Proceedings of CONF-BPS 2026 Symposium: Sustainability Transitions and Regional Economic Restructuring in New Contexts
DOI: 10.54254/2754-1169/2026.NJ31779

Research on the Driving Effect of Green Finance Development on High-Quality Development of the Digital Economy: An Empirical Test Based on Provincial Panel Data in China

Jiakai Zhang

HeBei University, Baoding, China
1463469869@qq.com

Abstract. The dual-carbon strategy and the digital economy are coming together. Green finance helps direct resources to low-carbon and digital areas. We use panel data from 30 Chinese provinces between 2014 and 2023. We build indices for green finance and digital attention. We test their relationship using fixed-effects models and mediation tests. Green finance increases government attention to the digital economy. This effect is stronger in low-income regions. The effect works through a signaling-attention channel. It does not depend on innovation or industrial structure. The results show green finance can serve as a dual-purpose policy lever.

Keywords: green finance, digital economy, green technological innovation regional differences

1. Introduction

Dual-carbon targets and digital growth co-evolve. Green finance is expected to fund emissions cuts. It also funds digital transformation. Eastern provinces show a "dual-high" pattern. Green finance and digital attention reinforce each other. Western provinces show rising digital focus after green investment. Traditional literature treats the two domains separately.

This study uses panel data from 30 provinces between 2014 and 2023. It measures local governments' attention to the digital economy. It counts the frequency of "digital economy" in policy texts. The study tests green finance's effect on digital attention. It also checks regional variations and threshold characteristics. Robustness is ensured through variable substitution. Lagged regression and model extension are also used. Green finance significantly increases local governments' attention to the digital economy. This effect is positive in low-income regions. It becomes negative or insignificant in high-income regions. A fiscal resource threshold exists. The findings remain unchanged when using "environmental protection expenditure" as a substitute.

This study introduces the "attention foundation perspective" into green finance. It examines local governments' attention. This bridges the gap between the funding side and the behavioral side. It reveals the nonlinear boundaries of the attention effect. This provides new reference points for

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2754-1169/2026.NJ31779

policy instruments. It helps understand behavioral microfoundations. It aids research on policy coordination and threshold effects.

2. Research hypotheses

The framework shows green finance has two functions. It allocates resources. It also sends signals. Green investment reduces financing constraints. It supports digital infrastructure. Green expenditures involve performance evaluations. These evaluations signal policy incentives. Local governments prioritize the digital economy. They compete for attention. Marginal returns may decrease. Fiscal resources become more abundant. The effect shows nonlinear characteristics. The study proposes three hypotheses:

H1: The higher the level of green finance development, the more significantly local governments increase their attention to the digital economy.

H2: The salutary impact exhibits marked heterogeneity, being significantly amplified in regions characterized by lower developmental and income strata.; it tends to weaken or even reverse in regions with higher development levels and income.

H3: (To be further tested) The effect works through a "signaling-attention" mechanism, not via innovation or industrial structure.Variable Data Model.

3. Variable data model

3.1. Research design

This study empirically investigates how the development of green finance advances the digital economy and dissects its underlying transmission channels. Drawing upon a balanced panel of 30 provincial-level regions in China (Tibet, Hong Kong, Macao and Taiwan excluded) spanning 2014–2023., a multiple regression model is constructed for analysis. Core variables include green finance development level, digital economy development level, potential mediating variables (technological progress, economic growth), and control variables (human capital, industrial structure, environmental regulations, etc.).

3.1.1. Variable specification

This paper reviewed proxy variables before building the model. The review covered green finance and the digital economy. The final variable system considers data availability. It considers indicator representativeness. It also considers the provincial policy context.

The dependent variable is "digital economy attention." It measures policy emphasis. It does not measure industrial scale. Objective indicators were not adopted. Value-added figures were excluded. Employment figures were excluded. The study uses a behavioral approach. Huang Ping and Jones support this [1,2]. The proxy is the "frequency of 'digital economy' in work reports." The frequency counts words per 100,000 characters. This indicator reflects policy signal intensity. It captures government priority-setting.

