

A Study on the Intrinsic Mechanism of the Impact of Technology Finance on High Quality Economic Development

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Abstract. This paper investigates the effects of modern technology finance (TF) on sustainable and high quality economic development. It proposes an index system for modern science and TF and economic growth with social progress and constructs a financial resource allocation output-input index. By analyzing these indicators and applying relevant models, the research shows that an improvement in the development level of modern science and technology finance significantly impacts high-quality economic development positively. Through empirical analysis, the research finds that modern TF has significant positive effects on economic development quality. The development of modern TF enhances the efficiency of financial resource allocation and influences economic development quality. Therefore, there exists a path of "accelerated development of modern TF > continuous improvement of financial resource allocation efficiency > sustainable and high quality economic development."

Keywords: Development of TF; economic quality development; intermediary effect.

1. Introduction

At present, China's economic strength and international influence have entered a new period, marked by a significant increase in comprehensive national power. The search for ways to improve the efficiency of financial services has become an important approach to continuing to improve the country's overall level. The integration of science and technology with finance has made people more aware that the further development of modern science and technology in finance has an impact on the economy far beyond that of a single factor of production.[1] Furthermore, the further development of TF is conducive to the technological innovation of financial institutions. In economic practice, provinces with a high level of financial resource allocation are usually able to attract a large amount of capital. Sufficient funds or capital can escort the rapid development of finance, which is conducive to the innovation and technological change of technological achievements related to financial technology. Thus, promoting the development of the economy in the direction of high-quality, sustainable development.

2. Analysis of influence mechanism and construction of index system of econometric model

2.1 Analysis of the mechanisms affecting the quality of development of the economy

The development of modern TF builds a service platform for financial institutions through technological innovation. This improves the service model of financial institutions and provides financial services such as financing support for science and technology-based enterprises. By utilizing the liquidity of capital, it promotes the flow of funds from low-quality projects to high-quality ones, optimizes capital institutions, improves the efficiency of financial resource utilization, ensures the effective introduction of resources into scientific and technological research and development activities, and obtains output income through the practical transformation of scientific and technological achievements. This helps achieve the goal of improving the allocation efficiency of financial resources.[2][3]

In summary, the development of modern TF in financial institutions aims to provide financial services such as financing support, improve the liquidity of capital, optimize the resource allocation

structure, and increase actual output. The efficiency of financial resource allocation is measured by the input and output of financial institutions and the financial industry. Therefore, this paper believes that the development of modern science and technology finance has a positive effect on the allocation efficiency of financial resources.

The allocation of financial resources often reflects the current situation of enterprises or institutions at the financing level and whether funds are effectively channeled to the real economy by the scale of their resource allocation. Expanding the scale of financial resource allocation requires attention to efficiency, and improving financial resource allocation efficiency can help science and technology enterprises alleviate financing difficulties and reduce financing costs, thereby promoting the transformation of their scientific and technological achievements into productive assets for economic development.[4] This also provides impetus for innovative development and advances high-quality economic development through technological progress. Therefore, improving the efficiency of financial resource allocation and maximizing the optimal allocation of financial resources are indispensable sources of power for economic development.

It is evident that the continuous development of modern TF plays a crucial role in improving the allocation efficiency of financial resources, ultimately leading to the development of the economy towards a path of high-quality development. The specific impact mechanism is illustrated in Figure 1.

