the main body and the international and domestic double cycle, so as to alleviate the adverse impact of the global economic downturn and global market contraction. In 2022, China put forward the opinions of accelerating the construction of national unified market, which provides support and guarantee for the construction of double circulation development pattern. The construction of a national unified large

market is conducive to breaking the bottleneck of China's economic development, promoting the transformation of China's market scale from quantity to quality, and realizing high-quality economic development. However, due to the influence of political and historical and other factors, there are still problems such as local protectionism and inconsistent market rules and system, which makes the construction of unified market slow.

On the one hand, the digital economy driven by digital technology realizes the transition development; On the other hand, the expansion of digital industry lays a solid foundation for the integration of digital economy into the economy and society. The highly innovative digital economy can promote the generation of new forms of business, the transformation and upgrading of industrial structure, optimize resource allocation efficiency, enhance market vitality, and improve total factor productivity through digital technology innovation and the improvement of digital infrastructure Strong

externality of digital economy shows that digital economy may be of great significance to the unified market construction, therefore, the author through rational analysis and content analysis of digital economy on the unified market construction and its specific mechanism, and put forward relevant Suggestions, expect to digital economy and unified market construction to provide certain reference and reference significance.

2.literature Review

2.1. Digital Economy

As a new form of economic development, digital economy has had an important impact on the economic and social development of other countries around the world. At the macro level, Vu K M and Asongu S^[13], based on the perspective of unbalanced development, empirically examines the development status of digital economy in 163 countries, finding that developing countries benefit more than developed countries in terms of digital popularization, and developing countries can narrow the gap with developed countries through the late-mover advantage of digital economy. Hui Zhang and Lin Shi^[4] believe that digital economy has substitution effect, penetration effect, innovation effect and industrial correlation effect, which then has an impact on the national economy and promotes the development of the national economy. Han Guo and Xiaojun Gao^[5] more system discusses the digital economic development of high quality, pointed out that the digital economy can reshape the national supply system, improve the economic growth potential, reduce market transaction costs, foster new economic development momentum, and from different perspectives of macro and micro digital economy to cultivate the theory of new economic development logic. At the middle view level, foreign scholars Yilmaz et al.^[15] In the process of empirical inspection of the economic development of various states in the United States, it is found that the improvement of the informatization level of one state can promote the improvement of the informatization level of neighboring states, that is, digitalization has spatial spillover effect. Based on the perspective of domestic scholars Tao Zhao^[11] and high-quality urban development, measured the development level of digital economy in 222 cities in China, empirically tested the impact of digital economy on the high-quality development of regional cities, and found that digital economy promotes the economic development of regional cities by improving entrepreneurial activity and spatial spillover effect. At the microscopic level, the Caputo et al.^[2] It is pointed out that Internet of Things technology plays a key role in the digital transformation and upgrading of manufacturing industry; more specifically, Banalieva et al.^[1] found that the integration of digital technology in the operation process can improve the "high cost and high energy consumption" problems prevalent in traditional

manufacturing enterprises. Haijian Li et al.^[6] believe that traditional enterprises can reduce enterprise costs and improve their production and operation efficiency through digital transformation, and more specifically and systematically explain the impact path of digitalization on enterprises.

2.2. Unified Big Market

The construction of a unified large market is an important stage and development content in the process of national economic development. Jiru Shen^[7] explored the unified market construction of production factors, commodities and personnel in the European Union, and then put forward the development enlightenment of China's socialist market economy construction. Lei Wang^[9] discussed the problems of price distortion, monopoly of factors, and low governance efficiency of factors market in the national unified factor market, and put forward the construction of unified factor market from the aspects of property rights system, science and technology system and legal system and so on. Yinqing Ge^[16], based on the opposite form of unified market—market segmentation, analyzed the reasons of Chinese market segmentation, clarified the negative significance of market segmentation, and put forward the realization path of eliminating market segmentation and building a unified market from the government level. Zhibiao Liu^[18] discussed the definition and characteristics of the domestic unified market, and put forward the development suggestions of the domestic unified market from the two aspects of breaking the government administrative monopoly and the enterprise economic monopoly. Compared with previous scholars' research is mainly based on theoretical analysis and content analysis, Pu Chen et al.^[10] used empirical research to build a mathematical model and quantitatively analyze the role of the domestic unified market construction on China's economic growth, providing factual evidence for the necessity and importance of the construction of a national unified market.

