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Digital Finance, New Urbanization and Regional Economic Growth—Empirical Analysis Based on Mesomeric Effect

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Abstract

With the advent of the era of digitization and intelligence, intelligent cities are put on the agenda. Digital finance is innovative finance perfectly integrated with digital technology, which can inject inexhaustible power into the sustainable, healthy and stable growth of China's economy. After consulting the relevant literature, it is found that the impact of digital finance or new urbanization on regional economic growth has been studied by most scholars, but the relationship between the three has rarely been studied by scholars. In this paper, the three are discussed together, and the two models of fixed and mesomeric effect are selected to empirically analyze the relationship between digital finance, new urbanization and regional economic growth, which is the innovation of this paper. In this study, it is found that in addition to significantly promoting regional economic growth, digital finance also plays a role in promoting regional economic growth by promoting the process of new urbanization. After further analysis, it is found that digital finance not only affects regional economic growth, but also has heterogeneity. Different from most previous concepts, digital finance has a greater impact on the economic growth of the western region than that of the eastern and central regions, which shows that digital finance plays a significant role in narrowing the regional economic gap. This provides new ideas for building digital China, narrowing the economic gap between the eastern and western regions and realizing balanced economic growth.

1. Introduction

The practice of more than 40 years after reform and opening up has verified that peace and development are still the eternal themes in the world. The world is at a time of great change. Only development can provide strong backing for China's reform in the current adjustment period full of great changes. The world economic structure will be restructured in the foreseeable future due to the strong driving force brought by the reform of digital technology. Under the impetus of advanced science and technology, various industries are developing vigorously. In the past, the rough development has brought serious challenges to the sustainable development of the ecological environment and economy in China. Traditional urbanization has been unable to meet the development requirements of Chinese society and the growing needs of people for a better life. In addition to bringing a possibility for the sustainable and healthy development of China's economy, new urbanization is also the only way to realize China's modernization. In the outline of China's 14th five-year plan, also explains in detail about accelerating digital development, building a digital China, improving the new urbanization strategy and optimizing the coordinated development of regional economy. When COVID-19 is affecting the whole world, China is in the post epidemic era. As China is beset by the transformation and upgrading of economic structure and the increasing uncertainty of domestic and international environment, it is particularly important to pay attention to the stable economic growth, find new growth modes and build a new development pattern for domestic and international double circulation.

Digital finance, relying on the Internet and using digital technologies such as big data, cloud computing and artificial intelligence, is not only affecting all aspects of our life, but also imperceptibly changing our original way of life. It seems that digital finance is out of reach, but it is actually covered in our daily life. Digital finance can be found in a series of processes such as online shopping, express logistics, investment and financial management and mobile payment. Compared with traditional finance, digital finance has become a new driving force to promote the high-quality development of China's economy by virtue of the advantages of digital technology, and has injected a strong driving force into the improvement of the competitiveness of Finance in China (Hu & Cheng, 2020). The powerful touch ability of informatization, digitization, intelligence and mobility of digital finance has crossed the obstacles formed by the geographical location of traditional finance, greatly reduced the cost of providing financial services, optimized the allocation of financial resources, improved various difficulties faced by the real economy (Zhang et al., 2019), effectively solved the problems of information asymmetry, and made digital finance a hot research topic widely concerned by all sectors of society (Huang & Huang, 2018). However, the lack of relevant data limits the research in the field related to digital finance to a certain extent, which brings great inconvenience to the theoretical research and practical guidance of digital finance. Fortunately, hundreds of mil-

lions of micro data provided by Ant Group has been used by the Institute of Digital Finance Peking University (Guo et al., 2020) to compile a set of digital finance indexes to reflect 31 provinces in China, which not only reflects the current situation of domestic digital finance, but also provides the possibility for scholars to study related fields (Qian et al., 2020).