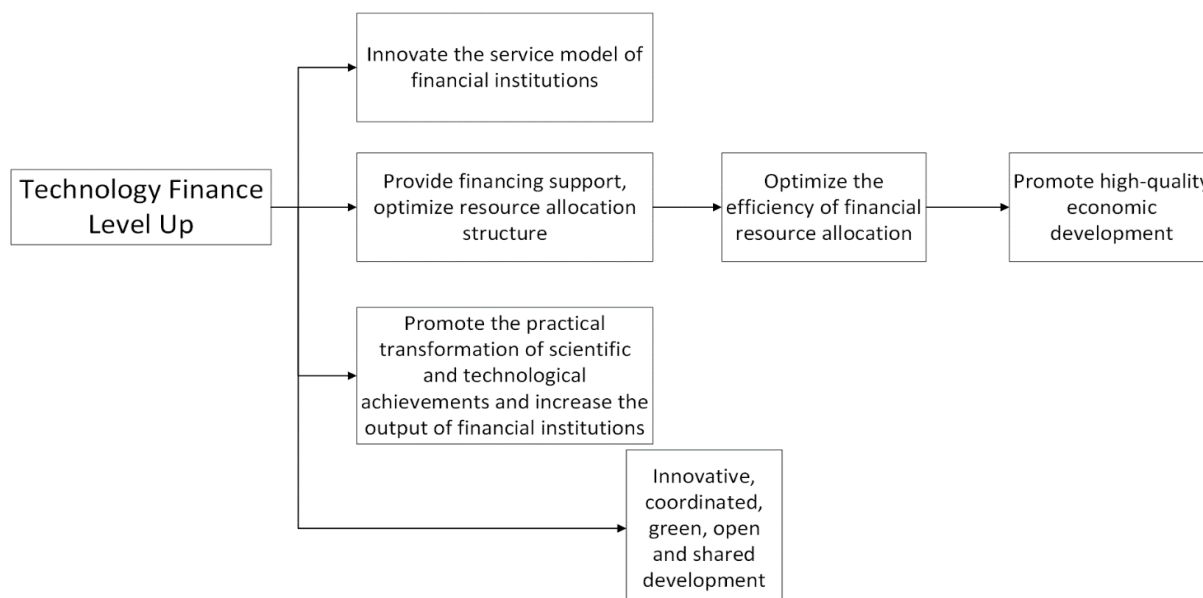


Fig 1. Influence mechanism

2.2 Econometric model setting

This paper set up an econometric model for empirical study, and the specific model formula is shown in Equation (1).

$$y_{it} = \alpha_0 + \alpha_1 tf_{it} + \alpha_2 \mu_{it} + \pi_{it} \quad (1)$$

In order to accurately verify the existence of modern TF to continue to develop, thus improving the allocation efficiency of financial resources, and finally realize the path of economic development to achieve high-quality development. In this paper, we designed a correlation model for mediating effect analysis, as shown in equation (2)(3)(4)

$$y_{it} = \beta_0 + \beta_1 tf_{it} + \beta_2 \mu_{it} + \pi_{it} \quad (2)$$

$$era_{it} = \gamma_0 + \gamma_1 tf_{it} + \gamma_2 \mu_{it} + \pi_{it} \quad (3)$$

$$y_{it} = \delta_0 + \delta_1 tf_{it} + \delta_2 era_{it} + \delta_3 \mu_{it} + \pi_{it} \quad (4)$$

2.3 The construction of modern technology finance development index system and related data description

This paper believes that the core of the TF is to solve the financing problem of technology-based enterprises,[5] so this paper divides the development of modern TF into three dimensions from the perspective of financing subjects: the development environment of modern TF, the development of public modern TF and the development of market modern TF and uses them to measure the development level of modern science and technology finance. The TF specific index system is shown in Table 1.

Table 1. Technology Finance Indicator System

First indicator	Second indicators	Third indicators	Indicator Description
Technology Finance	Technology Finance Environment	R&D personnel (+)	Full-time equivalent of R&D participants
	Public Technology Finance	R&D funding strength (+) Government funding strength (+)	R&D investment intensity Government funding in R&D internal expenditure
	Market Technology Finance	Enterprise funding strength (+)	Enterprise funds in R&D expenditure

In this paper, the study of the allocation efficiency of financial resources and related fields serves as the foundation for analysis. Input indicators such as the premium income of financial institutions, the number of employees in the financial industry, and total loans of financial institutions were used. Control variables selected for this paper encompass urbanization rate (urban), openness to the outside world (open), human capital level (edu), infrastructure (foun), and industrial structure (struc). The study focused on the 30 provinces from 2011 to 2019. Table 2 presents the descriptive statistics for these variables.[6]

Table 2. Basic statistical characteristics of the main variables

Variables	Mean Value	Standard deviation	Min value	Max value
y	0.2947369	0.1060631	0.1143093	0.7829068
tf	0.1871085	0.1912842	0.0000559	0.7265258
era	0.6094727	0.1719148	0.3405987	1
urban	0.5763462	0.1217674	0.3496685	0.8960663
open	0.0608053	0.0431427	0.0004292	0.2290211
edu	9.171803	0.8926757	7.473942	12.782
foun	916.0459	766.1507	41.6	3801.64
struc	1.291721	0.7120781	.527051	5.23404

3. Interpretation and analysis of the empirical results of the model analysis

3.1 Analysis of the overall effect of intrinsic influences

To comprehensively understand the impact of the development of modern science and technology finance on high-quality economic development, this paper constructed an index system for economic development and the development of modern TF. Based on the fixed-effects model and reference to relevant findings and laws, the impact of the development of modern TF on the quality of economic development was tested. The specific intrinsic factors of the overall effect analysis and empirical results are presented in Table 3.[7]

Table 3. Baseline regression analysis

Variables	y1	y2	y3
L.y			0.710*** (0.0504)
tf	0.388*** (0.111)	0.265*** (0.0573)	0.0898*** (0.0245)
urban		0.136 (0.0821)	0.0179 (0.0356)
open		0.364** (0.156)	0.139*** (0.0437)
edu		0.0283** (0.0123)	0.0109** (0.00461)
lnfoun		-0.0248** (0.00933)	-0.0111** (0.00433)
struc		0.0201** (0.0105)	-0.00322 (0.00384)
Constant	0.222*** (0.0161)	0.0197 (0.0980)	0.0220 (0.0409)
Observations	270	270	240
R-squared	0.489	0.755	0.868

