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The correlation between the degree of green transformation of the financial industry and China's economic growth ——Based on empirical analysis

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Abstract:

With the increasingly serious global environmental problems, green finance has become an important way to promote sustainable economic development. As the world's largest developing country, China's financial industry's green transformation degree of impact on economic growth is significant. Based on empirical analysis, this study explores the relationship between the degree of green transformation of the financial sector and China's economic growth. By constructing an econometric model, using the time series data, this study analyzes the expenditure of energy conservation and environmental protection as the main explanatory variables, analyzes its influence on economic growth, and reveals its mechanism. The results show that the green transformation of the financial sector can significantly promote China's economic growth. In addition, this study also discussed the green finance policy in promoting economic growth is likely to face challenges in the process of, and puts forward the corresponding policy Suggestions, to further enhance the green transformation of the financial industry, to strengthen its promoting effect on economic growth.

Keywords: green finance, the green transformation of the financial industry, China's economic growth, empirical analysis, policy recommendations

1. Introduction

Amidst the escalating severity of global climate change and environmental issues, green finance, as an important means to promote sustainable economic development, has attracted extensive attention from the international society. China is the world's largest developing country, and its balance between economic growth and environmental protection problems is particularly important. In recent years, the Chinese government has attached great importance to the development of green finance and introduced a series of policies and measures to promote green finance - for example, the 2024 Government Work Report emphasized "improving fiscal, taxation, financial, investment and price policies and related marketization mechanisms to support green development", And pointed out that it should "vigorously develop technology finance, green finance, inclusive finance, pension finance, and digital finance"; <The Guiding Opinions on Further Strengthening Financial Support for Green and Low-carbon Development>jointly issued by the People's Bank of China and several ministries and commissions clearly stated that by 2035, The framework and policy backing mechanisms for financing green and low-carbon initiatives will attain greater sophistication. However, this study will test and analyze the correlation between the degree of green transformation of the financial industry and China's economic growth and whether there is a positive correlation between them through the econometric model, and give corresponding policy suggestions.

2. Literature Review

In this study, domestic and foreign-related research about the green financial and economic growth relationship found that domestic scholars believe that the financial sector green transformation degree has an obvious correlation with economic growth, and green finance is to realize the sustainable development of the economy needs. For example, Hu Yanglin and Zhang Bo (2021)[1] found that the Pearl River Delta urban agglomeration exhibits a marked spatial interdependence between its economic growth and the development of green finance, and believed that the green finance development level and Budgetary allo-

cations for environmental safeguarding and energy efficiency in each city in the Pearl River Delta significantly promoted the economic growth of the city. PiaoLin (2017) [2[argues that The financial domain is essential for maximizing the productive use of resources, a green economy cannot leave financial support, and green financial management is the best support. The king He Jiankui Jiang Tong stability (2006)[3].

Think, green financial development is to realize the economic, social, and environmental coordinated progress, the need for sustainable development, also is the inevitable request of financial institutions for their development and trends. Niujun (2022)[4] pointed out the essentiality and imperative nature of ESG indices for fostering environmentally responsible and economically sustainable development under green finance principles Zhang Jianping and Li Linze (2023)[5] believe that the ecological environment problem is fundamentally a development problem, which is determined by the development path and development mode, and the green transformation of enterprises is the key point of sustainable development. Foreign scholars have also made similar findings. Such as Salazar (2017)[6] found that green finance can improve the utilization rate of resources, and adjust industrial structure, to provide a high-quality and economic development path.

To sum up, the current research conclusions on the correlation between the degree of ecologically oriented transformation of the financial sector and economic growth at home and abroad are consistent, but the research on the specific quantitative relationship between the degree of Sustainability-focused transformation of financial services and the economic growth of china is still lacking. Furthermore, suggestions can be further supplemented for policies that promote the overall development of green finance in China and the coordination and unity between green finance and China's economic growth. This article will with the overall development of China's green finance degree and China's economic growth as the research object, draw the corresponding quantitative relation, then put forward the corresponding policy recommendations.

3. Empirical Analysis

3.1 Variable selection and data description

This article selects the 2014-2023 time series data of each variable analysis, all data from the national database, the database of Wind, and the bank annual report. To prevent heteroscedasticity, and multicollinearity and to reduce the autocorrelation caused by nonstationarity to a certain extent, all variables were log-transformed.

Be explained variables: economic level (lnGDP) using the GDP per capita measured logarithmic in the country.

Important explanatory variables: finance degree using the logarithm of fiscal spending on environmental protection green transformation (lnEPE) to measure. By increasing the expenditure on environmental protection, The government can foster the improvement of the green finance market and expand funding avenues for environmentally sustainable projects, thereby fostering innovation and variety in green financial offerings, and aligning with the market's appetite for green investments.