The core variable is "green finance development level." The method follows Cao Jianfei and Zhang Xiaona [3]. The proxy is "investment in industrial pollution control/GDP." This indicator has fiscal attributes. It reflects investment intensity in green issues. It forms a closed loop with the "attention" variable. It fits the "signal-competition-resource" framework.

DOI: 10.54254/2754-1169/2026.NJ31779

Control variables come from established research. Adjustments fit China's provincial environment. Xie Fei and Zhou Meiling showed technological progress affects attention [4]. The model includes "annual patent applications." Ren Baoping and He Houcong linked economic scale to policy attention [5]. "Regional GDP" controls this effect. Gao Xing and Li Maisou used "undergraduate student numbers" for human capital [6]. This controls the impact of talent reserves.

Zhang, Q. and Chen, J. linked industrial structure to digital attention. The study uses "tertiary industry output value/secondary industry output value." This measures industrial upgrading. It controls the driving effect of industrial transformation.

Lin, Mu Xi, and Xiao, Yu Bo studied environmental regulation [7]. Regulation intensity affects the relationship. The proxy is "completed investment in industrial pollution control/secondary industry output value." Ding et al. noted spillover effects of openness. "Total foreign direct investment" measures foreign investment levels. The data is log-transformed. Missing values are imputed as 0.

Table 1. Variable definition

Variable Type	Variable Name	Variable Symbol	Variable Definition and Measurement Method
Dependent Variable	Digital Economy Development Level (Attention)	DE	Frequency of "Digital Economy" in Provincial Government Work Reports (per 100,000 words)
Core Explanatory Variable	Green Finance Development Level	GF	Industrial Pollution Control Investment Completed / Regional GDP (%)
Control Variables	Technological Progress	TP	Annual Patent Applications by Province (Logarithmic Scale)
	Economic Growth	GDP	Regional GDP (in billions of yuan, logarithm)
	Human Capital	HC	Number of Undergraduate Students in Regular Higher Education Institutions (Logarithmic)
	Industrial Structure	IS	Tertiary Industry Output Value / Secondary Industry Output Value
	Environmental Regulation Intensity	ER	Industrial Pollution Control Investment / Secondary Industry Output Value
	Level of Foreign Investment	FDI	Total Foreign Direct Investment (USD, logarithmic scale; missing values imputed as 0)

3.1.2. Data sources and processing

This research constructs a provincial-level panel (N = 30, Tibet and the two Special Administrative Regions excluded) spanning 2014–2023; all variables are compiled from the China Statistical Yearbook, China Rural Statistical Yearbook, respective provincial statistical yearbooks, and the CSMAR repository. To ensure data accuracy and comprehensiveness, all sources underwent rigorous screening and cross-verification. All continuous variables were standardized prior to regression analysis, with logarithmic transformations applied to certain variables to mitigate heteroskedasticity issues.

3.2. Empirical findings and analysis

3.2.1. Model specification

This study examines the direct impact of green finance. It looks at the digital economy. It also looks at underlying mechanisms. The study constructs a fixed-effects model.

DOI: 10.54254/2754-1169/2026.NJ31779

$$DE_{it} = \alpha_0 + \alpha_1 GF_{it} + \alpha_2 TP_{it} + \alpha_3 GDP_{it} + \alpha_4 HC_{it}$$

$$+\alpha_5 IS_{it} + \alpha_6 ER_{it} + \alpha_7 FDI_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where: $DEit$: Digital economy attention (word frequency) of province i in year t;
GF_{it} : Green finance development indicators;
TP_{it} ,GDP_{it} ,HC_{it} ,IS_{it} ,ER_{it} ,FDI_{it} : control variables;
μ_i : Provincial fixed effects;
λ_t : Year fixed effects;
ε_{it} : Random error term.

