The Positive Influence of Inclusive Finance on Industrial Structure Upgrading

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ABSTRACT

This paper aims to prove that the development of inclusive finance has positive impact on the upgrading of industrial structure. The rationalization of industrial structure is an inevitable requirement for high-quality economic development, while inclusive finance promotes economic development by realizing the extensiveness of financial services. In this process, whether inclusive finance plays a role in boosting the upgrading of industrial structure. The research employs regression analysis based on the panel model. The statistical basis for the study was data from 31 Chinese provinces from 2011 to 2019. The results confirm the hypothesis that the development of inclusive finance have a positive role in promoting the upgrading of the industrial structure and the promoting effect is distinctly heterogeneous: the promotion role of inclusive finance is the most significant in the eastern area, and in the middle and western regions the role still has room for development. This conclusion can further respond to the call for common prosperity, accelerate the upgrading of the consumption structure, promote economic development, build a clean industrial environment and form a new development pattern so as to achieve the high-quality and sustainable development of China's economy.

Keywords: Inclusive Finance, Industrial Structure Upgrading, Panel Model.

1.INTRODUCTION

China has witnessed a leapfrog development during the past 40 years, but meanwhile, problems like unreasonable industrial structure, uneven regional development and insufficient innovation cannot be ignored. They have already seriously impeded our quality and sustainability of economic development, so the upgrading of the industrial structure is imperative. Especially in recent years, now that the COVID-19 situation has swept the world, the uncertainty and instability of the international situation have increase, the domestic economic operation has faced new challenges, structural adjustment and growth momentum conversion have received new constraints, and economic security risks have risen, so that the transformation and upgrading of the industry structure has become difficult.[1] In the context of high-quality development, it is urgent to propose a path to achieve healthy development while promoting industrial structure upgrading. It is clearly stated by the 19th Congress Report that to promote quality change, efficiency change and dynamic change in economic development and to improve all-factor productivity, we should accelerate the construction of an

industrial system of coordinated development of real economy, scientific and technological innovation, modern finance as well as human resources. With the rapid development and mature application of modern digital information technology such as big data and cloud computing, the inclusive finance derived from the deep integration of the traditional inclusive finance and modern science and technology has revolutionized the traditional financial pattern of development, and has led to the formation of a new financial technology industrial map in the financial industry, which provides a new way of thinking for finance to better serve the real economy. Currently, the upgrading of industrial structure is regarded as a significant factor of speeding up economic development. Therefore, can the development of economy help promote the optimization and upgrading of the industrial structure?

Research on the relationship between the upgrading of industrial structure and financial development mainly focuses on digital economy. Guo Binnan, Wang Yu and Zhang Hao have proved that digital economy has a significant positive influence on the rational and advanced industrial structure, and has a stronger explanatory power for the advanced industrial structure.[2] The majority of research put their attention to the industrial restructuring under the influence of finance. Regarding inclusive finance, Qiu Yunfei and Shi Xiaokun believe that inclusive finance can promote the improvement of residents' consumption level and structure.[3] Huang Xinchun argue that inclusive finance has a direct driving effect on the improvement of urban innovation capabilities.[4] Shen Yang believe that inclusive finance can effectively improve the efficiency of financial services and promote the construction of urbanization.[5] Existing research provides a theoretical basis for this paper, but does not provide an accurate conclusion as to the main role of inclusive finance in influencing industrial upgrading.

Industrial structure upgrading is the transformation of economic growth mode and economic development model. With technological progress and economic development, the industrial structure is required to be adjusted and, when conditions are ripe, to achieve industrial structure upgrading. Fundamentally speaking, the process of continuous economic development is the process of gradual optimization and upgrading of industrial structure. It includes numerous elements, such as the upgrading of consumption structure, the improvement of employment structure, and the development of a new industrialization path. In this process, inclusive finance provides appropriate and effective financial services for all social strata and helps to transform and upgrade the economic development mode. Can it use this to promote the upgrading of industrial structure? This paper attempts to establish a panel regression model, we can clarify the intrinsic link between the inclusive finance and the industrial structure upgrading.

