Financial Efficiency and High-quality Development of Strategic Emerging Industries: An Empirical Study Based on Micro-Enterprise Data

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Abstract: This paper explores the causal relationship between financial efficiency and the high-quality development of strategic emerging industries from the perspective of financial efficiency. Based on data from listed companies in strategic emerging industries across 49 prefecture-level cities in China from 2011 to 2023, this study employs a fixed-effects model to empirically analyze the impact of city-level financial efficiency on the total factor productivity (TFP) of strategic emerging industries. The findings reveal a significant positive correlation between financial efficiency and the high-quality development of strategic emerging industries, indicating that improving regional financial efficiency can significantly enhance the TFP of strategic emerging enterprises. Further heterogeneity analysis shows that financial efficiency has a more pronounced promoting effect on non-state-owned enterprises, industrial enterprises, and enterprises in non-first-tier cities, while its impact on state-owned enterprises, service-oriented enterprises, and enterprises in first-tier cities is relatively weaker. This study provides empirical evidence for optimizing the mechanisms and pathways of financial support for the development of strategic emerging industries, emphasizing the importance of enhancing financial efficiency and deepening financial reforms to promote the high-quality development of strategic emerging industries.

Keywords: Financial Efficiency; Strategic Emerging Industries; Total Factor Productivity; Fixed-Effects Model

1. Introduction

Maintaining reasonable and rapid economic growth is of significant importance for any country or economic system. However, from the perspective of global economic development history, there are not many countries or regions that have been able to achieve rapid economic growth. With the deepening of reform and opening-up and the gradual establishment of a market economy system, emerging industries have continuously emerged. Industries represented by the internet, artificial intelligence, 5G, new energy, and new materials have become a vital force in China's economic development. Strategic emerging industries are crucial for China's economic transformation, upgrading, and high-quality development, and they have achieved remarkable progress in recent years. As a new engine of economic growth, they have played a prominent role in post-pandemic economic recovery[1]. Therefore, studying the relationship between financial efficiency and the high-quality development of strategic emerging industries, and optimizing the mechanisms and pathways of financial support for industrial development, holds significant practical importance.

2. Theoretical Analysis

The academic community has explored the relationship between financial development, R&D investment, and green total factor productivity, revealing the crucial role of financial support in promoting green technological innovation and enhancing production efficiency.

2.1 The Impact of Financial Development on Green Total Factor Productivity

The relationship between financial development and green total factor productivity (TFP) is key to understanding sustainable economic development. Bao[2], through a study on the impact of financial development on green TFP in the western regions of China, revealed the role of financial support in promoting green technological innovation and enhancing production efficiency. Additionally, Zhang [3] utilized the SBM-GML method to measure the green TFP of various provinces and analyzed the influence of financial scale, financial efficiency, and financial structure on it. The study found that developments in financial scale and structure dimensions can promote the growth of green TFP. These studies indicate that financial support, as an important external factor, plays a significant role in fostering green technological innovation and improving production efficiency. Under this sub-topic, the research by Ge et al.[4] also provides an important perspective. Using cross-country panel data from the "Belt and Road" initiative, they analyzed the relationship between financial development and green TFP, finding a negative correlation between the two and highlighting the significant channel effect of innovation heterogeneity. Furthermore, the implementation of technology-finance policies has been proven to significantly enhance firms' total factor productivity, particularly in alleviating financing constraints and improving innovation capabilities [5].

In summary, financial development influences green TFP through various channels, with both promoting effects and potential constraints. Differences in research outcomes may stem from variations in regional economic development stages, industrial structures, innovation capabilities, and the effectiveness of financial policy implementation. Therefore, formulating and implementing financial policies tailored to the specific characteristics of different regions is of great significance for promoting green development and sustainable economic growth.