2.3. Literature Review

While the digital economy has achieved remarkable results in practice, scholars at home and abroad have conducted in-depth studies on the digital economy, with clear and systematic studies on the definition and classification of the digital economy and the impact of the digital economy. However, due to the complexity of digital economy and the immature development stage of digital economy, there are still a series of problems in digital economy research, such as the definition, classification and evaluation criteria of digital economy are not unified. Related research mainly focuses on the definition and connotation characteristics of the unified market, and the influencing factors hindering the construction of the unified market, and mainly focuses on

scientific analysis, with less quantitative analysis. Few studies combine the digital economy with the unified big market item. Therefore, the author focuses on the construction of digital economy and domestic unified large market, explores the role of digital economy in the construction of domestic unified large market, in order to enrich the research in the digital economy and the field of unified large market, and put forward relevant suggestions for the development of digital economy and the construction of domestic unified large market.

3. Theoretical analysis

3.1. The Connotation of Digital Economy and Unified Market

3.1.1. The Definition and Connotation of the Digital Economy

The concept of digital economy was first put forward by Tapscott^[12] in his book *Digital Economy*, the father of digital economy. In his book *Digital Economy*. He believed that digital economy is an intelligent era based on the development of the Internet, and promotes economic and social development through intelligence.

Combined with the research of scholars, the author defines digital economy as a new economic form with digital technology as the key driver, digital infrastructure as the development base, and thus generating new production factors- -data, so as to promote high-quality economic development and integrate into all fields of society. On the one hand, digital economy realizes the value remodeling of the existing industry with its digital, permeable and substitutive characteristics, promotes the digital transformation of the industry, and finds a new path for the existing industry to break through the development bottleneck. On the other hand, digital economy, with its characteristics of knowledge, creativity and novelty, stimulates new industries to create value, promotes the development of digital industry and seeks new impetus for economic development.

3.1.2. The connotation of a unified market

The unified big market refers to the establishment of national unified market rules, the promotion of fair competition in the market, the creation of a highly inclusive and open market environment, the orderly and normal operation of the market, and the promotion of market efficiency. Smooth and continuous expansion.

3.2. The impact of the digital economy on the unified market

3.2.1. Digital Economy and Unified Market

As a new form of economic development, the impact

of the digital economy has penetrated into all aspects of the economy and society. At the macro level, the digital economy has become a new growth point of the economy and can promote high-quality economic development; at the meso level, the digital economy can play an important and positive role in regional development through structural optimization and technological innovation; at the micro level, the digital economy can promote the implementation of the digital transformation strategy of enterprises, and realize the digital transformation and integration of production, operation, sales, and services of enterprises. The digital economy also plays a crucial role in the construction and development of a unified market.

Based on the above analysis, the basic hypothesis 1 is put forward.

H1: The digital economy can promote the construction of a unified large market.

3.2.2. Digital Economy, Scale Effect and Unified Market

On the supply side, in the digital age, digital technology has alleviated the traditional problem of information asymmetry. The powerful information transmission capability and speed enable the main players in the market to obtain the information they are concerned about in a short period of time, and to seize the market pain points and discover Opportunities to provide the market with the required products and services, thereby increasing the number of entrepreneurial entities in the market. In addition, the knowledge spillover benefits of the digital economy make market supply entities no longer limited to organizational forms such as enterprises, and individuals can participate in the market supply chain with their knowledge structure and knowledge reserves. On the demand side, the development of the digital economy has broken the traditional market boundaries, enabling consumers in "non-central areas" to participate in market transactions through electronic communication equipment and increasingly mature logistics networks. In addition, the long tail effect of the digital economy has satisfied the needs of consumers with niche and personalized preferences, and has also allowed these consumers to integrate into the market.^[14]

Based on the above analysis, Hypothesis 2 is proposed.

H2: The digital economy can exert its scale effect to promote the construction of a unified large market.