2.THEORETICAL ANALYSIS AND RESEARCH HYPOTHESIS

In the practice of inclusive finance, banks have fallen into the dilemma of public welfare and profitability. Many regions in China, especially in the countryside, there still are difficulties for the financial institution to provide services while earning money to solve the problem of imbalance between supply and demand. Now with the help of inclusive finance, financial services break the shackles of traditional financial services that are subject to physical outlets and working hours. Therefore, inclusive finance has improved people's living standards to some extent, through expanding the scope and efficiency of financial services. Moreover, inclusive finance now is integrated into digital means such as big data and cloud computing can help information spreading and more convenient transaction to reduce transaction cost and make financial activities more active, which will accelerate the circulation of capital and financial activities. It can also effectively alleviate the problem of information asymmetry. By passing the "extrusion effect"

and "squid effect" to force the financial industry to accelerate the marketing reform process, thus promoting the formation of the optimal bank structure to create an optimized upgrade of industrial structure.[6] In other words, inclusive finance may play an important role in driving economic development and upgrading. The highspeed and high-quality development of economy can further promote the upgrading of the industrial structure. The development of inclusive finance is inseparable from the help of technological innovation. What's more, inclusive finance is capable of promoting urbanization construction since while benefiting the general public, it also able to stimulate government agencies to enjoy financial dividends and provide financial support for the construction of urban and rural infrastructure and the perfection of public facilities. Hence, this paper proposes the following research assumptions:

Hypothesis 1. The development of the inclusive finance can promote the upgrading of the industrial structure.

Hypothesis 1a. The development of science and technology can promote the upgrading of the industrial structure.

Hypothesis 1b. *The development of urbanization can promote the upgrading of the industrial structure.*

The level of economic development in various regions in China is different, correspondingly there must be difference in the development of inclusive finance according to the statistic released by Peking University. China's financial resources as well as most of high-tech enterprises are distributed in the Yangtze River Delta and coastal areas. The financial equipment and services in the middle and western areas are relatively backward. What' more, the financial concept in not updated in a timely manner. Regarding the different policy and developing process, this paper make the following hypothesis:

Hypothesis 2. There are regional differences in the driving effect of inclusive finance on the upgrading of industrial structure.

3.RESEARCH DESIGN

3.1.Data Sources

This study used data from 31 provinces in Mainland China from 2011 to 2019 as the research sample. Due to the lack of statistical data in some provinces and municipalities in some years, the data of Hong Kong, Macao, and Taiwan were excluded. The original data are mainly derived from the "China Statistical Yearbook", "China Labor Statistic Yearbook", "China Population and Employment Statistic Yearbook", "China High-tech Statistical Yearbook", China's Internet Development Statistical Report and Regional Statistical Yearbook, etc. In order to avoid the impact of inconsistencies in the



dimensions of the original data on the regression results, the data of all variables were processed by logarithms; the indicators of missing data were complemented by regression and interpolation.

3.2. Variable Design

3.2.1 Explained Variables

(1) Upgrading of industrial structure

This paper studies the impact of the development of the inclusive finance on the transformation and upgrading of the industrial structure. By referring to the research of Liu Wei[9], the product of the proportion of GDP in the tertiary sector and its labor productivity was mainly used as a measure of industrial structure upgrading, which was recorded as *INDG*. This can reflect the meaningful evolution through the rapid improvement of labour productivity.

Constructor as shown in equation (1):

$$INDG = \sum_{i=1}^{n} (Y_{it} / Y_{t}) (LP_{it} / lP_{t})$$
(1)

In the formula, *INDG* represents the level of industrial advance; Y_{it} represents the proportion of the *i*-th industry's GDP in year *t* for a specific area; Y_t denotes the total GDP for a specific area; *i* represents the 1,2,3 industries; LP_{it} represents the labour involved in the *i*-th industry in year *t*; LP_t represents the labour amount when the industrialization finished.