In this context, exploring the impact and action path of digital economy on regional economic growth is not only helpful to deeply understanding the connotation of financial supply side reform, but also of great theoretical and practical significance to promote and enrich the theoretical research and innovation of the development of China's digital finance. Therefore, in this paper, the research results of existing scholars are used for reference, the digital finance index released by the Institute of Digital Finance Peking University is adopted, the 30 inter provincial panel data (excluding Tibet, Hong Kong, Macao and Taiwan) from 2011 to 2020 are collected and sorted, and the fixed effect model is adopted to make an empirical analysis of the impact of digital finance on regional economic growth, and the mechanism of "digital finance-new urbanization-regional economic growth" is explained by constructing a mesomeric effect model, in order to explain the role of new urbanization in the process of digital finance promoting regional economic growth from a new perspective. According to the research results, digital finance can significantly promote regional economic growth. Moreover, new urbanization plays an intermediary role between digital finance and regional economic growth, and it has good robustness. When analyzing the regional heterogeneity, it is found that the regression coefficient of the western region is larger than that of the eastern and central regions, which shows that digital finance plays a greater role in promoting the economic growth of the western region than that of the eastern and central regions. In addition, the impact of secondary indicators of digital Finance on regional economic growth also shows heterogeneity, that is, the depth of digital finance plays a stronger role in promoting regional economic growth.

The following is the organizational framework of this paper. The first part is the introduction. In the second part, the relevant literature is reviewed and the research hypothesis of this paper is put forward. In the third part, the empirical research model is constructed and the selection of variables is explained. In the fourth part, the empirical results are analyzed and the robustness is tested. In the fifth part, the full text is summarized and the corresponding countermeasures and suggestions are put forward.

2. Literature Review and Research Hypothesis

2.1. Digital Finance and Regional Economic Growth

The method of maintaining high-quality economic development has always been a topic of general concern in academic circles. The development of traditional finance has been confirmed by most domestic and foreign scholars that it can significantly promote economic growth. By using the log linear regression mod-

el, Anand & Chhikara (2013) studied the development of inclusive finance in India and believed that the improvement of inclusive finance index can achieve the stable growth of economic. In addition, in order to promote the stable and efficient operation of Indian economy, Kapoor (2014) put forward some valuable suggestions for India in the future according to the development of inclusive finance in India. After collecting, sorting and studying international data, Li et al. (2016) concluded that the support of financial institutions to the real economy can significantly promote economic growth. Li et al. (2020) analyzed the relationship between the two and found that there is regional heterogeneity in the impact of digital finance on economic growth, which has a more significant impact on areas with insufficient infrastructure investment. Similarly, Xie et al. (2018) found that digital finance has greater marginal utility in the underdeveloped central and western regions than in the eastern region, that is, it can more significantly promote entrepreneurship in the region. Moreover, Yu et al. (2020) studied the internal mechanism of the two and found that digital finance plays a more significant role in promoting those regions with underdeveloped economy, which can effectively improve the financial environment of the region. This is also confirmed by the empirical analysis carried out by Tang et al. (2020). Therefore, while promoting economic growth, digital finance has a more significant effect on the western region, an economically underdeveloped region, than on the eastern and central regions.

Based on the above analysis, the following assumptions are proposed:

Hypothesis 1a: Digital finance can significantly promote regional economic growth.

Hypothesis 1b: it has regional heterogeneity and plays a more obvious role in promoting underdeveloped areas such as the western region.

2.2. Digital Finance and New Urbanization

Since the promotion of new urbanization must be strongly supported by funds, in the digital era, a perfect financial system provides financial support for the process of new urbanization in China with strong resource integration ability and high efficiency of capital flow (Chen, 2013). By studying the relationship between financial factors and new urbanization, Xiong & Xu (2015) concluded that financial support is an important factor affecting new urbanization, and pointed out that there is a strong spatial dependence between the two. Xie (2017) conducted empirical research and concluded that finance has a positive impact on the process of urbanization in terms of structure and scale. Zhao (2020) found that there is great potential for the development of new urbanization in the central and western regions on the premise of regional heterogeneity. Based on the panel data of Hunan Province for four years, Wen et al. (2019) studied the relationship between financial support and new urbanization and concluded the importance of high-quality financial development to new urbanization. With the help of the advantages of information technology, digital finance not only greatly

improves the allocation efficiency of resources, unblocks the channels of investment and financing (Xie & Zou, 2012), but also optimizes the economic structure. Moreover, there is a close relationship between the transformation and upgrading of economic structure and the process of new urbanization.