2.2 The Relationship between Digital Finance and Enterprise Total Factor Productivity

With the rapid development of digital technology, digital finance has become a new engine driving economic growth and enterprise innovation. Peng[6] using a sample of A-share listed companies in China from 2011 to 2020, empirically examined the impact of digital inclusive finance on enterprise total factor productivity (TFP). The study found that digital inclusive finance significantly enhances enterprise TFP, and this effect is long-lasting. On the other hand, the research by Zou and Zhao[7] revealed that TFP did not increase rapidly with GDP growth; instead, it showed a declining trend. However, financial scale, financial efficiency, and government financial intervention were found to have a significantly positive correlation with TFP.

2.3 Financial Efficiency, Industrial Structure Upgrading, and Total Factor Productivity

Financial efficiency is one of the key factors influencing industrial structure upgrading and total factor productivity (TFP). Xu and Jiang[8] using panel data from the Yangtze River Delta region and employing a PVAR model, analyzed the dynamic relationship between financial efficiency, industrial structure upgrading, and TFP. They found that improvements in financial efficiency can promote industrial structure upgrading, thereby enhancing TFP. Additionally, the research by Li and Wang[9] demonstrated that advancements in the financial sector, internet development, and household consumption can significantly and positively impact financial efficiency.

These findings highlight the positive role of financial efficiency in industrial structure upgrading and TFP improvement, emphasizing the importance of enhancing financial service efficiency and optimizing financial structures to drive industrial upgrading. At the same time, they underscore the immense potential of financial innovation, particularly the development of financial technology (FinTech), in optimizing economic structures and improving efficiency. It is evident that enhancing financial efficiency is a crucial pathway for promoting industrial structure upgrading and increasing TFP. Future research could further explore the specific mechanisms for improving financial efficiency and how policy adjustments and

financial innovations can achieve this goal.

The impact of financial efficiency on total factor productivity (TFP) is multifaceted. The supportive effect of financial efficiency on strategic emerging industries, as well as the heterogeneity of this effect, still requires further exploration. However, the influence of financial efficiency on the TFP of strategic emerging industries has not yet received sufficient attention, particularly given the uneven economic development across regions and the significant disparities in local financial services and financing channels. Therefore, this paper investigates the effect of regional financial efficiency on the high-quality development of strategic emerging industries, aiming to expand the scope of research in this field.

3. Research Design

3.1 Sample Selection and Data Sources

The primary data used in this study are derived from the sample space of the China Strategic Emerging Industries Company Development Index, released by the China Securities Index Company and the Shanghai Stock Exchange. It is important to note that this analysis utilizes city-level data based on the locations of these companies. The listed companies are located in 49 prefecture-level cities, which include not only first-tier developed cities or financial hubs such as Beijing, Shanghai, Guangzhou, and Shenzhen but also many other cities. As a result, the geographical coverage is relatively comprehensive, making the data highly representative for research on strategic emerging industries nationwide. The industry categories encompass high-end equipment manufacturing, new energy, high-tech services, information technology, new materials, and other sectors within the industrial sector.

The collection of city-level data is based on the 49 cities where these listed companies are located. The financial environments of these cities exhibit significant differences. To measure city-level financial efficiency, data on city-level financial institutions and financial industry practitioners are collected to calculate the financial efficiency at the prefecture-level. The acquisition of the aforementioned data is achieved through the CSMAR database.

Since the index released by the China Securities Index Company and the Shanghai Stock Exchange uses December 31, 2010, as the base period, the data collected for this study spans from 2011 to 2023. As of now, comprehensive data for 2024 are still unavailable, as most of the financial reports of listed companies have not been publicly disclosed. After preliminary organization and analysis of the data, this study employs an unbalanced panel dataset.

3.2 Variable Definitions

(1) Dependent Variable: The dependent variable is the total factor productivity (TFP) of strategic emerging enterprises. Improving TFP is a driving force or core element of China's high-quality development[10]. Since the concept of high-quality development was introduced, its application has significantly expanded to microeconomic analysis at the enterprise level. TFP has become a key indicator for evaluating the efficiency of resource utilization by enterprises. It not only reveals the growth potential and intrinsic advantages of enterprises but also directly reflects their core competitiveness and overall development quality[11]. The LP method is used to calculate the total factor productivity of enterprises, denoted as te.

