Research on How Fintech Can Promote the Digital Economy Development

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Abstract: This paper examines the impact of Fintech on the development of the digital economy through a literature review and case analysis to compare the differences in the development direction of Fintech at home and abroad. In order to achieve high-quality development and transformation, this paper proposes strengthening technological innovation channels, integrating Fintech into enterprise operations, and establishing a more comprehensive regulatory mechanism to ensure the security and stability of Fintech. This paper aims to promote the vigorous development of the global digital economy through a comprehensive analysis of the role and impact of Fintech.

1. Introduction

Currently, China's economy has entered a period of industrial transformation, mainly reflected in the development model, economic structure, technological level, and growth function. In the 20th National Congress of the Communist Party of China, the party and the government clearly proposed to speed up the transformation and development of the digital economy. However, in addition to the support of policies, the smooth flow of financing channels and the support of underlying technologies are also essential, so the development of Fintech has greatly helped. Fintech has enabled more choices for enterprises and enterprises, which empowers the underlying data, generating new growth momentum for the digital economy.

By sorting out past research results in the fields of Fintech and the digital economy, this article explains the intermediary effect and specific transmission mechanism of Fintech in empowering the development of the digital economy. At the same time, by comparing cases where Fintech empowers the digital economy at home and abroad, we summarize the characteristics of the above mechanisms in the actual process, the role and impact of Fintech on the digital economy, and propose directions for subsequent improvements.

2. Literature Review

2.1 The Definition and Influence of the Digital Economy

The digital economy is a more advanced economic stage after human beings have experienced agricultural and industrial economies. Different from raw materials, capital, and other factors of production in the industrial economy, enterprises in the digital economy will use digital information and existing knowledge as the core elements of production, use the Internet as an important carrier, and digital technology innovation as the core driving force. The digital economy is expected to realize further industrial interconnection and penetration into intelligent and efficient paths through the deep integration of cutting-edge digital technology and the real economy, based on China's extensive digital demographic dividend and industrial scale.

2.2 The Definition and Economic Impact of Fintech

Fintech aims to integrate innovative technologies with financial services and provide more efficient, convenient and innovative financial solutions by applying advanced technologies such as information technology, big data analysis, artificial intelligence, and blockchain to traditional financial services and empower the real economy. In addition, Fintech can improve the speed of

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transactions and business processing in a platform-based manner. For example, Ant Financial has successfully replaced traditional commercial banks and become the largest consumer credit platform.

2.3 The Influence Mechanism of Fintech on the Digital Economy

There have been many achievements in the research on the digital economy empowered by Fintech. Scholars such as Wang Shuangmiao have more authoritatively verified the intermediary mechanism of Fintech empowering the digital economy through quantitative means. Its research believes that Fintech stimulates financial service innovation at the data and platform end through endogenous new technologies, thereby stimulating the potential and needs of consumers and promoting digital economic innovation [1]. At the same time, Fintech can also promote regulatory innovation, enable entrepreneurs to obtain innovation resources, stimulate innovation dividends in the digital industry, and promote the development and innovation of the digital economy.

3. Research Case and Hypothesis

3.1 Study of Overseas Fintech Empowering Digital Economy

Fintech has a long history of development overseas. For example, as an online car loan refinancing platform, Caribou uses Fintech to help users refinance their current car loans at lower interest rates and involves services such as car insurance, repairs, retail, parts replacement, and extended warranties, which reflect how Fintech connects users' liabilities and credit institutions' assets, expanding users' consumption scenarios and accelerating the circulation of the automobile industry.

Fintech crowdfunding companies such as Kickstarter help small and micro enterprises and projects finance and raise money in the private market. With data-side processing, Kickstarter can monitor project progress, sales volume, financial level, and fund usage. Like P2P platforms, this can effectively prevent project income loss caused by winding up businesses so that funds can flow to the most valuable small, medium and micro businesses and projects [2]. In addition, through big data analysis of loan quality, project cash flow is sold as asset securitization to obtain recirculation.