2.3. New Urbanization and Regional Economic Growth

There is an imbalance in the process of new urbanization in China. The development of new urbanization has promoted the growth of regional economy by attracting talents and accelerating the flow of resources to a great extent. By introducing the spatial econometric model for empirical analysis, Xu et al. (2019) concluded that the new urbanization and industrial structure can significantly promote China's economic growth. Henderson (2000) analyzed the relationship between urban concentration and local economic growth in nearly 100 countries in 25 years, and concluded that there was a positive correlation between the two, and the road network density had a great impact on developing countries. Guo & Zhang (2018) used the panel data of prefecture level cities to conclude that new urbanization can significantly affect the improvement of regional economic development based on three intermediary mechanisms under certain conditions.

Based on the above analysis of digital finance, new urbanization and regional economic growth, this paper puts forward the following assumptions:

Hypothesis 2: Digital finance promotes regional economic growth by influencing the process of new urbanization, that is, the transmission mechanism of "digital finance-new urbanization-regional economic growth" exists.

To sum up, the existing literature provides a certain theoretical basis for the research hypothesis of this paper. Digital finance can not only alleviate regional financing constraints and promote economic growth by improving the regional financial environment and improving the convenience of obtaining financial services, but also drive regional economic growth by providing strong support for the funds required for new urbanization and promoting the process of new urbanization. In this paper, the following empirical will be used to test the above hypothesis.

3. Selection of Variables and Construction of Model

3.1. Construction of Model

1) Benchmark Model

In this paper, the fixed effect model is used as the benchmark model to investigate the impact of digital finance on regional economic growth. There is a large gap between the value range of explanatory variable and explained variable. Based on the problem of dimensional difference, the need of economic growth theory and the purpose of avoiding heteroscedasticity, logarithmic processing is carried out. The processed data are used to establish a regression model, as shown in formula (1).

$$\ln \text{PGDP}_{i,t} = \alpha_0 + \alpha_1 \ln \text{DFI}_{i,t} + \beta_1 \text{Control}_{i,t} + \varepsilon_{i,t} \tag{1}$$

Among them, i represents the province, t represents the time, $\ln\text{PGDP}_{i,t}$ represents the logarithm of the per capita real GDP of the i-th province in the t-th year, $\ln\text{DFI}_{i,t}$ represents the logarithm of the digital financial index of the i-th province in the t-th year. In addition, $\text{Control}_{i,t}$ is a series of control variables of the i-th province in the t-th year, including industrial structure (INS), information level (INL), research and development intensity (RDI), dependence on foreign trade (DFT) and road network density (RND). $\varepsilon_{i,t}$ is the random disturbance term. The magnitude and significance of coefficient α_1 reflect the impact of digital Finance on regional economic growth. Coefficient β_1 represents the influence of control variables on regional economic growth.

2) Mesomeric Effect Model

In this paper, in order to further investigate the role of new urbanization in the impact of digital finance on regional economic growth, intermediary variables are introduced to test the mesomeric effect. Based on formula (1), the new urbanization is taken as the intermediary variable, and the mesomeric effect model is established. The specific model is as follows:

$$\text{URB}_{i,t} = \alpha_2 \ln\text{DFI}_{i,t} + \beta_2 \text{Control}_{i,t} + \varepsilon_{2i,t} \tag{2}$$

$$\ln\text{PGDP}_{i,t} = \alpha_3 \ln\text{DFI}_{i,t} + \gamma\text{URB}_{i,t} + \beta_3 \text{Control}_{i,t} + \varepsilon_{3i,t} \tag{3}$$

Among them, $\text{URB}_{i,t}$ represents the new urbanization of the i-th province in the t-th year, $\varepsilon_{2i,t}$ and $\varepsilon_{3i,t}$ are random disturbance terms. The meaning of other variables is the same as that in formula (1) above.

3.2. Selection of Variables

1) Explained Variable

In this paper, referring to the practice of Zhang & Chen (2021), the per capita real GDP is used to represent the provincial gross domestic product (PGDP). The reason why the per capita data is adopted is that China is a country with a large population and a large economic volume. The actual operation of the economy cannot be better reflected only in terms of the total amount. The per capita GDP can better reflect the regional economic growth.

2) Core Explanatory Variables

Digital financial index (DFI). In this paper, referring to the current mainstream practice, the digital finance index compiled by the Institute of Digital Finance Peking University is taken as the research variable. Many scholars use this index to measure, study and analyze the current level of digital finance in China. In addition, the digital financial index does not exist in isolation, but also includes three secondary indicators.