(2) Independent Variable: Definition of Financial Efficiency. First, efficiency generally refers to the relationship between inputs and outputs. Financial efficiency, in a broad sense, refers to the relationship between the inputs and outputs of the financial sector. From an analytical perspective, financial efficiency can be categorized into macro financial efficiency, micro financial efficiency, and financial market efficiency. Macro financial efficiency primarily refers to the impact of macro financial policies on the economic system, measured by economic output to evaluate policy efficiency. Micro financial efficiency, on one hand, refers to the efficiency of financial institutions formed through their own capital operations, reflecting the relationship between capital inputs and outputs to the real economy. On the other hand, when measuring the financial efficiency of individual micro enterprises, it mainly refers to the relationship between capital inputs and outputs at the enterprise level, constituting the financial efficiency of

individual micro enterprises. Financial market efficiency, meanwhile, refers to the operational efficiency of capital markets, money markets, and other financial markets.

This study constructs city-level financial efficiency for the sample companies in strategic emerging industries. City-level financial efficiency refers to the efficiency of a city's financial system in serving the real economy, which is primarily determined by the relationship between the financial system's capital input and the local economic output. Since the sample enterprises are located within their respective cities, individual enterprises do not determine the efficiency of the city-level financial system. However, city-level financial efficiency can influence local enterprises. Therefore, using city-level financial efficiency helps mitigate the endogeneity issue between enterprise-level financial efficiency and high-quality development indicators.

Based on the related research by Xu et al.[12], this study employs the Stochastic Frontier Analysis (SFA) model to estimate city-level financial efficiency. According to the research requirements, the financial input variables include city loan balances, deposit balances, and the number of financial industry practitioners, while the output variable is the city's annual GDP. Considering that technical efficiency in panel data is likely to change over time during the statistical period, it is assumed that the inefficiency term varies with both individual enterprises and time. The following time-varying SFA model is constructed:

$$\ln \mathrm{GDP}_{it} = \beta_0 + \sum_{k=1}^{K} \beta_k \ln X_{it} + v_{it} + u_{it}, u_{it} \geq 0 \quad (1)$$

$$\gamma = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_v^2}, 0 \leq \gamma \leq 1 \quad (2)$$

In Model 1, i and t represent the i-th city and the t-th year, respectively. GDP_{it}, as the output variable, denotes the annual gross domestic product (GDP) of each city. X_{it} represents the input variables, which include the loan balance, deposit balance, and the number of financial industry practitioners for each city in each year. To perform the SFA efficiency calculation, the output and input variables are logarithmically transformed. u_{it} is the inefficiency term, which follows a truncated normal distribution and reflects the distance of the enterprise i from the efficiency frontier at time t. Clearly, the closer u_{it} is to 0, the higher the efficiency of the enterprise. v_{it} is the non-systematic error term, $v_{it} \sim N(0, \delta_v^2)$, It reflects errors caused by external random shocks. Model (2) represents the proportion (γ) of the inefficiency term in the composite disturbance term ($\varepsilon_{it} = u_{it} + v_{it}$), which is used to determine the validity of the SFA model. In empirical testing, if $\gamma \to 0$, the random disturbance term v_{it} dominates the composite disturbance term, and the impact of the technical inefficiency term u_{it} on the composite disturbance term is small. If $\gamma \to 1$, it indicates a larger distance between actual output and the efficiency frontier, which is due to the inefficiency term. In this case, using the SFA model is necessary. Following the research by Lian[13], the efficiency calculation adopts the BC95 model:

$$te_{it} = E\{\exp(-u_{it}) | \varepsilon_{it}\} \quad (3)$$

By performing the above process in STATA, the values of the parameters are obtained, where $\gamma = 0.9807$, indicating that the random disturbance term dominates the composite disturbance term. This confirms the necessity of using the stochastic frontier model. Subsequently, the city-level financial efficiency (te) values are calculated using equation (3).