3.2.2. Explanatory Variables

This study used LNdifi, calculated by Institute of Digital Finance of Peking University and selected the index of digital inclusive finance development in 31 provinces from 2011 to 2019. LNdifi now is widely applied into various researches regarding the development of digital economy and its effects correspondingly. This index is comprised of three dimensions, coverage breadth, use depth and digitization degree. The research of Guo Feng specifically introduced the composition of the index of digital inclusive finance.

3.2.3. Control Variable

Except for the explanatory variable, there are many other factors that may have influence on the upgrading of industrial structure. To make sure the accuracy of the results, by referring conclusions from previous study, this study takes the proportion of local fiscal expenditure in education and technology as GOV; the proportion of the urban population as URB; the proportion of students in average colleges and universities as HUM; the percentage of foreign direct investment as OPE; the amount of the fixed asset investment as INF; the amount of R&D expenditure as TEC; the length of road mileage (kilometer) as TRA. Among them, the calculation of GOV, OPE, HUM, and URB mainly refers to Tian's calculation.[10] INF, TEC, and TRA are mainly projected by empirical experience.

The variables are summarized and explained in Table 1.

Category	Variable Code	Variable Name	Index selection
Explained variable	INDG	Industrial structural upgrade	The index of advanced industrial structure
Explanatory variable	LN	Inclusive finance development level	Digital inclusive finance index
	GOV	Degree of government intervention	Local fiscal expenditure as a percentage of regional education and technology
	URB	Level of urbanization	The proportion of the urban population
Control veriable	HUM	Human capital	The proportion of students with a college degree to the whole population
Control variable	OPE	Level of opening up	The percentage of foreign direct investment
	INF	Infrastructure	The amount of the investment of fixed assets
-	TEC	Level of scientific and technological development	The R&D expenditure
	TRA	Degree of traffic development	The length of road mileage in kilometer

Table 1. Summary of variable descriptions.



3.3.Model Setting

Based on the proposed hypothesis, in order to effectively test the positive impact and effect of the development level of the inclusive finance on the upgrading of the industrial structure, the following basic measurement model is proposed for the direct transmission mechanism:

$$INDG_{it} = \alpha_0 + \alpha_1 LN_{it} + \alpha_2 GOV_{it} + \alpha_3 URB_{it} + \alpha_4 HUM_{it} + \alpha_5 OPE_{it} + \alpha_6 INF_{it} + \alpha_7 TEC_{it} + \alpha_8 TRA_{it} + m_i + v_t + u_{it}$$

In equation(2), *i* represents the region; *t* represents the time; *INDG* represents the upgrading of the industrial structure; m_i represents the regional fixed effect; v_t represents time fixed effect; u_{it} represents the random disturbance term.

4.EMPIRICAL ANALYSIS

4.1. Descriptive Statistical Analysis of Variables

Before the analysis of the sample data, the descriptive statistics of the research variables were first carried out, and the results are shown in Table 2. The mean value, standard deviation, minimum value and maximum value of industrial structure upgrading(INDG) are 556.1382, 371.596, 148.03 and 2346.21, respectively, indicating that there is a remarkable difference in the overall level of the industrial structure. The average value of the inclusive finance development value(LN) is 201.4372, the standard deviation is 90.71403, the minimum value is 16.22, and the maximum value is 410.28, indicating that there is a large gap in the development level of inclusive finance in different provinces. The average value of the government intervention level(GOV) is 18.28645, the minimum and the maximum value are 10.58 and 25.32 respectively, and the standard deviation is 3.244, indicating that there is a small difference among different provinces. The average value of the technology innovation level(TEC) is 477.1395, the minimum value is 1.15, the maximum value is 3098.5 and the standard deviation is 568.0598, which is larger than the average value, indicating that there is an imbalance and regional differences in the innovation level.