The coverage of digital financial services is the most intuitive feeling brought by the coverage (COV) breadth index of digital finance. With the technological advantages of the Internet and the blessing of artificial intelligence, distance is no longer a problem. The proportion of Alipay users and the average number of bank cards tied to card users determine whether their coverage is wide or not.

The use (USE) depth index of digital finance is measured from the users' use of the services provided by digital finance. From the perspective of use, it includes not only the total amount index of actual use, but also the activity index of use, that is, the frequency of use. It mainly includes a series of services that can meet the needs of users, such as payment, investment, insurance, credit and monetary fund.

The digitisation (DIG) degree index of digital finance reflects the technical advantages of high efficiency, convenience and low cost, which determines users' choice of digital finance to a certain extent. It is mainly evaluated from the four perspectives of mobility, benefits, credit and convenience, such as the number and amount of mobile payment, and the proportion of the use of Ant Credit Pay and Sesame credit.

3) Mediating Variables

Because the new urbanization (URB) is evolved through many factors such as population development, economic situation, social construction and ecological environment, this paper will analyze the new urbanization from the above four dimensions.

Population development is a key step in building a new type of urbanization and realizing sustained and high-quality economy. Various provinces have introduced talent introduction policies to increase the inclination of talent welfare, which reflects the talent concept of "people-oriented".

The economic situation reflects the continuous and high-quality improvement of the regional economy and the effective improvement of people's living standards. To some extent, the income level is related to the actual needs of people's livelihood and the driving force of sustainable development of the city in the future.

Social construction refers to the improvement of regional basic service facilities, the sharing of social resources and the convenience of public service measures. In addition to affecting the lifestyle and quality of life of urban residents all the time, this is also the key content of the rich connotation of new urbanization.

The ecological environment not only mainly reflects the consumption and emission of fuel energy such as coal and the protection measures for the ecological environment in the development of new urbanization, but also the essential requirements of people for a better life. In terms of realizing the sustainable and healthy development of new urbanization, the stable carrying capacity of ecological resources is an important guarantee.

In this paper, the evaluation index system of new urbanization constructed by Jiang & Hu (2021) will be used as a reference, a total of 11 sub indicators in the four criteria layers of population development, economic status, social construction and ecological environment will be selected, the data of each sub indicator will be collected, the entropy method will be used to calculate the new urbanization indicators, and the comprehensive indicators of new urbanization will be formed. The index evaluation system is shown in Table 1.

Table 1. Evaluation index system of new urbanization.

Target layer	System layer	Index layer	Index attribute
New urbanization	Population development	Average years of education of employed persons (years)	Positive
		Population density (person/m²)	Positive
		Unemployment rate (%)	Negative
	Economic situation	GDP growth (%)	Positive
		Consumption level of residents (yuan)	Positive
		Per capita disposable income (yuan)	Positive
	Social construction	Urbanization rate (%)	Positive
		Internet penetration (%)	Positive
	Ecological environment	Energy consumption (10,000 tons of standard coal)	Positive
		Carbon emission (10,000 tons of standard coal)	Negative
		Pollution charge (yuan)	Positive

4) Control Variables

Based on the research object of this paper, control variables such as industrial structure (INS), information level (INL), information level (INL), research and development intensity (RDI), dependence on foreign trade (DFT) and road network density (RND) are selected.

Industrial structure (INS). The ratio of the added value of the secondary and tertiary industries to the GDP of the region is regarded as the specific performance of the industrial structure, which can reflect the local economic situation to a certain extent. In addition to driving the sustained and healthy development of the economy, a high-quality industrial structure can directly affect the optimal allocation of resources to affect the stable development of the real economy.

Information level (INL). The ratio of the total amount of post and telecommunications business to the GDP of the region is used to measure the local informatization level, which reflects the local infrastructure level. With the acceleration of urbanization, perfect infrastructure can stimulate local economic vitality to a greater extent, strengthen domestic circulation and promote economic growth.

Research and development intensity (RDI). The proportion of research and development expenditure in the financial expenditure of the region is used to represent the intensity of research and development investment. Modern economy is more dependent on knowledge accumulation and scientific and technological progress. Spending on research and development can promote local innovation and affect sustained economic growth for a long time to come.

Dependence on foreign trade (DFT). The ratio of total foreign trade to local

GDP is used to reflect the local foreign trade activities, which is generally used to analyze the impact and dependence of the activities on the local economy.