Control variables: The selection of control variables in this article refers to the research of Chinese scholar Qi Yikang (2023)[7], and one of the five control variables proposed by him is chosen: ———— logarithm of the total population at the end of the year (lnTP); In addition, this study also introduces the logarithm of total energy consumption (lnEC) as the second control variable. The reason is that there is a certain positive correlation between the consumption of traditional resources such as coal and economic growth, but with its environmental pollution and stronger efficiency substitution of new energy, its effect on economic growth is gradually weakened, and green transformation can bring a stronger economic effect. With GDP in our country still having a lot of correlation, the explaining variables should be included in the.

The figure below presents the descriptive statistics for each variable:

Variable	Obs	Mean	Std. dev.	Min	Max
lnGDP	10	11.09532	.2258515	10.75603	11.40041
lnEPE	10	8.607948	.1829098	8.246853	8.90791
lnTP	10	11.85034	.0093794	11.83244	11.85836
lnEC	10	13.08879	.0986087	12.96766	13.25689

Figure1: Descriptive statistics

3.2 Establish an econometric model and conduct correlation analysis and regression analysis

$LnGDP_{it} = beta_0 + beta_1 lnEPE_{it} + beta_2 lnTP_{it} + beta_3 lnEC_{it} + u$

Where β_0 β_1 β_2 β represent the marginal effects of the main explanatory variables and control variables on the explained variables, respectively. The random error term u_t represents the comprehensive influence of other unlisted small factors on the explained variable. In the following, the regression analysis of this time series model will be conducted by Stata software.

3.2.1 Autocorrelation test (using bg method)

```
 estat bgodfrey

umber of gaps in sample = 2

reusch-Godfrey LM test for autocorrelation
```

lags(*p*)	chi2	df	Prob > chi2
1	**1.326**	**1**	**0.2496**

H0: no serial correlation

Figure2: The bg method was used for the autocorrelation test

The P value was beyond 0.01, and the significance level was about 1%, indicating that the model had a certain degree of autocorrelation.

3.2.2 Correction of autocorrelation and model regression

In this study, the Corcoran-Aukert iterative method is used to estimate the autocorrelation coefficient, and then the generalized difference method is used to modify the model, to eliminate the influence of autocorrelation. The specific operation is shown in the figure below:

```
Iteration 0:   rho = 0.0000
Iteration 1:   rho = -0.2903
Iteration 2:   rho = -0.2228
Iteration 3:   rho = -0.1923
Iteration 4:   rho = -0.1769
Iteration 5:   rho = -0.1687
Iteration 6:   rho = -0.1643
Iteration 7:   rho = -0.1619
Iteration 8:   rho = -0.1605
Iteration 9:   rho = -0.1598
Iteration 10:  rho = -0.1594
Iteration 11:  rho = -0.1591
Iteration 12:  rho = -0.1590
Iteration 13:  rho = -0.1589
Iteration 14:  rho = -0.1589
Iteration 15:  rho = -0.1589
Iteration 16:  rho = -0.1588
Iteration 17:  rho = -0.1588
Iteration 18:  rho = -0.1588
Iteration 19:  rho = -0.1588
Iteration 20:  rho = -0.1588
Iteration 21:  rho = -0.1588

Cochrane-Orcutt AR(1) regression with iterated estimates
```

Source	SS	df	MS		
				Number of obs	= 7
				F(3, 3)	= 584.22
Model	.419574532	3	.139858177	Prob > F	= 0.0001
Residual	.000718179	3	.000239393	R-squared	= 0.9983
				Adj R-squared	= 0.9966
Total	.420292711	6	.070048785	Root MSE	= .01547

lnGDP	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lnEPE	.0406321	.1103042	0.37	0.737	-.3104052	.3916694
lnTP	5.454681	4.162508	1.31	0.281	-7.792277	18.70164
lnEC	1.871458	.3211997	5.83	0.010	.8492575	2.893659
_cons	-78.3875	44.32369	-1.77	0.175	-219.4452	62.67025
rho	-.1588302					

Figure3: Cochran - Orcutt iteration method and the generalized difference method combined with correction model

It can be seen that the overall fitting degree of the model is good, the influence of each variable is significant, and there is an obvious positive correlation between the main explanatory variables and the model.

The sample regression model can be written as: $lnGDP_{it}=-78.39+0.04lnEPE_{it}+5.45lnTP_{it}+1.87lnEC_{it}+e_{it,}$ which is the fitting of the overall regression model.

3.3 Robustness test (lagged one-period explanatory variable to replace the original ex-

planatory variable)

```
. g lnEPE2=l.lnEPE
(4 missing values generated)

. reg lnGDP lnEPE2 lnTP lnEC
```

Source	SS	df	MS	Number of obs	=	7
				F(3, 3)	=	1111.39
Model	.314660377	3	.104886792	Prob > F	=	0.0000
Residual	.000283122	3	.000094374	R-squared	=	0.9991
				Adj R-squared	=	0.9982
Total	.3149435	6	.052490583	Root MSE	=	.00971

lnGDP	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
lnEPE2	.0955806	.0409395	2.33	0.102	-.0347073	.2258685
lnTP	4.425296	1.310778	3.38	0.043	.2538143	8.596778
lnEC	1.998934	.1361875	14.68	0.001	1.565525	2.432344
_cons	-68.33101	13.61098	-5.02	0.015	-111.6472	-25.01479

Figure4: The robustness test of regression of one-period-lagged explanatory variables

It can be seen that the explanatory variables after replacement are still significant, so they pass the robustness test.

