

Original Research Article

## The impact of digital transformation of commercial banks on the development of new quality productive forces

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**Abstract:** Against the backdrop of the global scientific and technological revolution and China's high-quality economic transformation, new quality productive forces have become a core strategic anchor for development, whose cultivation urgently requires efficient empowerment from the financial system. The digital transformation of commercial banks is the core path for digital finance to serve the real economy, yet existing research has paid insufficient attention to its spatial transmission effect and dynamic evolution characteristics. Taking panel data of 29 Chinese provinces from 2011 to 2023 as samples, this paper measures the provincial development index of new quality productive forces and the level of commercial banks' digital transformation, and conducts empirical tests with the dynamic spatial Durbin model. The results show that new quality productive forces have significant path dependence and positive spatial spillover effects. The digital transformation of commercial banks not only significantly drives the development of local new quality productive forces, but also exerts a stronger positive spillover effect on neighboring regions, with distinct temporal heterogeneity. The conclusion remains robust after robustness and endogeneity tests. This study supplements relevant theoretical evidence, and provides support and guidance for policy-making and banking practice.

**Keywords:** new quality productive forces; digital transformation of commercial banks; spatial spillover effect

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### 1. Introduction

While insufficient attention has been paid to the supporting role of the financial supply side, especially the spatial effects and phased characteristics of banks' digital transformation, leaving a clear research gap. Using panel data of 29 Chinese provinces from 2011 to 2023, this paper constructs an evaluation system for new quality productive forces from the dimensions of laborers, labor data, and labor subjects, measured by the entropy method. A provincial-level digital transformation index is synthesized based on the Peking University Commercial Bank Digital Transformation Index. The dynamic spatial Durbin model is employed to examine the impact mechanism and spatial effects of banks' digital transformation on new quality productive forces. Results show that new quality productive forces exhibit significant path dependence and positive spatial spillovers; banks' digital transformation significantly promotes local and neighboring new quality productive forces, with stronger spatial spillovers; the impact shows temporal heterogeneity, with negative inhibition in the early superficial transformation stage and strong positive promotion in the deep integration stage. The conclusions remain robust after robustness tests and endogeneity treatments. Theoretically, this study supplements spatial micro-evidence for the financial drivers of new quality productive forces, reveals cross-regional transmission mechanisms, and corrects the linear perception. Practically, it provides empirical support for local governments to break administrative barriers and promote regional coordination, and for commercial banks to deepen digitalization in core businesses and avoid formalistic transformation. This paper adopts literature review and empirical research methods, proceeding from research background, literature review, research design, empirical analysis to conclusions and policy implications. Main innovations include: precise measurement of provincial bank digital transformation and new quality productive forces; application of the dynamic spatial Durbin model capturing spatial correlation and path dependence; identification of spatial spillovers and temporal heterogeneity. Limitations lie in the use of provincial-level data only, with insufficient analysis of micro mechanisms and regional heterogeneity.

## 2. Literature review

In the cultivation of new quality productive forces, banks, as direct financial factors, play a prominent role. The capital market can empower new quality productive forces through multiple effects, and the digital transformation of banks needs to be accelerated<sup>[1]</sup>; the role of banks at all levels in technological R&D, achievement transformation and factor allocation cannot be ignored<sup>[2]</sup>. Resource mismatch and temporal-spatial shortcomings of the traditional financial system can inhibit enterprise innovation, while the digital transformation of banks can make up for these defects, optimize credit allocation, alleviate financing constraints, which is consistent with the logic of improving new quality productive forces<sup>[3]</sup>. The development of new quality productive forces has regional differences. Digital finance can promote the improvement of regional new quality productive forces, but affected by the digital divide, its promoting effect on cities with weak foundations is relatively weak<sup>[4]</sup>. Digital finance still faces challenges such as difficult financing, high cost and lagging supervision in serving new quality productive forces, which need to be addressed by improving the service system, strengthening policy incentives and optimizing supervision<sup>[5]</sup>.

## 3. Empirical study

### 3.1. Empirical design

This paper takes the balanced panel data of 29 provinces in China from 2011 to 2023 as the research sample. The explained variable is the provincial new quality productive forces development index (NTPF), which is measured by the entropy method based on the three dimensions of laborers, means of labor, and objects of labor. The core explanatory variable is the provincial commercial bank digital transformation level (Dig) synthesized by weighted calculation. Meanwhile, 5 control variables are included: transportation infrastructure, government intervention, social consumption level, environmental regulation, and innovation level. Considering the significant path dependence and spatial spillover characteristics of new quality productive forces, this paper constructs a dynamic spatial Durbin model (SDM) for empirical testing, and adopts the geographical adjacency weight matrix in the benchmark regression.

### 3.2. Spatial correlation test

The core premise for the application of the spatial econometric model is the existence of spatial autocorrelation of variables. This paper tests the spatial distribution characteristics of provincial new quality productive forces from 2011 to 2023 through the Global Moran's I, and the results are shown in **Table 1** During the sample period, the Global Moran's I of new quality productive forces are all significantly positive at the 5% level and above, with the value range of 0.184-0.277, showing a typical spatial distribution pattern of "high-high agglomeration and low-low agglomeration", which verifies the necessity of the spatial econometric model.