Road network density (RND). Generally, the road network density is measured by the ratio of the total mileage of the road network in the region to the area of the region. To a certain extent, the road network density reflects the size, convenience and economic activity of the city, and has a great impact on those economies that mainly rely on transportation and logistics.

See Table 2 for descriptions of all variables above.

3.3. Data Source

The digital financial index compiled by the Institute of Digital Finance, Peking University, the official website of the National Bureau of Statistics and the statistical yearbooks of various provinces are the main sources of data for this study. Considering the availability of data, the statistical yearbook does not include data from Tibet, Hong Kong, Macao and Taiwan. In addition, it also contains some data from the wind database. The main investigation time is from 2011 to 2020.

Table 2. Description of variables.

Type of variables	Name of variables	data source	Description of specific indicators	Representative symbols
Explained variables	Provincial gross domestic product	National Bureau of Statistics	Per capita actual GDP	PGDP
Core explanatory variables	Digital finance	Institute of Digital finance Peking University	Digital inclusive financial index	DFI
Intermediary variables	New urbanization	National Bureau of Statistics, Wind	Entropy method	URB
Control variables	Industrial structure	National Bureau of Statistics	Added value of secondary and tertiary industries/GDP	INS
	Informatization level	National Bureau of Statistics	Total post and telecommunications business/GDP	INL
	Research and development investment intensity	National Bureau of Statistics	R & D expenditure/financial expenditure	RDI
	Dependence on foreign trade	National Bureau of Statistics	Foreign trade/GDP	DFT
	Road network density	National Bureau of Statistics	Total mileage of highway/total area of this area	RND

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In this paper, the interpolation method is used to correct the problem of a small amount of missing data. There are 300 observed values of each variable investigation sample, and the descriptive statistical results are shown in Table 3. The maximum, minimum and average values of regional economic growth are 164,889, 16,413, and 56,386 respectively. The standard deviation is 27307, and the standard deviation coefficient is 0.48, close to 0.5, indicating that there are great differences in the economy of various regions in China, and there is a serious imbalance in economic development. It shows that the economic development in China is seriously unbalanced, and the economic gap between the eastern and western regions is still one of the factors perplexing China's sustainable development. The maximum value, minimum value and average value of digital financial index are 431.9, 18.33 and 217.2 respectively. The digital financial index of the region with the lowest level of digital financial development is less than one tenth of the average value, which shows that the development of digital finance in China needs to be improved, and there is a lot of room for improvement in low-level regions. In the empirical research part of the following paper, the regional economic growth and digital financial index are logarithmicized.

4. Analysis of Empirical Results

4.1. Benchmark Regression

The regression results of digital finance and regional economic growth are shown in Table 4. According to the coefficients from columns (1) to (6) in the table, after adding the control variables one by one, the regression influence coefficients of digital finance and a series of control variables on regional economic growth gradually decrease, and they all pass the significance test at the level of 1%. It shows that digital finance has a significant role in promoting regional economic growth. The impact coefficient of digital finance is 0.1401, that is, every 1% increase in digital finance can directly increase the regional economic growth by 0.1401%. It can be found that the coefficients of control variables,

Table 3. Descriptive statistics.

Variable	Mean value	Standard deviation	Minimum value	Maximum value
Provincial gross domestic product (PGDP)	56,386	27,307	16,413	164,889
Digital Finance (DFI)	217.2	96.97	18.33	431.9
New urbanization (URB)	0.487	0.104	0.284	0.805
Industrial structure (INS)	0.967	0.154	0.737	1.539
Information level (INL)	4.204	2.383	1.983	15.65
Research and development investment intensity (RDI)	2.022	1.411	0.390	6.580
Dependence on foreign trade (DFT)	0.258	0.280	0.012	1.458
Road network density (RND)	0.998	0.559	0.092	2.529