(3) Control Variables: Definitions of relevant control variables. Corporate research and development (R&D) is included as a control variable in the analysis. The R&D indicator is calculated as the intensity of corporate R&D, specifically the ratio of R&D expenditure to operating revenue, denoted as (Rd). Whether a company is state-owned is included as another control variable, denoted as (State), where state-owned enterprises are assigned a value of 1 and non-state-owned enterprises are assigned a value of 0. The return on equity is used as an indicator of corporate growth, denoted as (Roe). Firm size is included as a control variable, with firm size denoted as (Size). Financial leverage, measured as the asset-liability ratio, is denoted as (Dar). Firm age is denoted as (Age). Descriptive statistics for the variables are presented in the table 1.

Table 1. Descriptive Statistics of Financial Efficiency

Variables	Obs	Mean	Std.Dev	Min	Max
TFP	1200	14.85	0.872	10.45	18.3
TE	900	0.915	0.048	0.58	0.97
Rd	950	6.89	6.785	0.02	45.5

Size	1100	17.02	1.15	12.8	21.1
Roe	1080	0.05	0.59	-10.8	1.3
Dar	1120	0.5	0.64	0.03	10.8
Age	1120	2.75	0.38	1.4	3.7
State	1120	0.3	0.46	0	1

3.3 Model Construction

Since the data used in this study consist of panel data from 2011 to 2023, with sample firms drawn from 49 prefecture-level cities across the country, and based on the research needs of this topic as well as referencing related studies by Zhou et al.[14], the following "baseline regression model" is adopted:

$$\mathbf{Hq_{it} = \beta_0 + \beta_1 te_{it} + \delta X_{it} + u_i + \varepsilon_{it}} \quad (4)$$

$\mathbf{Hq_{it}}$ represents the high-quality development indicator of the enterprise, measured by the total factor productivity (TFP) of the enterprise. $\mathbf{te_{it}}$ denotes the financial efficiency of the city where the strategic emerging industry enterprise is located, and financial efficiency is calculated using the aforementioned SFA model. Other symbols remain consistent with the previous text. The regression process applies clustered standard errors (Clustered standard error).

4. Empirical Analysis

4.1 Baseline Regression Results and Analysis

The baseline regression results are presented in the "Financial Efficiency Baseline Regression" table 2. The F-statistic for the individual effects test is 12.50, with a p-value of 0.000, rejecting the null hypothesis that individual effects do not exist, indicating the presence of individual effects. To further determine the form of the individual effects, a Hausman test was conducted. The Hausman test result is 41.22, with a p-value of 0.000, indicating that the fixed effects estimation is superior to the random effects estimation. Therefore, the fixed effects model estimation results should be selected. The R-squared value of 0.62 suggests that the fixed effects model fits well. The estimation results are analyzed below.

Table 2. Baseline Regression Results

Variables	Pooled OLS	FE	RE
te	0.075**	0.165***	0.075
	-1.95	-2.65	-1.1
Size	0.016***	0.014***	0.016***
	-12.5	-6	-7.2
Roe	0.004***	0.003*	0.004*
	-3.2	-1.7	-1.8
Rd	0.008***	0.007***	0.008***
	-9	-2.8	-3.5
Dar	0.048***	0.035	0.048***
	-5.5	-1.6	-2.5
Age	0.029***	0.042***	0.029***
	-5.8	-3.5	-4.1
State	0.002	-0.003	0.002
	-0.5	(-0.400)	-0.3
_cons	2.080***	2.010***	2.080***
	-50	-30	-30.5
year FE		YES	
individual FE		YES	
N	750	750	750
R-squared		0.62	
F(Individual effects)		12.50***	
Hausman test		41.22***	

Note: The values in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

From the results in column (2) of the "Financial Efficiency Baseline Regression Results" table, after controlling for individual characteristics such as firm size (Size), firm age (Age), return on assets (Roe), ownership type (State), R&D intensity (Rd), and asset-liability ratio (Dar), the coefficient of financial efficiency on the high-quality development of strategic emerging industries is 0.075, which is significant at the 5% level. This indicates a significant positive correlation between financial efficiency and the high-quality development of strategic emerging industry enterprises. Based on the estimation results in column (2), a one-unit increase in financial efficiency (te) leads to an average improvement of 0.165% in the high-quality development of strategic emerging industry enterprises.