Based on the data in the first column of the table, it can be observed that the effect of the development of modern TF on the improvement of the quality of economic development is significant even without any control variables, with a coefficient of 0.388. This indicates that a 1% increase in the growth of the development of modern TF leads to a 0.388% increase in the level of sustainable and high-level quality economic development. The data in the second column demonstrates that there is a positive correlation between the development of modern TF and the improvement of the high-level quality of economic development. This correlation may be attributed to the effective integration of the development of modern TF that can alleviate corporate financing constraints and facilitate access to innovation funds.[8] Additionally, the financial services platform built by the development of modern science and technology finance can also provide an excellent resource allocation environment for financial activities.

3.2 Analysis of the mediating effect of science and technology finance-financial resource allocation-quality economic development

To test the possibility of the path of continuous development of modern TF leading to improved allocation efficiency of financial resources and ultimately achieving high-level quality economic development, this paper constructed a mediation model with financial resource allocation as the mediating variables. The empirical results of the specific mediation effect regression analysis are presented in Table 4.

Table 4. Baseline regression analysis

Variables	1.y	2.era	3.y
tf	0.365*** (0.0880)	0.663*** (0.113)	0.319*** (0.0890)
era			0.0729** (0.0317)
urban	0.0754 (0.0611)	0.0295 (0.143)	0.0676 (0.0564)
open	0.111 (0.121)	-0.225 (0.243)	0.126 (0.116)
edu	0.0279** (0.0110)	-0.0316 (0.0261)	0.0297*** (0.0107)
Infoun	-0.0362*** (0.00657)	-0.0587*** (0.0173)	-0.0317*** (0.00665)
struc	-0.00244 (0.00963)	0.0418* (0.0244)	-0.00539 (0.00888)
Constant	0.158* (0.0897)	1.096*** (0.181)	0.0844 (0.0929)
Observations	270	270	270
Numberofid	30	30	30

Using the control variable method, this paper employed a three-step regression method to test the existence of an intermediary effect. The analysis of the regression coefficients of high-level and sustainable quality economic development indicates that the development of modern TF has a significantly positive impact on improving the efficiency of financial resource allocation. This finding suggests that the enhancement of the development level of modern TF can create a favorable market environment for the development of financial institutions by mitigating the adverse phenomenon of information asymmetry. According to the rules of intermediary effect, a partial intermediary effect is observed, meaning that the development of modern science and technology finance improves the allocation efficiency of financial resources, which, in turn, further promotes the development of economic development towards the path of high-level quality development.

4. Conclusion

In this paper, the entropy value method was utilized to measure the level of development of modern TF and the economic development in different regions. The impact of the development of modern TF on high-level and sustainable quality economic development was examined, and it was concluded that the development of modern TF significantly contributes to development. Furthermore, there were observed regional differences in the impact of the development of TF on the economy. According to the mediating effect model, the development of modern TF can positively influence the quality of economic development by improving the efficiency of financial resource allocation. Additionally, the enhancement of the development level of modern science and technology finance can facilitate the effective development of financial institutions, which in turn, is conducive to the optimal allocation of resources and improvement of the allocation efficiency of various resources.

References

- [1] Zhao Changwen, Chen Chunfa, Tang Yingkai. Science and technology finance [M]. Beijing: Science Press, 2009.
- [2] Li Xindan, Shuang Langen. Science and Technology Finance - Theory and Practice [M]. Nanjing University Press, 2013.

- [3] Mao Dawei, Mao Youjia. The logic of science and technology finance [M]. China Finance Press, 2015.
- [4] Zhang Zixuan, Zhao Liping. Analysis of the threshold effect of science and technology finance development, technology innovation level and economic growth in each province - based on inter-provincial panel data from 2000-2015 [J]. Science and Technology Management Research, 2018, 38(05): 93-98.
- [5] Han Junhua, Han He Yang, Zhou Quan. Economic growth effect, operation mode and risk management path of science and technology financial innovation [J]. Science Management Research, 2018, 36(03): 102-105.
- [6] Zhang Teng, Liu Yang. The impact of science and technology finance on the quality of economic growth-an empirical study based on spatial econometric model [J]. Wuhan Finance, 2019, No.229(01): 25-31.
- [7] Lu Xiaodong. Does financial resource mismatch hinder China's economic growth [J]. Financial Studies. 2008, (4),55-68.
- [8] Zhao Qiang. An empirical analysis of the impact of financial resource allocation distortion on total factor productivity [J]. Henan social science, 2017(12).