 Table 2. Variable descriptive statistics.

(2)

Variable	Observation	Average	Standard deviation	Minimum	Maximum
INDG	279	556.1382	371.596	148.03	2346.21
LN	279	201.4372	90.71403	16.22	410.28
GOV	279	18.28645	3.244169	10.58	25.32
URB	279	56.65728	13.14233	22.71	89.6
HUM	279	1.922401	0.508869	0.8	3.45
OPE	273	2.128681	1.890802	0.01	12.1
INF	217	15734.41	11334.67	516.31	55202.72
TEC	279	477.1395	568.0598	1.15	3098.5
TRA	279	147204.6	78353.35	12084	337094.9

Before regression analysis, in order to select the panel model, the F-test was conducted to determine whether the random effect or the fixed effect was selected, and the test results showed that the null hypothesis was rejected at the significance level of 1%. Then, the Hausman test was conducted, and the test results showed that the P value was 0.000. Therefore, the fixed effects model was selected for empirical analysis. In order to explore the impact of the inclusive finance on the upgrading of industrial structure, it is necessary to study the influence of independent variables (inclusive finance) on dependent variables (record the model that only contains control variables as model (1)), and then add independent variables to model (1) in turn. Table <u>3</u> shows the regression results of the impact of the inclusive finance on the upgrading of the industrial structure.

4.2. Empirical Test of the Impact of Inclusive Finance on Industrial Structure Upgrading

Table 3. Regression results of the impact of the inclusive finance on the upgrading of industrial structure.

	Model (1)	Model (2)	Model (3)
Variable	INDG	INDG	INDG
LN	1.226***	0.755***	0.880***
	(0.152)	(0.119)	(0.088)

GOV	0.022	-0.086***	-0.078***
	(0.037)	(0.030)	(0.028)
URB	0.080***	0.099***	0.074***
	(0.015)	(0.040)	(0.021)
HUM	0.179	0.183	0.071
	(0.265)	(0.498)	(0.407)
OPE	-1.144**	-0.008	-0.023
	(0.061)	(0.039)	(0.038)
INF	-0.017***	0.009***	-0.008***
	(0.002)	(0.002)	(0.001)
TEC	0.499***	0.536***	0.502***
	(0.367)	(0.042)	(0.033)
TRA	-0.001	-0.001	0.001
	(0.001)	(0.001)	(0.001)
CONSTANT	-128.615	-97.391	73.387
	(88.476)	(180.156)	(108.964)
Model	OLS	FE	RE
R-squared	0.8494	0.781	0.796
F	144.49	54.39	1155.92

Note: (1)**,***indicate significance at the statistical level of 1% and 5% respectively;(2)the robust standard errors are in parenthese.

It can be seen from Table 3 that in Model (2) and Model (3), the regression coefficients of level of inclusive financial development (LN) was positive at the significance level of 1%, which were 0.755 and 0.880 respectively and the hypothesis H1 is verified. In Model (2), the level of scientific and technology development (TEC) was positive at the significant level of 1%. Hypothesis 1a can be proved. We can also see the level of urbanization (URB) and infrastructure (INF) was positive at the significance level of 1%, which were 0.099 and 0.009 respectively. The improvement of urbanization means more people have access to more digital devices and financial institutes, and therefore push inclusive finance forward, as well as the upgrading of industrial structure. Hypothesis 1b can be proved.

4.3. Robustness Test

In order to test the robustness of the conclusions of this study, the following test were conducted from the aspect of time. Considering that the inclusive finance and the upgrading of the industrial structure may be in the progress of developing, we separate the decade into two period. Model (4) represents the period before 2015 and Model (5) represents the period after 2015, including 2015. From Table 4, it can be seen that the year after 2015, the impact of inclusive finance is more pronounced, but the overall regression analysis results are robust.

