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The Impact of Science and Technology Finance on Investment Efficiency of Sci-Tech Enterprises

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Introduction

This research mainly reflects spirit of 20th National Congress of the Communist Party in China, which includes continuing to deepen reforms in an all-round way, further release economic vitality, vigorously implement innovation, accelerate enterprises' transformation and upgrading, and empower enterprises with science and technology finance to replace traditional financial tools. The key problem facing science and technology enterprises today is how to effectively utilize scientific and technological financial innovation to expand their scales efficiently. Therefore, this paper tries to test whether science and technology finance innovation improves enterprises' investment efficiency. A suitable and effective science and technology index system structure is built, and the empirical tests among under and over-investment high-tech innovation enterprises (HTIEs) are carried out. Our results show positive influence on HTIEs' investment efficiency at a statistically significant level for both under and over-investment HTIEs.

Research Questions

Q1: Does science and technology finance improve over-investment HTIEs' investment efficiency?
Q2: Does science and technology finance improve under-investment HTIEs' investment efficiency?

Methodologies

- For science and technology finance index, four first-level and ten second-level indicators are selected for 31 provinces in China. Arithmetic average method is then applied for the weights.
- As of investment efficiency, Richardson (2006)'s model is adopted, using residual method.
- Finally, the fixed-effect model is employed to test the impact of science and technology finance on investment efficiency.

Mathematical Formulas

- The distribution formula of the science and technology financial index is between 0-100:

$$\text{No. } i \text{ Metric Score} = \frac{Xi - X\min}{X\max - X\min} * 100 \quad (1)$$

For other non-base period indicators calculation, use the following formula:

$$\text{No. } i \text{ Metric Score in } t \text{ (year)} = \frac{Xi(t) - X\min(0)}{X\max(0) - X\min(0)} * 100 \quad (2)$$

- Model:

$$IE = \alpha_0 + \alpha_1 TF_{it} + \alpha_2 Control_{it} + \varepsilon_{it} \quad (3)$$

Main Results

	(1) Overinv	(2) Underinv
TF	0.002***	0.001***
	(6.843)	(3.546)
IN	0.766***	0.851***
	(75.589)	(96.891)
OPE	0.226***	0.235***
	(7.718)	(9.773)
Q	0.069***	0.072***
	(11.952)	(17.221)
SIZE	–0.096***	–0.083***
	(–15.581)	(–14.477)
LEV	–0.841***	–0.884***
	(–34.356)	(–37.969)
_cons	–7.281***	–9.005***
	(–57.199)	(–83.930)
N	3,089	3,605
R^2	0.747	0.808

***p < 0.01, **p < 0.05, *p < 0.10

Conclusion

From 2012 to 2022 data, Beijing's development level of science and technology finance is in the leading position all over China, and from the average level of science and technology finance development for each year, the development level shows different trends. The early stage shows an obviously increasing trend, while this speed has slowed down significantly later on. However, enterprises started to rebound and upgrade, and the development level has accelerated soon after.

The 3,605 under-investment HTIEs in China show stronger effect than those 3,089 over-investment HTIEs. These results indicate that science and technology HTIEs, as the main force in China's transformation into an innovative country, should be paid more emphasis on. Rational attention should be paid to the impact of science and technology finance on the development of HTIEs. The impact of the development level of science and technology finance on investment efficiency for HTIEs should be determined based on the situation. For enterprises with excessive investment, science and technology finance can significantly exacerbate the enterprises' over-investment to a certain extent. For enterprises with under-investment, science and technology finance can significantly alleviate the burden of the lack of investment to some degree. Overall, these results indicate that the development level of science and technology finance in China shows a significant positive impact on the enterprises' investment efficiency.