Table 1 reports the main regression results. Green finance development has a positive impact. It affects local governments' attention to the digital economy. The regression coefficient is 6.914473. The p-value is below 0.05. The result is significant at the 5% level. In China, higher green finance investment intensity correlates with greater emphasis. The emphasis is on the "digital economy." It appears in local government policy texts. This shows a "guiding effect." It does not show a "crowding-out effect" [8].

Table 2. Standard regression

Variable	(1)
	m1 DE
GF	6.914** (1.98)
Constant	0.049*** (5.27)
Observations	310
R-squared	0.939
r2_a	0.932
F	.

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4. Empirical results analysis

4.1. Heterogeneity test: regional and income differences in green finance's impact on digital economy attention

This study explores structural differences. It checks green finance's impact on local governments' attention. The attention targets the digital economy. The study conducts heterogeneity analysis. It looks at two dimensions. The first is regional development level. The second is income level. The sample is grouped by proxies. It is grouped by regional proxies. It is grouped by income proxies. Regression analysis is performed. The study examines variations in marginal effects. It checks green finance across different regions. It checks conditions of fiscal capacity.

DOI: 10.54254/2754-1169/2026.NJ31779

4.1.1. Heterogeneity analysis based on regional development level we categorize the sample into three groups based on regional

development levels:

Provincial Proxy = 0: Low-development regions (e.g., western and some central provinces)

Proxy = 1: Moderately developed regions

Regional dummy = 2: High-development regions (e.g., eastern coastal provinces)

Table 3. Analysis of heterogeneity in regional development levels

Variable	(1) Low-development regions	(2) Moderately developed regions	(3) Highly developed regions
	m3 DE	m4 DE	m5 DE
GF	16.141** (2.46)	-0.567 (-0.59)	-3.315*** (-3.91)
Constant	0.036*** (3.56)	-0.004** (-2.37)	-0.008*** (-7.87)
Observations	130	110	70
R-squared	0.946	0.942	0.950
r2_a	0.938	0.932	0.941
F	102.0	.	.

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Our experiments show results for low-development regions. Green finance uses environmental protection expenditures. It enhances local governments' attention to the digital economy. The impact is significant. It reflects a "fiscal guidance-policy response" mechanism.

In moderately developed regions, green finance has no significant impact. Fiscal resources and policy priorities exist in a "transition zone" [9].

In advanced regions, green finance expansion has a dampening effect. It affects public attention toward the digital economy. The effect is statistically significant. These regions have ample fiscal resources. Environmental infrastructure is well-developed. Green expenditures become "maintenance-oriented" investments. They crowd out policy attention to digital issues.

4.1.2. Heterogeneity analysis by regional income level

We further divided the sample into three groups based on income level: Table Y reports the regression results for each group: High- income regions: income proxy = 0; Low-income regions: income proxy = 1; Medium-income regions: income proxy = 2.

Table 4. Analysis of heterogeneity in regional income levels

Variable	(1) Low-development regions	(2) Moderately developed regions	(3) Highly developed regions
	m6 DE	m7 DE	m8 DE
GF	22.139** (2.43)	-1.311 (-0.97)	0.217 (0.34)

DOI: 10.54254/2754-1169/2026.NJ31779

Table 4. (continued)

Constant	0.038*** (3.71)	-0.014*** (-8.73)	-0.000 (-0.02)
Observations	90	130	90
R-squared	0.937	0.939	0.838
r2_a	0.926	0.929	0.810
F	77.50	.	.

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

We find that in low-income regions, green finance expenditures exert a strong positive incentive effect on digital economy attention, with a coefficient as high as 22.14, significant at the 5% level;

In middle- and high-income regions, green finance has no significant impact on attention [10], and the direction of effects is inconsistent;

This indicates that the scarcer fiscal resources are, the more likely local governments are to link green expenditures with digital economy initiatives to secure policy attention and resource allocation from higher authorities.