3.2 Study of China's Fintech Enabling Digital Economy

China's Fintech mainly focuses on consumer finance. The rapid rise and comprehensive penetration of Fintech platforms such as Alipay and WeChat Pay have greatly impacted the digital economy. Especially in the context of the epidemic, Alipay promptly responded to the small and micro-enterprise support policy, reducing fees and profits to small and micro merchants in the form of free traffic coupons by more than 10 billion and using 20 billion free traffic results to help physical merchants reduce costs and improve efficiency.

3.3 Research Hypothesis

3.3.1 The Impact of Fintech on the Development of Digital Economy

Fintech has accelerated digital transformation and encouraged the development of the digital economy. With blockchain technology, transaction costs are reduced, and digital assets are developed, and artificial intelligence improves financial services efficiency, quality, and popularity by enhancing risk control, credit assessment, and customer service [3]. As a result of innovative financial services models such as mobile payments, e-commerce, and virtual banking, Fintech has expanded the market scope of the digital economy. For example, inclusive finance can provide services to small and micro businesses that traditional finance cannot cover. Loans and payment services are provided to businesses and rural residents. Furthermore, regulatory technology and financial supervision can help monitor risk in real-time, prevent financial risks from occurring, and maintain a stable digital economy.

In summary, this paper puts forward the first research hypothesis:

H1: The development of Fintech promotes the development of the digital economy. The higher the level of Fintech, the higher the development level of the digital economy.

3.3.2 Other Factors Affecting the Development of the Digital Economy

Policy environment, manpower and education training, and industrial structure upgrading are also important factors affecting the digital economy.

First, the policy environment plays a crucial role. A clear digital economy policy and regulatory framework can help stimulate corporate innovation and guide technology investment and digital transformation. Policy stability can provide certainty in corporate strategic planning, thereby promoting the long-term sustainable development of the digital economy.

Secondly, manpower and education play a crucial role in the digital economy. The popularization of digital education and training can meet the learning needs of people at different levels and help them better integrate into the digital economy [4]. Human quality will promote technological innovation and stimulate the digital economy's inherent vitality.

Finally, the digital economy is transforming the industrial structure. The digital revolution has changed traditional industries' production, operation, and service methods, improved efficiency, and reduced costs.

In summary, this paper proposes research hypothesis two:

H2: Policy environment, manpower, education and training, and industrial structure impact the development of the digital economy.

4. Model Setting and Variable Description

4.1 Construction of Econometric Model

The above theory shows that advances in financial science and technology promote the development of the digital economy. The following model is constructed to verify hypotheses H1 and H2:

$$\mathrm{Gerd}_{i,t} = \alpha + \beta \mathrm{Fintech}_{i,t} + \gamma \mathrm{Control}_{i,t} + \varepsilon_{i,t} \quad (1)$$

Among them, Gerd represents the development level of the digital economy; Fintech represents the level of Fintech development; Control represents a series of factors that may affect the development level of the digital economy, ε is a random error term.

4.2 Variable Selection

4.2.1 Explained Variable

This paper measures the development level of the urban digital economy by characterizing digital industrialization, which promotes the formation and development of digital industry through the market-oriented application of modern information technology [5]. This paper selects five indicators to measure the above-mentioned level of digital economy development. They are telephone penetration rate (TelPopularity), number of Internet broadband access users (BroadBandSub), software industry income (SoftwareIncome), above-scale electronic information manufacturing main business income (MainSaleRevenue), and number of smart city pilots (SmartCityPilotsNumber) [6].

4.2.2 Core Explanatory Variables

The core explanatory variable, the progress level of Fintech, adopts the Peking University digital financial inclusion index. The index can be divided into coverage breadth (Scope), depth of use (Depth), and degree of digitalization (Digital). The control variables used in this article include:

(1) The industrial structure (Ind) is based on the tertiary to secondary industry output ratio. Optimizing and upgrading the industrial structure facilitates green and coordinated development.

(2) Financial development level (FD), measured by the regional end-of-year loan balance ratio to China's GDP that year, the original sound financial foundation helps to allocate green factors.

(3) Foreign direct investment (FDI), the ratio of the actual amount of foreign capital used to China's GDP in the same year, is used. On the one hand, low-quality FDI flowing in due to lax supervision will hinder the green economy. On the other hand, FDI releases innovative effects to

promote green development.

(4) Government intervention (Gov) is calculated by dividing the government's R&D investment by the current year's GDP ratio.