City-level financial efficiency reflects the efficiency of financial resource allocation and economic output. The aforementioned results indicate that the higher the city-level financial efficiency in which strategic emerging industry enterprises are located, the higher their level of high-quality development. Therefore, it is increasingly important to continuously deepen financial reforms, including capital market and credit market reforms, and to enhance the ability of financial

markets to serve the real economy. Strengthening the market-oriented mechanisms of financial markets and continuously improving the mechanisms and levels of targeted financial support for the development of strategic emerging industries will help provide essential financial conditions and environments for the growth of strategic emerging industries.

4.2 Robustness Tests

Although this study addresses the endogeneity issue between firm-level financial efficiency and firm-level high-quality development indicators, such as total factor productivity (TFP), by focusing on city-level financial efficiency, which effectively mitigates the problem, there remains the possibility that estimation results could be influenced by variable calculation methods, regional financial conditions, and economic development levels, potentially leading to non-robust results. To address this, the following methods are employed for robustness testing. As illustrated in table 3.

4.2.1 Changing the measurement of the dependent variable

To test the reliability of the regression results, this study attempts to change the estimation method of the dependent variable. The two-stage Generalized Method of Moments (GMM) is used to estimate total factor productivity (TFP), as the GMM method offers unique advantages for this purpose. Specifically, the estimation method for high-quality development in strategic emerging industries is switched from the LP method to the GMM method. The high-quality development indicators for strategic emerging industries, estimated using this approach, are then incorporated into the fixed-effects regression model for empirical analysis.

Table 3. Robustness Test Results

Variables	(1)	(2)	(3)
te	2.550***	0.150*	
	-2.65	-1.8	
fine			0.008*
			-1.7
Size	0.140***	0.013***	0.015***
	-3	-5	-6
Age	0.310*	0.031**	0.042***
	-1.7	-2.15	-3.5
Roe	0.067**	0.004	0.004*
	-2	-1.3	-1.8
Rd	0.033	0.013***	0.009***
	-0.6	-2.9	-2.9
Dar	0.26	0.056**	0.038*
	-0.7	-2.1	-1.7
State	-0.22	0.003	-0.002
	(-0.960)	-0.18	(-0.230)
State	-0.23	0.003	-0.002
	(-0.970)	-0.18	(-0.230)
_cons	3.110***	2.040***	2.060***
	-2.8	-26	-26.5
year FE	YES	YES	YES
individual FE	YES	YES	YES
N	750	470	750
R-squared	0.23	0.685	0.63

Note: The values in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

In terms of technical implementation, the following steps are taken: First, calculate:

$$Hq_{GMM_{it}} = \ln(Y) - 0.59 \times \ln(L) - 0.36 \times \ln(K) \quad (5)$$

Then, substitute the calculated high-quality development indicators for strategic emerging industries into the fixed-effects "baseline regression model" to obtain the following equation:

$$Hq_{GMM_{it}} = \beta_0 + \beta_1 te_{it} + \delta X_{it} + u_i + \varepsilon_{it} \quad (6)$$

In the above equation, $Hq_{GMM_{it}}$ represents the high-quality development variable obtained using the GMM estimation method, while the other symbols have the same meanings as in equation (4). The fixed-effects estimation is then applied to this equation. The results, as shown in the "Financial Efficiency Robustness Test Results" table, reveal in column (1) that the coefficient for city-level financial efficiency, when incorporated into the fixed-effects regression model, is 2.55, which is significant at the 1% level. This indicates a significant positive correlation between financial efficiency and the high-quality development of strategic emerging industries, confirming the baseline regression results.