Table 4. Estimation results of benchmark regression

Variable	(1) lnPGDP	(2) lnPGDP	(3) lnPGDP	(4) lnPGDP	(5) lnPGDP	(6) lnPGDP
lnDFI	0.2284***	0.2311***	0.1957***	0.1868***	0.1719***	0.1401***
	(24.8116)	(25.4251)	(21.5308)	(21.3930)	(19.7977)	(15.1690)
INS		0.3802***	0.5637***	0.4600***	0.4079***	0.4047***
		(2.9290)	(4.8677)	(4.1460)	(3.8919)	(4.2476)
INL			0.0221***	0.0194***	0.0193***	0.0168***
			(8.0551)	(7.3644)	(7.7967)	(7.3403)
RDI				0.0659***	0.0608***	0.0403***
				(5.2005)	(5.0858)	(3.5681)
DFT					0.4349***	0.3492***
					(5.2866)	(4.6003)
RND						0.6298***
						(6.6339)
Constant	9.6212***	9.2396***	9.1492***	9.1724***	9.4215***	8.9876***
	(204.4046)	(66.8254)	(75.3311)	(80.0717)	(80.1296)	(71.7174)
Observations	300	300	300	300	300	300
R-squared	0.7466	0.7566	0.8147	0.8362	0.8558	0.8814

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively. The values in brackets are robust t statistics.

industrial structure, informatization level, research and development investment intensity, dependence on foreign trade and road network density are significantly positive, which is in line with the logical and economic significance of this paper. The impact of digital Finance on regional economic growth is significant on the whole, which verifies the original hypothesis 1a.

4.2. Intermediary Regression

When digital finance affects regional economic growth, it will also promote the process of new urbanization, and the continuous improvement of new urbanization will better promote regional economic growth, and this part of the promotion role is the intermediary effect of digital finance in promoting regional economic growth. After analyzing the impact of digital finance on regional economic growth, the regression results with new urbanization as the intermediary variable are analyzed. In Table 5, column (1) is the regression result of formula (1) with regional economic growth as the dependent variable, and column (2) is the regression result of formula (2) of the intermediary model. It shows that the development of digital finance will have a positive impact on new urbanization.

Table 5. Test Results of Intermediary Mechanism

Variable	(1) lnPGDP	(2) URB	(3) lnPGDP
URB			1.2731***
			(6.2189)
lDFI	0.1401***	0.0119***	0.1249***
	(15.1690)	(4.1029)	(14.1516)
INS	0.4047***	0.0328	0.3630***
	(4.2476)	(1.0948)	(4.1344)
INL	0.0168***	0.0046***	0.0109***
	(7.3403)	(6.3809)	(4.7579)
RDI	0.0403***	0.0005	0.0410***
	(3.5681)	(0.1421)	(3.9452)
DFT	0.3492***	0.1025***	0.2187***
	(4.6003)	(4.2983)	(3.0025)
RND	0.6298***	0.0990***	0.5038***
	(6.6338)	(3.3179)	(5.6260)
Constant	8.1399***	0.0999**	8.2210***
	(63.9912)	(2.0366)	(67.3122)
Observations	300	300	300
R-squared	0.8814	0.6045	0.9004

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively. The values in brackets are robust t statistics.

The coefficient is 0.0119 at the significance level of 1%, which shows that the better the development of digital finance, the more it can promote the development of new urbanization. Column (3) is the regression result of formula (3) of the intermediary model. Both digital finance and new urbanization have positive influence coefficients, which are 0.1249 and 1.2731 respectively, and both of them have passed the significance level test of 1%. The coefficient of new urbanization is significant, which shows that digital finance has a mesomeric effect on regional economic growth. It is proved that digital finance significantly promotes regional economic growth in the process of promoting new urbanization, that is, it verifies the original hypothesis 2.

4.3. Heterogeneity Analysis

1) Secondary Indicators of Digital Finance

Due to the different emphasis on the connotation of the three secondary indicators of digital finance, it is necessary to deeply explore the relationship be-

tween the secondary indicators of digital finance and regional economic growth, so that the research conclusion can have more practical significance. Regression is carried out for three secondary indicators respectively, and the results are shown in Table 6. According to the regression results, the three secondary indicators of digital finance have passed the significance level test under the condition of 1%, which shows that these three secondary indicators can significantly promote the improvement of regional economic growth. Among them, the use depth has the largest influence coefficient, which is 0.1327. This shows that compared with the other two secondary indicators, the depth of digital finance can better promote regional economic growth. The reason is that with the popularity of mobile phone and smart phone, almost all netizens in China have a Alipay account or WeChat account, so that fewer new users can be developed and the pattern of Internet users has basically been set. However, more and more people are no longer satisfied with simple mobile payment, but choose to

Table 6. Regression results of secondary indicators of digital finance.