3.2.3. Digital Economy, Resource Allocation Optimization Effect and Unified Market

Relying on digital technology, organizations can establish digital platforms. For example, organizations

with the government as the main body have created a national public resource trading platform through digital technology, and market participants can query public resource trading information nationwide on this platform. Participate in the transaction of resources in the national unified public resources market. Another example is the establishment of a national e-commerce platform through digital technology by an enterprise-based organization, which not only provides new market distribution channels for producers, but also meets the diversified needs of consumers. In addition, the digital economy has improved the degree of marketization of factors, and factors such as land, labor, capital, knowledge, and data can flow freely under the strong penetration and high permeability of the digital economy. For example, the development of digital finance enables capital to be faster. Form a connection with enterprises to improve the efficiency of capital use; the development of digital technology enables knowledge to be diffused in a more efficient and rapid way, allowing the free flow of knowledge elements and becoming an important source of power for innovation. Based on the above analysis, Hypothesis 3 is proposed. H3: The digital economy can promote the construction of a unified large market through the optimization effect of resource allocation.

4. Research design

4.1. Model settings

In order to test the impact of the digital economy on the construction of a unified large market, a benchmark fixed effect model is established (1)

$$MI_{it} = \alpha + \alpha_1 DEI_X_{it} + \alpha_2 CON_{it} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

where i is the region, t is the time, MI is the regional marketization level, DEI_X is the digital economy development level, CON is a series of control variables, μ is the province fixed effect, δ is the time fixed effect, and ε is the random error term.

In order to test the effect mechanism of the digital economy on the construction of a unified large market, the scale effect and the optimal resource allocation effect are introduced into the intermediary model:

$$M = \beta + \beta_1 DEI_X_{it} + \beta_2 CON_{it} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

$$MI_{it} = \theta_1 + \theta_2 DEI_X_{it} + \theta_3 M + \theta_4 CON_{it} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (3)$$

Among them, M is the mediating variable, which is GDP per capita ($\ln\text{pgdp}$) and labor market index (LAC).

As a new form of economic development, the impact of the digital economy has penetrated into all aspects of the economy and society. In macro aspect, digital economy has become a new growth point of economy and can promote high-quality development; In medium level, digital economy can play an important positive role on regional development through structure optimization and

technological innovation; At micro level, digital transformation strategy of production, operation, sales and services. Digital economy also plays a vital role in the construction and development of a unified domestic market. It is embodied in the following aspects:

4.2. Variable setting

Explained variable: Unified large market construction level (MI). It is difficult to quantify the unified large market. This paper adopts the level of marketization as a surrogate variable for the construction level of the unified large market. The "China Marketization Index" compiled by Fan Gang and Xiaolu Wang measures the regional marketization development level of China's provinces, autonomous regions and municipalities directly under the Central Government from five aspects, including the relationship between the government and the market, and the development of non-state-owned economy. It is objective, systematic and authoritative. Therefore, this article uses the provincial marketization comprehensive index in the report to describe the construction of a unified large market. In addition, since the latest marketization index ends in 2016, the 2017-2019 marketization comprehensive index draws lessons from Zheng Sun et al. [19] and Zhenyu Yao [20]. It is calculated based on the average growth rate of the market-oriented composite index over the years. Explanatory variable: regional digital economy development level (DEI_X). Due to factors such as the inconsistency of its definition, the broad scope and the complexity of content, the development of China's digital economy measured by different organizations and scholars is not the same. Therefore, with reference to the research of, Yang Liu [8], Yilin Wu [17], etc. We comprehensively measure the figures at the provincial level in China from three aspects: digital foundation, digital innovation and digital application. The level of economic development. The measurement method used is the entropy method.

Table 1: Indicator system of digital economy development level

First-level indicator	Second-level indicator	Third-level indicator	Proxy variable
Digital economy	Digital foundation	Communication foundation	Cable density
			Mobile base station density
			Mobile phone penetration rate
		Internet Basics	Internet Access Port

Digital innovation		Number of Internet Domain Names
		Number of sites
		Number of pages
	Innovation support	Number of technology business incubators
		Average number of students in higher education institutions per 100,000 population
	Innovation input	R&D spending as a percentage of GDP
		Number of R&Ds per 10,000 people
	Innovation output	Number of patent applications accepted
		Technical market turnover
	Digital application	Digital finance
Digital industry		E-commerce sales as a percentage of GDP
		Proportion of software industry enterprises/software business revenue
Digital governance		Local government governance efficiency
Digital user		Mobile internet users
		Internet broadband access users
		Computers per

			100 people
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Mechanism variables: The scale economy effect ($\ln p_{gdp}$) is measured by the per capita GDP of each province; the resource optimal allocation effect is represented by labor resources, which is described by referring to the labor marketization index constructed by Renmin University of China.