4.2.2 Changing the empirical research sample

Among the samples used in this study, many enterprises are located in key developed cities such as Beijing, Shanghai, Guangzhou, and Shenzhen. These four major cities hold significant influence both in China and globally, and their financial market development levels are unparalleled in China, making them first-tier developed cities. In contrast, numerous strategic emerging

industry enterprises are located in other cities, where both economic development levels and financial market conditions differ significantly from those of the aforementioned four first-tier cities. Therefore, considering these regional differences, this study attempts to exclude listed companies in strategic emerging industries located in Beijing, Shanghai, Guangzhou, and Shenzhen. Regression analysis is then conducted on the remaining listed companies in strategic emerging industries distributed across other cities. The regression results are shown in column (2) of the "Financial Efficiency Robustness Test Results" table. It is evident from the table that, after excluding the sample enterprises from the four first-tier cities, the regression value of financial efficiency for the remaining sample enterprises in other cities is 0.15, which passes the significance test at the 10% level. This result significantly confirms the reliability of the baseline regression results.

4.2.3 Replacing the measurement of the core independent variable

Existing research in this field indicates that the selection of indicators to measure financial efficiency is diverse. The definition of financial efficiency indicators is divided into different levels and dimensions, including macro, micro, and regional dimensions. To address potential biases in the calculation of financial efficiency in this study, the core independent variable, city-level financial efficiency, is replaced. Drawing on the research of Xu et al.[15] and Zhang et al.[16], this study considers using the ratio of financial institution loan balances to deposit balances for the year as the city's financial efficiency, denoted as fine. This financial efficiency (fine) is then incorporated as the core explanatory variable into the fixed-effects "baseline regression model" for empirical analysis, resulting in the following model after replacing the core independent variable:

$$Hq_{it} = \beta_0 + \beta_1 fine_{it} + \delta X_{it} + u_i + \varepsilon_{it} \quad (7)$$

The symbols in the above equation are defined as in the previous text. The regression results are shown in column (3) of the "Financial Efficiency Robustness Test Results" table. The regression coefficient for city-level financial efficiency, based on the ratio of loan balances to deposit balances at the city level, is 0.008, which is significant at the 10% level. This indicates that, after replacing the core explanatory variable and using the new statistical approach, city-level financial efficiency still exhibits a significant positive correlation with the high-quality development of strategic emerging industries. This further confirms the baseline regression results.

4.3 Heterogeneity Analysis

The regression results of the heterogeneity analysis are presented in Table 4.

4.3.1 Heterogeneity analysis by ownership type

The following discusses the heterogeneity of the impact of financial efficiency on the high-quality development of strategic emerging industries based on ownership type. According to the ownership records in the CSMAR database, enterprises are categorized as state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs). This study examines the effects of financial efficiency on the high-quality development of both SOEs and non-SOEs. In column (1) of the "Heterogeneous Effects of Financial Efficiency on High-Quality Development Results" table, it can be seen that the coefficient of financial efficiency on the high-quality development of SOEs is 0.1201, but it does not pass the significance test. In column (2) of the same table, the coefficient of financial efficiency on the high-quality development of non-SOEs is 0.1901, which is significant at the 5% level. This indicates that, for non-SOEs, financial efficiency has a significant positive correlation with their high-quality development level. Financial efficiency has different impacts on the high-quality development of SOEs and non-SOEs. The level of financial efficiency in a city has a limited impact on SOEs. However, for non-SOEs, due to their relatively weaker position in the financial market compared to SOEs, an improvement in city-level financial efficiency can provide more favorable financing conditions for non-SOEs. Therefore, the higher the financial efficiency, the higher the high-quality development level of non-SOEs.

4.3.2 Heterogeneity analysis by industry

The following discusses the heterogeneity of the impact of financial efficiency on the high-quality development of strategic emerging industries based on industry type. By analyzing the industry categories of listed

companies in strategic emerging industries recorded in the database, the industry classifications of these companies were organized and examined. It was found that strategic emerging industries can be broadly divided into two major categories: industrial enterprises primarily focused on manufacturing and service-oriented enterprises primarily focused on high-end services. Therefore, the sample data is divided into two industry categories: industrial-type enterprises and service-type enterprises. By regressing financial efficiency against high-quality development levels for these two industry categories, it is evident that financial efficiency has varying effects on the high-quality development of strategic emerging industries. Specifically, in columns (3) and (4) of the "Heterogeneous Effects of Financial Efficiency on High-Quality Development Results" table.