Variable	(1) lnPGDP	(2) lnPGDP	(3) lnPGDP
lnCOV	0.1068***		
	(14.9666)		
lnUSE		0.1327***	
		(12.8830)	
lnDIG			0.0991***
			(10.1495)
INS	0.3967***	0.4352***	0.3612***
	(4.1347)	(4.2091)	(3.1913)
INL	0.0169***	0.0169***	0.0219***
	(7.3352)	(6.7875)	(8.2713)
RDI	0.0372***	0.0368***	0.0472***
	(3.2651)	(3.0075)	(3.5037)
DFT	0.4396***	0.3757***	0.2123**
	(5.8175)	(4.5768)	(2.2311)
RND	0.7307***	0.8046***	0.8056***
	(7.9049)	(8.1687)	(7.2104)
Constant	9.1109***	8.8370***	8.9597***
	(72.1857)	(64.6613)	(60.0531)
Observations	300	300	300
R-squared	0.8797	0.8609	0.8323

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively. The values in brackets are robust t statistics.

buy their required financial and insurance products and personalized consumption activities on the Internet. In particular, during the epidemic, the number of active people on the internet almost reached its peak. During the epidemic, almost all production activities were carried out online, which ushered in the development wave of digital finance promoting economic growth in China.

2) Regional Heterogeneity

In China, the economy presents a pattern of increasing from west to east and from north to south. Due to the difference of geographical location and environment, the economic development of each region is different. Therefore, 30 provinces in China are divided to explore the impact of digital finance on the eastern, central and western regions of China. According to the regression results in Table 7, digital finance has always had a positive impact coefficient, which is significant at the level of 1%, which shows that the digital finance index has a positive impact on the economic growth of the three regions. However, the impact coefficient of digital finance on the western region with relatively backward economy is higher than that in the eastern region with higher economic development level, which is 0.153. This may be because digital finance can make up for the shortcomings of traditional offline financial outlets and services, reduce

Table 7. Regression in different regions.

Variable	(1) eastern area	(2) central area	(3) western area
lnDFI	0.134***	0.133***	0.153***
	(0.0257)	(0.0149)	(0.0120)
INS	0.627***	−0.284	0.434***
	(0.147)	(0.318)	(0.134)
INL	0.0256***	0.0186***	0.0141***
	(0.0051)	(0.0044)	(0.0030)
RDI	0.0009	0.0621**	0.0480
	(0.0160)	(0.0243)	(0.0370)
DFT	0.644***	0.0391	0.108
	(0.101)	(0.564)	(0.261)
RND	0.0148	0.507**	0.924***
	(0.226)	(0.201)	(0.142)
Constant	10.03***	9.500***	8.687***
	(0.306)	(0.343)	(0.155)
Observations	110	80	110
R-squared	0.884	0.916	0.914

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively. The values in brackets are standard deviation.

service costs and provide sufficient support for financial services in underdeveloped areas, which greatly alleviates the local financing constraints and stimulates and meets the strong financial needs of the region. At the same time, digital finance can effectively improve the mismatch degree of financial resources, optimize the rational allocation of resources, and effectively promote the development of local economy. Therefore, digital finance has heterogeneity on regional economic growth. Among them, its role in promoting the economy of the western region is stronger than that of the eastern and central regions, that is, the original hypothesis 1b is verified.

4.4. Robustness Test

In this paper, in order to further ensure the reliability of the research conclusion, the following two methods are used for robustness test.

1) The explained variable is replaced

In this paper, the practice of most scholars is adopted, that is, the logarithm of GDP of each province is used as an alternative variable to measure regional economic growth for robustness test. The results are shown in column (1) of Table 8.

Table 8. Robustness test.

Variable	(1) lnGDP	(2) lnPGDP
lnDFI	0.1507***	0.1384***
	(15.1129)	(14.2543)
INS	0.4449***	0.4476***
	(4.3254)	(4.6251)
INL	0.0184***	0.0164***
	(7.4520)	(7.1343)
RDI	0.0391***	0.0446***
	(3.2041)	(3.4291)
DFT	0.4336***	0.2947***
	(5.2921)	(2.8903)
RND	0.7219***	0.6716***
	(7.0441)	(5.8051)
Constant	7.8091***	8.8883***
	(57.7233)	(69.4011)
Observations	300	260
R-squared	0.8853	0.8847

Note: ***, ** and * represent the significance levels of 1%, 5% and 10% respectively. The values in brackets are robust t statistics.