**Table 1.** Global moran's I of new quality productive forces (2011-2023).

Year	I-value	Z-value	P-value	Year	I-value	Z-value	P-value
2011	0.238	2.509	0.0121	2018	0.195	2.136	0.0327
2013	0.242	2.519	0.0118	2020	0.204	2.180	0.0292
2016	0.277	2.785	0.0054	2023	0.228	2.371	0.0177

### 3.3. Benchmark regression results

The benchmark regression results of the dynamic spatial Durbin model are shown in **Table 2** The results show that the coefficient of the first-order lag term of the explained variable L.NTPF is significantly positive at the 1% level, confirming the strong path dependence of new quality productive forces. The spatial autoregressive coefficient  $\rho$  is significantly positive at the 1% level, verifying the significant positive spatial spillover effect of inter-provincial new quality productive forces. For the core explanatory variable, the coefficient of local bank digital transformation (Dig) is significantly positive at the 1% level, which has a direct driving effect on local new quality productive forces. The coefficient of its spatial lag term  $W \times Dig$  is also significantly positive at the 1% level, and the value is larger than the local effect coefficient, indicating that the positive spatial spillover effect of bank digital transformation in neighboring provinces on local new quality productive forces is stronger.

Table 2. Benchmark regression results.

Variable	Coefficient	Z-value	Spatial Lag Term	Coefficient	Z-value
L.NTFP	0.953***	85.39	Dig	0.00144***	18.01
Dig	0.000357***	9.39	rho	0.128***	6.75
Control Variables	All significant	-	sigma2_e	0.000297***	14.32

Note: \*\*\*, \*\*, \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively, the same below.

### 3.4. Robustness and heterogeneity tests

This paper conducts robustness tests by excluding the special sample of the 2020 COVID-19 epidemic, replacing the economic-geographical distance weight matrix, and switching to the SAR/static SDM model. The coefficient sign and significance of the core explanatory variable have no substantial changes, and the core conclusion is highly robust. The temporal heterogeneity test adopts grouped regression with 2018 as the dividing point, and the results are shown in Table 3. Before 2018, the coefficient of Dig was significantly negative at the 1% level, and the superficial transformation and resource crowding in the early stage of transformation had a negative inhibitory effect on new quality productive forces. After 2018, the coefficient of Dig was significantly positive at the 1% level, and the transformation turned to a strong positive empowerment effect on new quality productive forces after the in-depth integration of digital technology and core business.

Table 3. Temporal heterogeneity test results.

Variable	Before 2018	After 2018
L.NTFP	2.640***	0.951***
Dig	-0.000553***	0.000807***
rho	1.386***	0.0833**

## 4. Conclusions and suggestions

### 4.1. Research conclusions

Based on panel data of 29 provinces in China from 2011 to 2023, this paper conducts an empirical test with the dynamic spatial Durbin model and draws three core conclusions. First, the development of provincial new quality productive forces in China shows significant path dependence and positive spatial spillover effects. The digital transformation of commercial banks exerts a dual positive driving effect on new quality productive forces: it not only significantly promotes the development of local new quality productive forces, but also generates a stronger cross-regional spatial spillover effect on neighboring provinces. Second, there is distinct temporal heterogeneity in the relationship between the two. In the initial transformation stage before 2018, it presented a negative inhibitory effect on new quality productive forces due to superficial construction and resource crowding; after 2018, when entering the stage of in-depth integration of digital technology and core business, it turned into a strong positive empowerment effect. Third, there is a two-way causal relationship between the digital transformation of commercial banks and the development of new quality productive forces. After addressing endogeneity with the instrumental variable method, the core conclusions remain highly robust, and the benchmark regression underestimates the real empowerment effect of the transformation to a certain extent. The cultivation of new quality productive forces is a systematic project formed by the spatial linkage of multiple factors.

### 4.2. Policy recommendations

Based on the research conclusions, three targeted policy recommendations are put forward. First, promote the in-depth integration of commercial banks' digital transformation into core businesses, avoid formalistic transformation, focus on the digital reconstruction of core links such as credit decision-making and risk pricing, develop exclusive financial products adapted to new quality productive forces, and narrow the gap in transformation capabilities between regions. Second, break down regional administrative barriers to financial services, cancel unreasonable restrictions on cross-regional digital services, fully release the spatial spillover effect of banks' digital transformation, build a cross-regional collaborative financial ecosystem, and form a regional linkage development pattern of "the advanced driving the backward". Third, improve the coordinated supporting policy system. Through policies such as financial discounts, risk compensation and tax

incentives, encourage banks to increase financial support for areas related to new quality productive forces, and simultaneously consolidate the foundation of regional innovation ecology and digital infrastructure, to form a virtuous circle of two-way empowerment between financial digitalization and industrial modernization.

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## **About the author**

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