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Table 4	Robustness	test regression	results
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	Model (4)	Model (5)
Variable	INDG	INDG
LN	0.638***	1.420***
	(0.156)	(0.367)
GOV	-0.011	-0.057
	(0.028)	(0.074)
URB	0.111	-0.039
	(0.084)	(0.084)
HUM	0.093	0.388
	(0.779)	(1.097)
OPE	0.061	-0.082
	(0.120)	(0.065)
INF	-0.007**	-0.003
	(0.003)	(0.003)
TEC	0.385***	0.487***
	(0.081)	(0.080)
TRA	-0.001	0.002
	(0.001)	(0.001)
CONSTANT	-136.778	101.072
	(372.672)	(362.564)
Model	FE	FE
R-squared	0.7543	0.1929
F	44.57	47.65

4.4.Heterogeneity test

To test the heterogeneity of the conclusion of this study, the 31 provinces are divided into 4 parts, including eastern(Model(6)), middle(Model(7)), western(Model(8)) and northeast area(Model(9)). As Table 5 shown, the eastern and northeast area is positive at the significance level of 1% and 5% respectively, which were 0.773 and 0.853 respectively. According to the coefficients, the

impact of inclusive finance on the upgrading of industrial structure in eastern area is more significant than others, then northeast area, western area and middle area. In terms of the actual economic development situation, the digital ecology and network facilities in eastern region are relatively perfect, such as communication equipment, network coverage and artificial intelligence industry, which is conductive to the positive role of inclusive finance with the help of advanced digital technology, human capital and etc. The northeast region enjoys the bonus of the old industrial basic and has policy support. In recent years, the state has given more developing policy concessions to support the western area, so it has more dividends than the middle area. In conclusion, the heterogeneity test can help prove hypothesis 2.

Table 5. Heterogeneity test regression results.

	Model (6)	Model (7)	Model (8)	Model (9)
Variable	INDG	INDG	INDG	INDG
	0.773***	-0.404	0.336*	0.853**
LIN	(0.199)	(0.316)	(0.178)	(0.331)
COV	-0.169***	-0.032	-0.037	-0.037
GOV	(0.057)	(0.048)	(0.033)	(-0.037)
LIDR	0.177**	0.594***	0.059	0.266
UKD	(0.085)	(0.119)	(0.046)	(0.215)
	-2.682*	-2.759**	1.311**	-6.147**
ПОМ	(1.431)	(1.185)	(0.497)	(1.959)
ODE	0.027	0.092	0.123	-0.691
OFE	(0.074)	(0.322)	(0.100)	(0.071)
INF	-0.012***	-0.004	-0.002	-0.007**
	(0.005)	(0.003)	(0.003)	(0.002)
TEC	0.629***	0.088	0.597***	0.239
TEC	(0.081)	(0.259)	(0.159)	(0.291)
ΤΡΛ	-0.003	-0.001	0.001	0.003
INA	(0.002)	(0.001)	(0.001)	(0.005)
CONSTANT	356.528	-1899.517***	-298.637	-304.9542
CONSTANT	(539.82)	(479.015)	(188.752)	(1119.73)
Model	FE	FE	FE	FE
R-squared	0.8722	0.1757	0.2582	0.6371
F	46.72	4.50	17.82	3.89

4.5.Endogenous test

To address subliminal endogeneity, this paper replaces the inclusive financial index(LN) with firstdegree lag of inclusive financial index(l.LN) . As Model(10) in Table 6 shows, the coefficient of inclusive finance remains significantly positive, indicating that the conclusion remains robust after addressing potential endogenous issues.