(5) The level of human capital (Edu), expressed by the number of students in colleges and universities as a percentage of the total population, human capital in advanced education is conducive to the green transformation of the economy.

(6) GDP per capita (GDP_per), measured by the ratio of the actual GDP of the year to the resident population.

(7) Urbanization level (Urb), measured by the ratio of the urban population to the total population.

This paper uses investment efficiency (Inv) and green technology innovation (GI) as two intermediary variables. The proportion of the total investment in fixed assets of the whole society to GDP and the percentage of green utility model patents granted in the year to the number of all utility model patents granted are used to measure.

5. Control Variable

Many other factors affect the digital economy level in each province, such as population, economic development level, forest coverage area, industrial development level, etc. This article draws on the existing literature and selects the end-of-year population of each province (Pop, 10,000 people), annual GDP (GDP, 100 million yuan), the number of industrial waste gas treatment facilities (TreatFacilNum, sets), and forest area (ForestArea, 10,000 hectares) as control variables . In addition, province dummy variables and year dummy variables are added to the model to control the province and year fixed effects.

The definition of the main variables in this paper is shown in Table 1 :

Table 1 Definition of key variables

Variable	Level 1 indicators	Secondary indicators	Definition and measurement
Explanatory variables	$Fintech_{i,t}$		Fintech Development Index
Explained variable	Development level of digital economy($Gerd_{i,t}$)	$TelPopularity_{i,t}$	TelPopularity (unit/hundred people), including fixed and mobile phones
		$BroadBandSub_{i,t}$	BroadBandSub(10,000 households)
		$SoftwareIncome_{i,t}$	SoftwareIncome (100 million yuan) Including SoftwareIncome, software product income, information technology service income, information security income and embedded system software income
		$MainSaleRevenue_{i,t}$	MainSaleRevenue (100 million yuan)
		SmartCityPilotsNumber	SmartCityPilotsNumber (pieces)
Control variable$Control_{i,t}$	$Pop_{i,t}$		The population of each province at the end of the year (ten thousand people)
	$GDP_{i,t}$		Annual GDP of each province (billion yuan)
	$TreatFacilNum_{i,t}$		Number of industrial waste gas treatment facilities per year in each province (sets)
	$ForestArea_{i,t}$		Annual forest area in each province (ten thousand hectares)
	Year		Annual dummy variable
	Region		Provincial dummy variable

6. Authentic Proof Analysis : Multiple Regression

6.1 Descriptive Statistical Analysis

The descriptive statistical results of the explained variables, explanatory variables and control

variables are shown in Table 2. As far as the explained variables are concerned, each data shows that there is a large gap in the development level of Fintech in various provinces. In terms of explanatory variables, the level of digital industrialization in various provinces in China is also characterized by imbalance, and the data fluctuates greatly. For example, the difference in TelPopularity between provinces is twice that of the number of Internet BroadBandSub, SoftwareIncome, and electronic information manufacturing MainSaleRevenue. There is an order of magnitude gap, indicating a significant gap in the level of digital industrialization between underdeveloped and developed provinces. As far as the control variables are concerned, the GDP of each province intuitively reflects the gap in the level of economic development among the provinces. Correspondingly, the number of industrial waste gas TreatFacilNum in each province also shows a large fluctuation, and the forest coverage area of each province is also quite different due to natural reasons such as geographical location and climate, as well as measures such as acquired artificial afforestation.

Table 2 Descriptive statistical results of explained, explanatory, and control variables.