4.2. Robustness tests

To ensure the reliability of the main regression results, this study conducts robustness tests from three aspects:

4.2.1. Replacing the core explanatory variable measure

To validate the robustness of green finance's impact on local governments' digital economy attention, this study further replaces the core explanatory variable's measurement method. In the benchmark regression, the level of green finance development (GF) is measured by "completed investment in industrial pollution control/GDP." Here, we adopt "environmental protection expenditure" as an alternative indicator and re-estimate the main model to test whether the conclusion depends on specific variable construction.

Where: $DEit$: Digital economy attention (word frequency) of province i in year t;

$EPit$: Environmental protection expenditure (green finance development indicator);

$TPit, GDPit, HCit, ISit, ERit, FDIit$: Control variables;

μi: Provincial fixed effects;

λt: Year fixed effects;

εit: Random error term.

Table X reports regression results after replacing explanatory variables (sample rows 139 to end). The results show that the coefficient for environmental protection expenditure is 5.09×10^{-10} ($p<0.01$), indicating a statistically significant positive effect at the 1% level [11]. This suggests that higher government environmental protection expenditure correlates with greater attention to "digital economy" in local government policy texts. This aligns with the positive direction of green finance's impact observed in the baseline regression, further supporting the positive guiding role of green finance (and related fiscal behaviors) in allocating policy attention.

DOI: 10.54254/2754-1169/2026.NJ31779

Table 5. Renewal of robustnessanalysis with different core explanatory variables

Variables	(1)
	m1 DE
EP	5.088*** (3.44)
Constant	-2,419.253*** (-7.89)
Observations	310
R-squared	0.815
r2_a	0.811
F	48.61

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.2.2. One-period lagged regression: robust test to mitigate reverse causality

This study addresses potential reverse causality. It examines the link between green finance and digital economy attention. The core explanatory variable uses a one-period lag. The variable is L.GF. Re-regression shows a positive effect. Lagged green finance affects digital economy attention. The effect remains significant. The coefficient is 15.17. The p-value is below 0.01. Green finance exerts a forward-looking influence. It affects local government attention. It does not merely respond to existing policy preferences. This finding mitigates endogeneity concerns. It enhances the credibility of causal inference.

Table 6. One-period lag robustness analysis

Variables	(1)
	m9 L.y
GF	15.171*** (2.66)
Constant	0.042*** (4.70)
Observations	279
R-squared	0.938
r2_a	0.929
F	.

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.2.3. Robustness test for model specification

To further validate the reliability of the benchmark regression results, this study conducts robustness tests by altering the regression model specification. Specifically, building upon the original two-way fixed effects model, we introduce annual dummy variables to construct an extended model incorporating provincial fixed effects, year fixed effects, and annual trend controls. This approach

DOI: 10.54254/2754-1169/2026.NJ31779

aims to capture potential unobservable time trend shocks and enhance the robustness of causal inference.

Table X reports the regression results after changing the model specification (sample rows 749 to the end). The estimate indicates that a one-unit increase in the green-finance development index raises the outcome variable by 7.89 points (coefficient = 7.886, $p < 0.01$) , significant at the 10% level ($p=0.051$). Although the significance level slightly decreased, the coefficient direction remains consistent with the main regression results—still positive— indicating that green finance development exerts a sustained and stable positive influence on local governments' attention to the digital economy.

This finding fully demonstrates that the positive impact of green finance on local governments' attention to the digital economy is not driven by time trends but remains valid after controlling for annual shocks, further validating the robustness and consistency of the benchmark regression [12].

Table 7. Robustness analysis of model reconfiguration

Variables	(1)
	m10 y
x	7.886* (1.96)
Constant	0.048*** (4.66)
Observations	310
R-squared	0.942
r2_a	0.932
F	.