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Table 6	Endogenous	test regression	results
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	Model (10)
Variable	INDG
L NI	0.998***
LIN	(0.275)
COV	-0.022
900	(0.047)
מסוו	-0.037
UND	(0.060)
	0.343
ПОМ	(0.547
	-0.031
OFE	(0.040)
INF	-0.007***

	(0.002)
TEC	0.540***
ILC	(0.055)
ТРА	-0.001
	(0.001)
CONSTANT	-5.859
CONSTANT	(264.301)
Model	FE
R-squared	0.7134
F	57.67

5.CONCLUSIONS

5.1.Discussion

Based on the panel data from 2011-2019 of 31 provinces in China, this article analyses the relationship between the inclusive finance and the upgrading of the industrial structure and aims to provide practical suggestions for the upgrading of China's regional industrial structure and high-quality sustainable economic development. The empirical results show the following: Firstly, inclusive finance can significantly promote the upgrading of industrial structure, and the conclusion is still true after considering endogenous

problems. The deeper and more extensive the application of inclusive finance, the faster and higher the process and quality of the industrial structure upgrading. Secondly, the impact of inclusive finance on the upgrading of industrial structure in different regions is different. According to the heterogeneity analysis, the promotion effect of inclusive finance in the east and northeast is more significant. Then is the western area, thanks to the policy support.

5.2.Implications

This paper provides a theoretical basis and effective ways for local governments in China to play the leading role in the inclusive finance and puts forward effective suggestions for promoting industrial progress and realizing circular, green and sustainable economic development. Based on the conclusions of this article, the following suggestions are made:

1. In the process of industrial structure transformation and upgrading, the government should comprehensively promote the development of digital inclusive finance to become one of the strong driving forces. Inclusive finance can not only accelerate the process of industrial structure upgrading, but also help the economic development of various regions, especially remote areas. In addition, it can improve people's consumption level, provide more convenient financial services, and alleviate the financing difficulties of some small enterprises. Credit departments and their related entities are supposed to continue to expand the coverage of inclusive finance and strengthen the depth of use. Under the concept of sustainable development, a more inclusive digital financial system is expected to be created by deepening digital functions such as personal payment, small online loans, internet insurance and fund wealth management. In this way, we may build a solid supply of digital infrastructure services.

2. Due to the fact that inclusive finance has different roles in promoting industrial structure upgrading as a result of factors like economic development foundation and policy support, the government should allocate the inclusive financial resources rationally and implement a differentiated digital financial strategy. As to developing areas in the middle and western regions, we should appropriately guide financial poverty alleviation funds from the perspective of policy support. Diversified market entitles should flow into the middle and western regions orderly, continuously improve the construction of financial systems and network infrastructure in the poverty-stricken areas, and give full play to the guidance role of the government. As for developed areas like eastern area, we should make full use of their economic advantages and digital environment advantages. Attention should be paid on how to highlight the innovation of financial instruments and improve the efficiency of inclusive financial services in order to build

a more diversified and modern financial market system. Through different measures and priorities, while strengthening capital exchanges, resource sharing, and talent flows between regions, the gap will be narrowed.

3. To create a more suitable business environment and enhance the vitality and motivation for development for the upgrading of industrial structure is an inherent requirement under the new development pattern. Recently, the foreign investment environment has been poor, and foreign investment in various regions in China has generally decreased. Optimizing the business environment is not only conductive to stabilizing market expectations, but also beneficial to attracting high-tech enterprises and high-quality capital from all over the world. Therefore, in order to promote the domestic cycle and the domestic and international double cycle, more high-end industries and advanced technologies are introduced to support and promote the industrial structure upgrading, including giving full play to different comparative advantages and combination advantages, continuously improving market access conditions, promoting the free flow of production factors and guiding domestic enterprises to open up diversified international markets.

AUTHOR'S CONTRIBUTIONS

Conceptualization, R.H.; methodology, R.H.; software, R.H.; validation, R.H.; formal analysis, R.H; resources, R.H.; data curation, R.H; writing—original draft preparation, R.H.; writing—review and editing, R.H. All authors have read and agreed to the published version of the manuscript.

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The availability of these data is limited. These data come from the official national statistical database of China, and can be obtained with prior permission on the websites of these publishers. The authors declare no conflict of interest.

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