Variable	Variable description	Mean value	Standard deviation	Minimum value	Median	Maximum value
GTFP	Green total factor productivity growth	1.034	0.142	0.516	1.013	1.852
Fintech	Fintech development level	203.358	91.567	18.330	214.255	410.280
Scope	Fintech coverage breadth	183.606	90.244	1.960	190.335	384.660
Depth	Fintech using depth	197.966	91.350	6.760	189.945	439.910
TelPopularity	TelPopularity	221.819	1,091.433	95.779	110.590	127.311
BroadBandSub	Internet BroadBandSub	883.291	730.721	40.500	672.961	1,131.880
SoftwareIncome	SoftwareIncome	2,723.923	4,339.003	10.590	562.513	3,571.556
MainSaleRevenue	MainSaleRevenue of electronic information manufacturing industry above designated size	3,669.026	7,115.053	13.294	1,398.517	3,496.256
Pop	SmartCityPilotsNumber	4,561.117	2,728.772	25,1.040	3,834.500	6,143.600
GDP	Population of each province at the end of the year	24,535.848	18,970.305	13,035.102	18,679.415	30,006.820
TreatFacilNum	Annual GDP by province	9,672.419	8,254.253	4,311.000	6,710.000	12,984.000
ForestArea	industrial waste gas TreatFacilNum per year in each province	717.787	616.372	282.410	575.325	906.130

6.2 Regression Analysis

This paper uses the mixed POOL model, the fixed effect FE model, and the random effect RE model to regress the provincial panel data from 2012 to 2019, and uses the F test to compare the FE model and the POOL model, and the BP test to compare the RE model and the POOL model. and Hausman test to compare FE model and RE model. The results of the three inspections are shown in Table 3 below.

Table 3 POOL model, FE model and RE model test

Test type	Test purpose	Test value	Test conclusion
F Test	Comparison and selection of FE and POOL model	F (29,172)=222.695,p=0.000	FE model
BP test	Comparative selection of RE and POOL model	$\chi^2(1)=323.356,p=0.000$	RE model
Hausman test	Comparative selection of FE nd RE model	$\chi^2(8)=0.986,p=0.998$	RE model

Specifically, the results of the regression analysis of the provincial panel data from 2012 to 2019 using the random effect model are shown in Table 4 below:

Table 4 Random effects model regression results

	Model 1	Model 2	Model 3	Model 4	Model 5
TelPopularity	-0.000**	-0.000**	-0.000*	-0.000	-0.000
	(-2.242)	(-2.789)	(-1.665)	(-1.034)	(-1.218)
ln_BroadBandSub	-0.069*	-0.028	-0.031*	-0.059**	-0.052*

	(-1.400)	(-0.730)	(-1.322)	(-2.104)	(-1.897)
ln_SoftwareIncome	-0.051*	-0.001	-0.173***	-0.045*	-0.060**
	(-1.541)	(-0.049)	(-5.597)	(-1.588)	(-2.129)
ln_MainSaleRevenue	-0.089**	-0.036*	-0.142***	-0.143***	-0.162***
	(-2.422)	(-1.202)	(-4.865)	(-5.939)	(-6.643)
ln_Pop		0.752***	0.006	-0.055	0.071
		(11.949)	(0.059)	(-0.634)	(0.746)
ln_GDP			1.255***	0.445***	0.449***
			(8.257)	(2.978)	(3.062)
ln_TreatFacilNum				0.701***	0.680***
				(9.879)	(9.733)
ln_ForestArea					-0.074***
					(-3.054)
Constant term	9.022***	4.285***	0.288	1.917***	1.660***
	(28.114)	(9.177)	(0.457)	(3.517)	(3.069)
R^2	0.183	0.520	0.640	0.758	0.768
Sample capacity	210	210	210	210	210

Note: t value in parentheses, ＊p<0. 10, ＊＊p<0. 05, ＊＊＊p<0. 01

7. Conclusion

As a result of China's extensive digital demographic dividend, Fintech continues to expand consumption scenarios, thereby increasing circulation within China's consumption and supporting small, medium, and micro enterprises. International cases mainly focus on financing, guiding resources to areas with the greatest potential, stimulating enterprise vitality, and deepening the capital market. Therefore, the following embodiments are proposed in this paper. (1) Enhance Fintech innovation channels and integration with enterprises. Provide higher-quality financing services while reducing costs and risks of supporting the digital economy. (2) Establish a comprehensive regulatory mechanism for the digital economy powered by Fintech. For example, the regulatory sandbox covers many aspects, such as payment settlement, credit reporting, and monetary policy. Financial supervision can be tested on a small scale, innovative products and business models can be monitored and optimized on time, and digital economic development risks can be effectively reduced using simulation technology. (3) Promote the innovation of inclusive digital economy and Fintech, reduce the pain points of economic structural transformation, and better realize the transformation to high-quality development.

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