Control variables: Referring to existing scholars' research, the control variables that affect the level of regional marketization mainly include: transportation development level (RDD), industrial structure level (AIS), number of private enterprises (PE), foreign capital utilization level (TFI), market size (TP), RDD is measured by the ratio of railway mileage to provincial area, that is, railway density, AIS is measured by the ratio of regional tertiary industry output value to secondary industry output value, PE is measured by the number of legal entities of regional privately held enterprises, and TFI is measured by The total amount of foreign-invested enterprises is measured, and TP is measured by the total population of the region. In addition, in order to reduce the probability of problems such as heteroscedasticity, the number of private enterprises, the level of foreign capital utilization, and the market size are logarithmically processed, which are represented by $\ln pe$, $\ln tfi$, and $\ln tp$, respectively.

Table 2 Variable table

	Variable symbol	Variable name	Proxy variable
Explained variable	MI	Unified market	Market index
Explanatory variables	DEIX	Digital economy	Measured by entropy method
Control variable	RDD	Traffic development level	Railway density
	AIS	Industrial structure	The ratio of the output value of the tertiary industry to that of the secondary industry

	Intfi	Introduce investment	Introduced foreign capital as a proportion of GDP
	Inpe	Market vitality	Number of private companies
	Intp	Consumption potential	The total population of the province
Mechanism variable	Inpgdp	Economies of scale	Provincial GDP per capita
	LAC	Resource allocation optimization effect	Labor marketization index
Instrumental variable	L.DEI_X	The digital economy lags behind	The digital economy lags behind

4.3. Data Sources

Taking into account the development of the digital economy and the availability of data, the research object of this paper is 31 provinces, autonomous regions and municipalities in China from 2012 to 2019. The data in the research process are mainly from the National Bureau of Statistics, the provincial statistical bureaus, and the China Macroeconomic Database, China Regional Economic Database, China Regional Economic Statistical Yearbook, and the comprehensive marketization index is from the "Marketization Index Report of China's Sub-provinces", and some missing data are filled by web search and interpolation. The descriptive statistics of the regression variables in this paper are shown in Table 3.

Table 3: Descriptive statistics of variables

Variable	Sample Size	Mean	Standard Deviation	Min	Max	Range
MI	248	6.720	2.218	0.020	11.55	11.53
DEI_X	248	1.798	1.686	0.152	7.315	7.163

RDD	248	0.919	0.519	0.0531	2.115	2.062
AIS	248	1.218	0.664	0.549	5.169	4.620
Inpgdp	248	10.79	0.428	9.873	12.01	2.138
Intfi	248	6.518	1.488	2.426	9.880	7.454
Inpe	248	12.36	1.202	7.497	14.84	7.341
Inupd	248	7.874	0.403	6.939	8.620	1.681

5. Empirical Results and Analysis

5.1. Analysis of regression results

In order to explore the impact of the digital economy on the unified market, the variables were regressed, and the benchmark regression results were obtained in Table 4. Columns (1) and (3) are the regression results of the fixed-effect model and the random-effect model before adding control variables, respectively. , the results of the fixed effects regression model show that the digital economy (DEI_X) coefficient is positive and significant at the 5% significance level, while the random effects regression model results show that the digital economy (DEI_X) coefficient is positive and at the 1% significance level down significantly. All indicate that the digital economy can significantly improve the level of unified market construction. Columns (2) and (4) are the regression results of the fixed-effects model and the random-effects model after adding control variables. The results of the fixed-effects regression model show that the digital economy (DEI_X) coefficient is positive and is at the 5% significance level. Significant, the random effects regression model results show that the digital economy (DEI_X) coefficient is positive and significant at the 1% significance level. Assumption 1 is verified, the digital economy can have a positive impact on the construction of a unified large market.

Table 4: Benchmark regression results

	(1)	(2)	(3)	(4)
	FE	FE	RE	RE
	MI	MI	MI	MI
DEI_X	0.694**	0.681**	0.849***	0.608***
	(2.11)	(2.34)	(4.68)	(3.27)
RDD		0.133		0.306**
		(0.75)		(2.18)
AIS		-0.302		-0.438
		(-0.86)		(-1.59)

Inpe		-0.405*		-0.198
		(-1.88)		(-0.87)
Intfi		0.014		0.284**
		(0.08)		(2.09)
Intp		6.065*		0.814***
		(1.98)		(3.10)
_cons	4.773***	-39.725	4.513***	-1.357
	(8.63)	(-1.58)	(10.88)	(-0.48)
Province	YES	YES	YES	YES
Year	YES	YES	YES	YES
N	248.000	248.000	248.000	248.000
r2_a	0.715	0.736		
F	21.914	24.473		

5.2. Robustness test

In order to improve the reliability of the empirical results, methods such as replacement of core variables, replacement of samples and re-regression, and instrumental variable methods are adopted to conduct robustness tests.