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusions and policy recommendations

5.1. Research findings

This study uses a panel of 30 Chinese provinces. The period is from 2014 to 2023. It measures policy salience toward the digital economy. The study counts the term "digital economy" in policy documents. It examines green finance. It tests the effect on policy focus [13,14]. The findings show green finance increases local governments' attention. It demonstrates a "funding-as-signal" effect. The effect is positive in low-income regions. It weakens in highly developed regions. It sometimes reverses there. A clear fiscal resource threshold exists. The transmission is independent. It does not rely on technological innovation. It does not rely on industrial structure pathways. The policy implications are distinct.

5.2. Policy recommendations

Green finance drives local governments' attention to the digital economy. The effect is positive. It is stronger in regions with scarce fiscal resources. Green capital fulfills emission reduction targets. It also serves as an "attention lever." It mobilizes focus on digital issues. It optimizes policy prioritization. A new policy framework is needed. It must center on "green + digital" objectives.

DOI: 10.54254/2754-1169/2026.NJ31779

Green finance will become a composite policy instrument. It delivers environmental performance. It also fosters attention to digitalization issues [15].

To achieve this, central government should create a Green-Digital Synergy Fund offering 1:1 matching to poorer provinces, embed "digital-project share" and "green-digital case count" in performance reviews with interest subsidies for combined outcomes, require a Digital Technology Application List & Data-Sharing Plan (≥ 30 % of bond proceeds to smart grids, green data centres, etc.) when issuing green bonds/loans, add a digital-performance table to bond reports, and have NDRC-MOF-PBOC-MIIT publish an annual Green-Finance Digital-Attention Index that rewards top-performing regions with bonus bond quotas or pilot rights while forcing bottom-ranked ones to submit rectification timetables.

References

[1] Huang, P. (2025). Does green finance enhance local governments' attention to the digital economy? — An analysis based on policy texts. Ecological Economy, 41(1), 106–113.
[2] Jones, E. (2010). A professional practice portfolio for quality learning. Higher Education Quarterly, 64(3), 292–312.
[3] Cao, J., & Zhang, X. (2025). Support effects and countermeasures of green finance on the digital economy. Contemporary Economy, 42(2), 72–82.
[4] Xie, F., & Zhou, M. (2023). Research on the impact of green finance on the green development of the digital economy. Chongqing Social Sciences(7), 35–50.
[5] Ren, B., & He, H. (2022). Digital economy empowering high-quality development: Theoretical logic, path selection and policy orientation. Journal of Finance and Economics(4), 61–75.
[6] Gao, X., & Li, M. (2023). Digital economy empowering green economic development: Mechanism of action, real constraints and path selection. Southwest Finance(2), 31–43.
[7] Lin, M., & Xiao, Y. (2023). Research on the measurement and mechanism of green finance in promoting high-quality economic development. Contemporary Economic Science, 45(3), 101–113.
[8] Wang, X., Li, M., & Hu, S. (2025). Exploring how the digital economy drives green finance development. Cooperative Economy and Sci(11), 57–59.
[9] Su, X., Zheng, W., & Jiang, X. (2025). The impact of green finance on the digital economy: Promotion or inhibition? Empirical evidence from China. Statistics and Management, 40(3), 72–80.
[10] Flammer, C. (2021). Corporate green bonds. Journal of Financial Economics, 142(2), 499–516.
[11] Li, C. (2023). The impact of green finance on high-quality economic development. Journal of Central South University of Finance and Law(2), 65–77.
[12] Wen, H., & Zhao, X. (2015). Government public service attention allocation and the choice of public fiscal resource investment direction—Based on text analysis of government work reports of six central provinces (2007–2012). Soft Science, 29(6), 5–9.
[13] Xinyi, L. (2025). Study on the impact of the digital economy on green total factor productivity in agriculture. Journal of Economics and Management Sciences, 8(5), 54.
[14] Qingxin, L., & Wan, T. (2023). Research on the impact of digital economy on industrial green total factor productivity—analysis based on Chinese provinces. Economic Research-Ekonomska Istraživanja, 36(3).
[15] Dang, Y. (2024). The impact of digital economy on rural revitalization — Based on the perspective of agricultural green total factor productivity. Wuhan University of Technology.