In column (3), the coefficient of city-level financial efficiency on the high-quality development of strategic emerging industries is 0.1411, which is significant at the 5% level, indicating a significant positive correlation between city-level financial efficiency and the high-quality development of strategic emerging industries. However, in column (4), the effect of city-level financial efficiency on the service sector within strategic emerging industries does not pass the significance test. This suggests that city-level financial efficiency has a more pronounced and differentiated impact on the high-quality development of strategic emerging industries across different industry categories. For industrial manufacturing enterprises, city-level financial efficiency is directly related to their financing capabilities. In other words, the impact of city-level financial efficiency on the high-quality development of industrial enterprises is greater than that on service-oriented enterprises.

Table 4. Heterogeneous Regression Results of Financial Efficiency on High-Quality Development

Variables	(1)	(2)	(3)	(4)	(5)	(6)
te	0.1201	0.1901**	0.1411**	0.013	-0.004	0.1496*
	-1.18	-2.55	-2.04	-0.06	(-0.020)	-1.78
Age	0.024*	0.046***	0.036***	0.056**	0.055***	0.032**
	-1.81	-3.3	-2.9	-2.72	-3.14	-2.06
Roe	0.004***	0.003	0.005	0.003*	0.003	0.004
	-3.69	-1.1	-1.07	-1.87	-1.1	-1.31
Rd	0.012**	0.009***	0.008**	0.013**	0.006	0.012***
	-2.7	-2.64	-2.45	-2.04	-1.67	-2.76
Dar	0.102***	0.04	0.005	0.079**	0.014	0.055*
	-4.18	-1.62	-0.2	-2.12	-0.43	-1.97
Size	0.015***	0.014***	0.018***	0.010***	0.015***	0.014***
	-4.75	-5.46	-6.05	-2.77	-3.49	-5.36
State			-0.01	-0.002	0.009*	-0.012
			(-0.790)	(-0.100)	(0.710)	(-0.98)
_cons	2.063***	2.013***	2.056***	2.130***	2.221***	2.025***
	-18.08	-26.6	-30.87	-12.66	-12.13	-25.23
year FE	YES	YES	YES	YES	YES	YES
individual FE	YES	YES	YES	YES	YES	YES
N	177	575	499	253	304	448
R-squared	0.748	0.624	0.64	0.683	0.564	0.683
F	32.119	44.589	41.338	20.284	24.818	40.494

Note: The values in parentheses are t-statistics. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

4.3.3 Heterogeneity analysis by region

From the perspective of the geographical distribution of the sample enterprises, although they are spread across more than 40 cities nationwide, cities that serve as important regional or even global financial centers have distinct advantages in terms of financing conditions for strategic emerging industry enterprises, local economic development levels, and their connectivity to international

financial markets compared to other cities. First, there are core cities, including Beijing, Shanghai, Guangzhou, and Shenzhen, which are regional financial centers. Strategic emerging industry enterprises located in these core cities are categorized as the first-tier city group, while enterprises in other cities are categorized as the non-first-tier city group. The financial efficiency levels of the cities where these two groups of strategic emerging industries are located are then regressed against their high-quality development. The specific regression results are shown in columns (5) and (6) of the "Heterogeneous Effects of Financial Efficiency on High-Quality Development Results" table. From column (5), it can be observed that the regression results of city-level financial efficiency on the high-quality development of strategic emerging industries in first-tier cities are not significant. However, from column (6), it is evident that the coefficient of city-level financial efficiency on the high-quality development of strategic emerging industries in non-first-tier city groups is 0.1496, which is significant at the 10% level. This indicates that, although first-tier cities possess unique financing conditions and financial market environments, their city-level financial efficiency does not have a significant impact on the high-quality development of strategic emerging industries. In contrast, for strategic emerging industry enterprises located in non-first-tier cities, local financial efficiency has a significant impact on their high-quality development. In other words, these enterprises rely more heavily on local financial efficiency levels for financing.

Through the above analysis, it is evident that city-level financial efficiency has heterogeneous effects on the high-quality development of strategic emerging industries. This differential impact exists due to variations in the ownership structure, industry category, and geographical location of the enterprises.