5.2.1. Replace explanatory variables and explained variables

Replace explanatory variables. The digital innovation development level in the digital economy is used to replace the digital economy development level, and as a new explanatory variable, the regression is performed. The regression results are shown in column (1) of Table 8. The digital innovation development level coefficient is significantly positive. The level of economic development still has a positive impact on the construction of a unified large market.

Replace the explained variable. The degree of government intervention is used as an inverse surrogate variable for the construction level of the unified large market. The higher the degree of government intervention, the lower the construction level of the unified large market, and it is measured by the proportion of regional annual budget expenditure to regional GDP to replace the original regional marketization index. The regression results are shown in column (2) of Table 8. The regression coefficient is significantly negative, indicating that the digital economy can reduce the degree of government intervention, that is, improve the construction of a unified large market.

5.2.2. Replacement sample regression and tail reduction processing

Considering that some missing data in Tibet and its digital economy development level are far behind other

provinces, autonomous regions, and municipalities directly under the Central Government, it may affect the regression results and cause biases. Therefore, the Tibet region is removed and the regression is performed again. The results are shown in Table 8. As shown in column (3), the digital economy coefficient is still significantly positive. Considering the influence of extreme data, the 1% and 99% quantiles of the explained variables, explanatory variables and their control variables are all shortened. The economic coefficient remains significantly positive.

Table 5: Replacement of core variables, replacement of sample regression and tail reduction

	(1)	(2)		(3)	(4)
	MI	MI		MI	MI
DEI_I	16.05 5**	- 0.030* *	DEI_ X	0.650* *	0.761* *
	(2.35)	(-2.41)		(2.27)	(2.55)
RDD	0.087	-0.013		0.091	0.142
	(0.47)	(-1.61)		(0.46)	(0.73)
AIS	-0.182	0.021		-0.383	-0.152
	(-0.52)	(1.39)		(-1.04)	(-0.39)
Inpe	- 0.403*	-0.016		-0.440	-0.287
	(-1.97)	(-1.19)		(-1.68)	(-1.30)
Intfi	0.002	0.000		-0.021	0.035
	(0.01)	(0.05)		(-0.12)	(0.20)
Intp	5.650*	-0.037		7.456* *	4.825
	(1.96)	(-0.19)		(2.66)	(1.45)
_cons	- 35.89 9	0.820		- 50.52 8**	- 31.44 1
	(-1.52)	(0.54)		(-2.13)	(-1.17)
Province	YES	YES		YES	YES
Year	YES	YES		YES	YES
N	248.0 00	248.0 00		240.0 00	248.0 00
r2_a	0.735	0.325		0.736	0.724
F	29.11 2	6.898		26.18 5	26.41 9

5.2.3. Endogenous processing

In view of the fact that although the digital economy

can improve the construction of the unified large market, the construction of the unified large market may also promote the development of the digital economy, that is, there is a problem of reverse causality. Therefore, referring to the practice of Yang Liu [8], the digital economy is lagged by one period, and it is used as an instrumental variable for regression using the two-stage least squares method (2SLS). level has a significant boosting effect.

Table 6: Instrumental variable method

	(1)	(2)
	First stage	Second stage
VARIABLES	DEI_X	MI
DEI_X		1.256*** (0.356)
RDD	-0.0857** (0.0434)	0.257** (0.109)
AIS	-0.0185 (0.0662)	-0.173 (0.159)
Inpe	0.0413 (0.0598)	-0.467*** (0.146)
Intfi	0.0357 (0.0431)	-0.0741 (0.104)
Intp	0.844 (0.857)	5.349** (2.102)
L.DEI_X	0.450*** (0.0665)	
Constant	-2.571 (6.469)	-34.43** (15.58)
Province	YES	YES
Year	YES	YES
R-squared	0.996	0.985

5.3. Mechanism inspection

5.3.1. The mediating role of the scale effect

This section will examine the mediating role of the size effect. The scale economy effect of each province is measured by per capita GDP of each province, and the mediating effect model is used to test the influence mechanism of scale effect. The regression results are shown in Table 8. The digital economy coefficient in column (2) is positive at a significant level of 1%, indicating that the digital economy can expand the scale effect, while column (3) shows that the scale effect can promote the construction of a unified large market, which further indicates that there is a mediation effect test, and

According to the regression calculation, the mediating effect accounted for 52.46%. Therefore, the hypothesis 2 of this paper is verified, and the digital economy can promote the construction of a unified large market by expanding the scale effect.