As the core explanatory variable, digital finance and other control variables also passed the significance level test of 1%, and the value of influence coefficient did not show much change.

2) Municipalities directly under the central government are excluded

Due to different geographical advantages and policy preferences, there should be some differences in the growth effect of the development level of digital finance. The provinces involved in this study eliminated the four municipalities directly under the central government. The regression results are shown in column (2) of Table 8. Among them, the significance of the influence coefficient of digital finance and control variables has not changed, and the coefficient has basically remained stable.

According to the above robustness test results, the regression results have not changed much, and digital finance has good robustness to regional economic growth. Therefore, the conclusion of this paper is verified.

5. Conclusions and Suggestions

5.1. Conclusions

This paper tries to innovate on the basis of analyzing the impact of digital Finance on regional economic growth. By constructing an intermediary effect model and introducing new urbanization as an intermediary variable, this paper analyzes the impact of digital Finance on regional economic growth from the intermediary mechanism. From the perspective of regional heterogeneity, this paper analyzes the impact of China's unbalanced development of digital Finance on regional economic growth, and analyzes the structural heterogeneity of the three dimensions of digital finance index.

In this paper, based on the inter provincial panel data from 2011 to 2020, the impact mechanism of digital finance on regional economic growth is analyzed. The main conclusions are as follows:

First, from the perspective of action mechanism, in addition to directly promoting regional economic growth, digital finance also indirectly improves regional economic growth by affecting the process of new urbanization, that is, there is an intermediary effect.

Second, the secondary indicators of digital finance play different roles in promoting regional economic growth. Compared with the other two secondary indicators, their depth of use can promote regional economic growth to a greater extent.

Third, digital finance has regional heterogeneity on regional economic growth, that is, its promoting effect on the western region with relatively backward economy is greater than that in the eastern and central regions.

5.2. Suggestions

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

First of all, the opportunity for digital development should be seized, and a new smart city should be built. While innovating finance, digital technology has also innovated the way forward of new urbanization. On the basis of relying on the advantages of digital technology, the local government should adjust measures to local conditions and make use of 5G, artificial intelligence, block chain and other scientific and technological technologies to create a new concept of an interconnected city in line with the local actual situation. From the perspective of smart cities, the transformation of production and lifestyle should be led, and the regional economy should be guided to develop in a green, healthy and sustainable direction, so that the people's needs for a better life can be met.

Secondly, the service experience of users should be improved, and the potential needs of users should be deeply explored. When the coverage of digital finance reaches a certain extent, the marginal effect that digital finance can be promoted will gradually decrease, and the marginal effect of its use depth will be relatively higher. After the basic needs of users are met, their satisfaction with general products is difficult to be greatly improved. Therefore, on the premise of ensuring the safety and convenience of users, relevant financial regulators and departments should appropriately introduce marketization, which is a powerful hand, constantly increase the innovation of financial service products, make full use of big data, intelligent algorithms and other scenario applications to accurately locate user needs, improve service experience, meet personalized product and service needs, and promote the vigorous development of the economy.

Finally, the construction of digital finance should be improved and regional development should be coordinated. According to the historical changes of the main social contradictions in China, the imbalance of regional economic development in China not only seriously restricts the healthy development of China's economy as a whole, but also brings some challenges to the supply side structural reform. At the national level, policy support for remote areas in the western region should be appropriately increased, the construction of digital financial system should be accelerated, and domestic and international resources should be coordinated. In addition, it is necessary to fundamentally solve the problem of excessive concentration of resources, so as to promote the rational and healthy flow of resources. Only in this way can the sustainable growth of regional economy be injected with continuous vitality.

5.3. Deficiencies

In the process of in-depth study of the impact of digital Finance on regional economic growth, while pursuing the innovation of the paper, this paper strives to maintain a clear idea in the context of this paper. However, due to its limited scientific research ability and limited research level, it is inevitable that there will be the following deficiencies:

There are few academic achievements available for research and their own academic ability is insufficient, so the research on this problem may not be in-depth,

detailed and comprehensive.

Because some of the data studied in this paper are difficult to obtain, such as incomplete disclosure, resulting in short data years, small research sample size and lack of data integrity.

Therefore, these deficiencies need to be improved in the follow-up research.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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