

# Whether technology endowment can reduce insurance companies' green credit risk

## -- Based on empirical analysis of the new construction industry

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**Abstract.** This paper explores the impact of technology endowment on insurers' green credit risk in the new construction industry through empirical analysis. Studies have shown that by introducing green building performance insurance, insurance companies are able to effectively reduce the risk of green credit. Overall, the endowment of science and technology in the new construction industry has a significant effect on the reduction of green credit risk of insurance companies. Through the introduction of green insurance mechanism and technology, insurance companies are able to achieve high-quality development in the field of green finance, while contributing to the goal of carbon neutrality.

**Keywords:** technology endowment, green credit, insurance companies, risk management, construction industry.

## 1. Introduction

In the construction sector, which is a major area of energy consumption and carbon emissions, the introduction of technology endowments is seen as a key factor in reducing green credit risk. Science and technology endowments, the capacity and resources of enterprises in scientific and technological innovation, can play an important role in green credit by improving production efficiency [1], reducing environmental impact, and enhancing the adaptability and competitiveness of enterprises. Therefore, this study aims to explore the role of science and technology endowment in reducing green credit risks of insurance companies through empirical analysis, and provide new perspectives and insights for academic research and practical application in related fields.

## 2. Research Background

### 2.1 Rise of green credit

In recent years, with the proposal of the "double carbon" goal and the continuous improvement of the green finance system, the scale of China's green credit market has expanded year by year. From the growth point of view, from 2013 to 2020, the growth rate of green credit balance remained at about 10%-20%, and since the "double carbon" goal was proposed, the growth rate has significantly increased to more than 30%. By the second quarter of 2024, the balance of green loans has increased to 34.76 trillion yuan, accounting for 13.61% of the total loan balance [2].

Here are some data on Chinese credit in recent years, as shown in Table 1 below:

Table 1: China credit data

particular year	Outstanding green credit (trillion yuan)	Proportion of total loan balance (%)
2013	4.9	7.1

2018	8.23	5.81
2023	30.1	12.7
2024Q2	34.76	13.61

## 2.2 Sustainable development needs of the construction industry

With the acceleration of urbanization and population growth, the impact of the construction industry on the environment is increasingly significant, including energy consumption, carbon emissions, resource waste and environmental pollution. Therefore, promoting the sustainable development of the construction industry is not only the key to realizing the construction of ecological civilization, but also an important way to cope with the challenges of climate change and resource shortage.

## 3. Empirical Research

### 3.1 Hypothesis Proposal

Compared with commercial banks, the investment and loan business of insurance companies is more inclined to long-term, low-liquidity assets, and pay attention to asset-liability matching and long-term returns. Therefore, this paper proposes the following hypothesis:

H1: Science and technology endowment has a significant positive relationship with corporate income, and technology-intensive enterprises are more able to meet the return on investment of insurance companies.

### 3.2 Analysis of data sources and variables

#### 3.2.1 Data sources

The data in this paper comes from the financial report data of 182 listed companies in the new materials section of the Shanghai Stock Exchange, which includes the operating income, operating cost, net profit, current assets, non-current assets, income tax amount of 182 enterprises in 2023, and the operating income and operating cost of the sample in 2022[3].

#### 3.2.2 Data processing, definition and interpretation of variables

Due to the different sizes of the sample enterprises, this paper adopts the indicator of profit rate to replace net profit, that is, the real value is replaced by percentage as the explained variable, and the explained variable is a continuous variable with the interval from 0 to 1.

Variable definitions and explanations are shown in the following table:

Table 2. Definition and handling of major variables

variable name	variable being explained	Variable properties and coding
p	Profit rate of enterprise	continuous variable
tech	Proportion of non-current assets	continuous variable
dummy_scale	Whether the firm generates economies of scale	1= Generate economies of scale
		0= no economies of scale
dummy_tr	Whether companies receive tax subsidies	1= Receiving government subsidies
		0= No government subsidy received

### 3.3 Modeling and interpretation

The Beta model can better explain the ratio change relationship between 0 to 1, which is more

suitable for the data in this paper, so Beta regression is adopted. The link function for establishing regression is:

$$g(p) = \ln \left( \frac{p}{1-p} \right)$$

Build Beta regression model:

$$\ln \left( \frac{p}{1-p} \right) = \beta_0 + \beta_1 \text{tech} + \beta_2 \text{dummy\_scale} + \beta_3 \text{dummy\_tr}$$

### 3.4 Empirical results and corresponding analysis

Corresponding regression results are shown in the following table:

Table 3. regression result

VARIABLES	(1)	(2)
	p	scale
tech	0.118**	
	(0.387)	
dummy_scale	-0.279**	
	(0.124)	
dummy_tr	0.779***	
	(0.270)	
Constant	-2.497***	2.157***
	(0.327)	(0.109)
Observations	182	182
Standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

As can be seen from the regression results, the regression result of the core explanatory variable is significant with a coefficient of 0.118, which indicates that on average, when the ratio of non-current assets increases by 1%, logit(p) will increase by 0.118. The results show that the ratio of non-current assets has a significant positive effect on the profit rate of enterprises.

The results show that in the field of new materials, economies of scale will have a negative impact on the income of enterprises, while the government's preferential tax policies for enterprises will have a significant positive impact on the income of enterprises[4].

## 4. Conclusions and Suggestions

According to the regression results, the proportion of fixed costs and the government's tax subsidy policy will have a positive impact on the return rate of the new construction industry, while the size of the enterprise will have a significant negative impact on the return rate. Technology-intensive enterprises have higher returns, and economies of scale produce diminishing marginal returns[5].

According to the conclusion, this paper puts forward the following suggestions for the green credit business of insurance companies: develop targeted loan products and establish a credit evaluation system, actively cooperate with the government to obtain policy support, establish community support network, and build a risk-sharing mechanism[6].

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