5. Research Conclusions

This study, based on a fixed-effects model and using firm-level microdata from strategic emerging industries, empirically examines the role of financial support in promoting the high-quality development of these industries. The findings reveal that: first, there is no significant relationship between financial efficiency and the high-quality development of strategic emerging industries in first-tier cities. Second, in inland regions, local financial efficiency significantly supports the high-quality development of strategic emerging industry enterprises. Third, financial efficiency has no significant effect on the development of state-owned strategic emerging enterprises but significantly promotes the development of non-state-owned enterprises in these industries. Fourth, for strategic emerging enterprises in the industrial sector, financial efficiency significantly enhances their high-quality development, whereas for service-oriented strategic emerging enterprises, there is no significant causal relationship between financial efficiency and high-quality development. To promote the high-quality development of strategic emerging industries, it is crucial to continuously improve the policy-based financial support system. The government can support this goal through various measures, such as tax incentives, government-guided funds, and the improvement of credit guarantee systems.

References

[1] Li, W. J., Guo, J. (2022). The development of China's strategic emerging industries: Achievements, challenges, and responses. Economic Review, (8), 65–75.

[2] Bao, W. Y. (2024). Research on the impact of financial development on green total factor productivity in western China. Financial Literature Tribune, (11), 7–9.

[3] Zhang, Y. Y., Xing, T. C., Chen, G. Y. (2022). Pathways of financial development affecting green total factor productivity: Efficiency channels and technology channels. Financial Forum, (06), 16–24+54.

[4] Ge, P. F., Huang, X. L., Xu, Z. Y. (2018). Financial development, innovation heterogeneity, and green total factor productivity improvement: Empirical evidence from the "Belt and Road" initiative. Finance and Economics Science, (01), 1–14.

[5] Yang, C. (2023). Science and technology finance policies and enterprise total factor productivity [Master's thesis, Guizhou University of Finance and Economics].

[6] Peng, L. L. (2022). An empirical study on the impact of digital inclusive finance on enterprise total factor productivity [Master's thesis, Dongbei University of Finance and Economics].

[7] Zou, X. Y., Zhao, J. (2013). The relationship between total factor productivity and financial development: Evidence from Guangdong Province. Journal of Financial Economics Research, (02), 77–85.

[8] Xu, J. J., Jiang, L. P. (2022). Research on the relationship between financial efficiency, industrial structure upgrading, and total factor productivity in the Yangtze River Delta. Journal of Baoding University, (04), 30–36.

[9] Li, W., Wang, C. F. (2019). Analysis of regional financial efficiency and influencing factors in China: A two-dimensional perspective from supply and demand sides. Journal of Commercial Economics Research, (03), 159–162.

[10] Zhao, X. C., Wang, Y. (2022). Research on financial support for strategic emerging industries: Empirical evidence from ChiNext-listed companies. Journal of Technical Economics and Management Research, (09), 83–88.

[11] Xu, Z. Y., Liu, S. Y., Liu, X. M., et al. (2024). The impact of corporate financialization on high-quality enterprise development: Perspectives from capital structure and maturity mismatch. Accounting Communications, (16), 58–62.

[12] Xu, J., Pan, J. Y. (2019). Transportation infrastructure and economic growth: Spatiotemporal differences and mechanisms—A study based on a two-way fixed-effects model. Inquiry into Economic Issues, (12), 29–42.

[13] Lian, Y. J. (2018). Stochastic frontier models: Progress and Stata applications. Journal of Zhengzhou University of Aeronautics, 36(01), 97–112.

[14] Zhou, X. R., Zhang, Y. (2021). International transport corridors and China's import-export growth: Evidence from the China-Europe Railway Express. Management World, (04), 52–63+102.

[15] Xu, Y. Z., Tong, H. Y. (2019). Financial inclusion, capital efficiency, and high-quality economic development. Macro Quality Research, (02), 114–130.

[16] Zhang, Y. P., Zhao, J., & Ye, D. (2019). The basic experience and trend analysis of income distribution system reform in the 70 years of new China. Reform, (12), 115–123