Table 7: Mechanism Analysis - Scale Effect

	(1)	(2)	(3)
	MI	Inpgdp	MI
DEI_X	0.975*** (13.86)	0.201*** (17.98)	0.464*** (4.81)
Inpgdp			2.548*** (7.42)
_cons	4.967*** (31.30)	10.426*** (431.29)	-21.596*** (-6.07)
N	248.000	248.000	248.000
r2_a	0.548	0.621	0.638
F	192.120	323.213	160.176
Direct effect	0.464		
Indirect effect	0.512		
The proportion of mediation effect	52.46%		

5.3.2. The mediating role of the optimal allocation of resources

This part will examine the mediating role of the optimal resource allocation effect. Taking the labor marketization index as a specific surrogate variable, the mediation effect model is used to test the mechanism, and the regression result table (10) is obtained. Both Sobel test and Bootstrap test show that the mediating effect of resource optimal allocation effect exists in the digital economy improving the level of unified large market construction, and the mediating effect accounts for 35.51%.

Table 8: Mechanism Analysis - Resource Optimal Allocation Effect

	(1)	(2)	(3)
	MI	LAC	MI
DEI_X	0.764*** (4.36)	0.089** (2.26)	0.768*** (4.35)
LAC			-0.051 (-0.15)
_cons	3.222***	-0.216	3.211***

	(2.62)	(-0.76)	(2.61)
Province	YES	YES	YES
Year	YES	YES	YES
N	248.000	248.000	248.000
r2_a	0.978	0.630	0.978
F	640.364	17.669	633.206
Soble test	0.0511*** (z=2.59)		
Bootstrap test	0.051*** (Z=2.84)		
The proportion of mediation effect		35.51%	

5.4. Heterogeneity analysis

5.4.1. Regional heterogeneity

According to the theory of regional differences, there are large differences in different regions due to factors such as resource endowment, institutional differences, and historical development. Therefore, according to existing research and traditional division methods, the 31 provinces, autonomous regions and municipalities directly under the Central Government are divided into eastern, central, and western regions. Heterogeneous regression analysis was carried out in four regions in the northeast.

The regression results show that in the eastern region and the western region, the digital economy coefficient is significantly positive at the 1% significance level, indicating that the digital economy in these two regions can significantly promote the construction of a unified large market, while in the northeastern region, the regression results are not consistent. Not significant, it may be that the digital economy foundation in Northeast China is relatively weak, and the development and application of digital technology is slow. The regression results in the central region are not significant, which may be limited by the industrial structure of the central region.

Table 9: Regression by region

	(1)	(2)	(3)	(4)
	East	Middle	West	Northeast
	MI	MI	MI	MI
DEI_X	0.419***	-0.384	1.088***	0.479
	(4.73)	(-1.41)	(5.43)	(1.37)
RDD	0.094*	-0.465***	0.809***	-0.536**
	(1.97)	(-4.94)	(8.89)	(-2.52)
AIS	-	-0.684**	-0.349	0.208
	1.142***			
	(-7.75)	(-2.31)	(-1.53)	(0.82)
lnpe	1.351***	1.223***	0.589***	0.377
	(8.53)	(4.84)	(4.13)	(0.67)
Intfi	0.536***	0.843***	0.395***	0.784**
	(3.93)	(4.01)	(3.00)	(2.28)
Intp	-	0.407*	-	-3.359***
	2.190***		0.308***	
	(-11.14)	(1.73)	(-2.76)	(-5.54)
_cons	4.799***	-	-	25.055***
		15.440***	3.044***	
	(3.43)	(-5.24)	(-3.27)	(5.53)
N	80.000	48.000	96.000	24.000
r2_a	0.878	0.850	0.926	0.780
F	123.315	60.128	272.508	21.608

5.4.2. Heterogeneity of marketization level

In order to explore the impact of the digital economy on the development of the degree of marketization, the regions lower than the national marketization average of 5.94 in 2012 were classified as low-marketed regions, and the regions higher than the national marketization average of 9.39 in 2019 were classified as high-marketed regions. Regions with a marketization index lower than 9.39 but higher than 5.94 are classified as medium-market-oriented regions. From this, the heterogeneity analysis of market-oriented regions is carried out. The regression results show that the impact of the digital economy on medium-level market-oriented regions is more significant. The role of market-oriented regions and low-level market-oriented regions is not significant.