4. Policy Recommendations

Based on the empirical analysis we can prove that the financial sector of the green degree of transformation and economic growth has a positive correlation, and can be roughly concluded that the quantitative relationship between them, below this study will put forward some for better realize the coordinated development of the green financial and economic growth policy Suggestions.

4.1 Enhance the direction and oversight of green finance policies.

(1) Improve the green finance policy system to ensure policy consistency and coherence.
(2) Introduce more fiscal and tax incentive policies to encourage the improvement of green finance, such as discount interest on green loans.

4.2 Facilitate the growth and expansion of the green finance market.

(1) Expand the size of the green bond market and encourage more institutions to participate in the offering and exchange of environmentally sustainable bonds.
(2) Develop green funds to attract private capital into the green investment sector.
(3) Promote the innovation of financial products such as green loans and green insurance to meet the green financing needs of different market players.

4.3 Strengthen green finance regulation

(1) Improve green finance standards and certification systems to ensure the quality and transparency of green finance products.
(2) Strengthen the supervision of the green financial market and prevent the abuse and misuse of green financial products.
(3) Establish a green finance risk early warning and assessment mechanism to detect and defuse risks promptly.

4.4 Encourage enterprises to make green transformation

(1) Introduce policies to encourage enterprises to strengthen environmental awareness and management.
(2) Empower enterprises to undertake research and development (R&D) in green technologies and innovations, thereby bolstering the competitiveness of environmentally sustainable industries.
(3) More financing support and preferential policies will be given to green projects and enterprises.

4.5 Deepen international cooperation on green finance

(1) to strengthen the cooperation with other countries in the field of green financial and exchange, and promote the global green financial development.
(2) Collaborate in the establishment of global standards and rules for green finance, and enhance China's voice in the global green finance field.

4.6 Strengthen publicity and education on green finance

(1) Improve public awareness and understanding of green finance and enhance public awareness of environmental protection.

(2) Strengthen green finance training and education for financial institutions and enterprises, and improve the professional quality of green finance practitioners.

4.7 Improve green finance infrastructure

(1) Establish and improve the green finance information sharing platform, and improve the transparency and accessibility of green finance information.

(2) Improve the construction of innovation infrastructure for green financial products and services, such as green rating agencies and green certification agencies.

Through the implementation of the above policy recommendations, we can efficiently foster a harmonious progression of green finance and economic growth, attaining a mutually beneficial outcome that integrates high-quality economic development with ecological and environmental preservation.

5. Conclusion

Through meticulous evaluation and empirical investigations, this study delves into the interplay between the level of eco-friendly transformation within the financial sector and China's economic expansion. The findings underscore that this environmental transition within the financial industry not only fosters the sustainable advancement of China's economy but also bears a marked and favorable correlation with economic growth.

Firstly, the eco-conscious reshaping of the financial landscape fosters efficient resource utilization and environmental enhancement by directing capital flows towards eco-friendly and sustainable endeavors. This shift has not only heightened environmental consciousness within the financial sector but also sparked widespread enthusiasm for green investments, thereby bolstering the development of environmentally responsible industries. This proactive stance towards green investments has infused fresh momentum into China's economic growth trajectory, rendering it more enduring and resilient.

Secondly, empirical assessments reveal a notable and positive linkage between the extent of eco-friendly transformation within the financial sector and China's economic growth. This signifies that as the eco-conscious evolution of the financial industry deepens, China's economic expansion is poised to witness further enhancement. This correlation manifests itself across multiple facets, encompassing the burgeoning of green financial instruments such as eco-credit and sustainable bonds, alongside the growing prominence of green industries within the national economy.

Furthermore, the ecological transformation of the financial sector contributes notably to mitigating financial hazards and reinforcing the resilience of the financial system. As part of this transformation, financial establishments prioritize environmental and societal risk mitigation, thereby minimizing the financial consequences stemming from ecological degradation, climatic alterations, and other related factors. Simultaneously, this shift fosters industrial innovation and progression, expediting the widespread adoption of financial technology, and enhancing the efficacy and caliber of financial services.

In essence, a tangible link exists between the ecological transformation of the financial industry and China's economic prosperity. To propel China's economy towards sustainable growth, it is imperative to further advance the greening of the financial sector, intensify the focus on eco-friendly investments, refine green finance policies, and motivate diverse sectors of society to engage in eco-friendly investments. Additionally, emphasis should be placed on nurturing and innovating green industries, and implementing strategies to elevate their share in the national economy, thereby guiding China's economic trajectory towards a greener and more sustainable future.

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