Table 10: Heterogeneity analysis of marketization regions

	High market area		Market-oriented region		Low market area	
	(1)	(2)	(3)	(4)	(5)	(6)
	MI	MI	MI	MI	MI	MI
DEI_X	-0.066	-0.372	0.458***	0.285***	4.141***	-0.278
	(-0.90)	(-1.32)	(13.78)	(4.10)	(6.47)	(-0.52)
RDD		0.080		-0.046		0.557***

		(0.73)		(-0.75)		(3.80)
AIS		0.216		-0.259**		-0.344*
		(0.54)		(-2.15)		(-1.82)
lnpe		0.382		0.728***		0.383**
		(0.89)		(3.99)		(2.04)
Intfi		0.508**		0.282*		0.590***
		(2.29)		(1.82)		(3.70)
Intp		0.081		-1.042***		-0.129
		(0.09)		(-4.20)		(-0.71)
_cons	10.374***	0.733	6.482***	4.875***	1.849***	-2.141*
	(30.19)	(0.12)	(72.33)	(3.49)	(4.46)	(-1.99)
N	34.000	34.000	131.000	131.000	83.000	83.000
r2_a	0.002	0.152	0.498	0.726	0.542	0.800
F	0.811	2.791	189.889	178.593	41.817	45.494

6. Conclusions and inspirations

Based on the econometric model and data from 31 provinces, autonomous regions and municipalities in China from 2012 to 2019, this paper empirically analyzes the impact of the digital economy on the construction of a unified market. The research conclusions are as follows: (1) The digital economy has a positive impact on the construction of the unified large market through academic rational analysis and empirical econometric analysis; (2) The digital economy mainly exerts the effect of economies of scale and the optimal allocation of resources to the construction of the unified large market. (3) The digital economy has regional heterogeneity and marketization level heterogeneity in the construction of a unified large market. For the eastern and western regions, the digital economy plays an important role in the construction of the unified large market, while for the central and northeastern regions, the digital economy has no significant impact on the improvement of the unified large market construction level. For regions with a moderate level of marketization, the impact of the digital economy is significant, while for regions with a high degree of marketization and regions with a low degree of marketization, the impact of the digital economy is not significant.

Based on the above conclusions, the following suggestions are put forward:

(1) Continue to promote the development of the digital economy and expand economies of scale. The digital economy has become the engine of economic and social development and an important driving force for breaking through the bottleneck of economic development and achieving high-quality economic development. Therefore, to continue to promote the development of the digital economy, it is necessary not

only to expand the quantitative scale of the digital economy, but also to improve the quality of the development of the digital economy. First, we will continue to improve the digital infrastructure network to provide basic support for the development of the digital economy; secondly, we will continue to build a digital market to inject vitality into the development of the digital economy; finally, we will continue to promote the digital transformation and upgrading of the industry to realize the digital development of the industry.

(2) Bridging the digital divide. The knowledge attribute of the digital economy makes it difficult for weak knowledge groups and regions to adapt to the application of digital technology in the economy and society. On the contrary, higher knowledge groups and regions can quickly adapt to the application of digital technology, and even seize opportunities in digital innovation and application. Realize the growth of wealth, thus creating a "digital divide" between the two, making regional development more unbalanced, urban and rural development more uncoordinated, etc., and the construction of a unified large market is not used. Therefore, it is necessary to play the role of the government's "visible hand" to bridge the digital divide through policy support and inclination.

(3) Continue to promote digital technology innovation. Digital technology is the key to the development of the digital economy. Whether it is in the development of new industries or in the transformation of old industries, digital technology plays a crucial role. Therefore, it is necessary to strengthen digital technology research and development, and give certain policies and resources. Tilting to create an open digital innovation model. In addition, it is also necessary to speed up the transformation of digital technology innovation achievements, and build a systematic and scientific digital technology innovation achievement

transformation platform based on market demand.

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