RESEARCH ON THE IMPACT OF GREEN FINANCE ON GREEN TECHNOLOGY INNOVATION

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The green technology innovation of enterprises cannot succeed without the support of capital. Financing constraints are the bottleneck of green technology innovation activities carried out by enterprises. In this regard, the government has adopted green finance-related policies, and the financial institutions have supported more efficient green technology innovation in enterprises with financial instruments like green credit and green bonds. This article, with the starting point of green finance, the study object of financial data of A-share listed companies from 2016 to 2021, and the mediator of financing constraints, studies the impact of green finance on green technology innovation through finding the correlation between enterprises’ annual ESG rating and financing constraints. This study finds: the impact of green finance on green technology innovation is positive; financing constraints are the mediator between green finance and green technology innovation; and there is a negative correlation between enterprises’ ESG management performance and their financing constraints.

On account of the conclusion of this article, the suggestions are as follows: it is necessary for the government to design the development framework of the green economy in a top-down way and to encourage financial institutions and enterprises to work together in terms of green innovation; financial institutions should actively practice the philosophy of green development and broaden the supporting channels of green finance; and enterprises need to focus on the philosophy of ESG development in order to gain more support for green investment capital.

Keywords: green finance; financing constraints; ESG; green technology innovation

Introduction

The survival and development of human society cannot be separated from the endowments of nature. At the same time, human behavior also affects the structure, function, and evolution of nature.
With the continuous development of social productive forces and the continuous promotion of industrialization, human society is constantly improving its ability to develop natural resources and absorb resources from nature, but it is also bringing more and more irreversible negative effects on the natural environment. Green technology innovation is the development need and development trend of the current era, which will run through the whole production process of all walks of life and promote the development of related industries.

But we also know that so far, although the relevant departments in guiding green finance have done a lot of fruitful work, such as policy-guided financial institutions to carry out green credit, green bonds, and green insurance, set up a green financial reform innovation area, promote the environmental rights market, etc., at the same time we also found that there are not enough green financial systems for enterprise green technology innovation, the decisive role is not enough, the product line is not rich, and coverage is not extensive. To vigorously support the development of green industries, we need to increase investment in green industries. At the same time, at the enterprise level, due to the insufficient understanding of the national green assistance policy, it is difficult to accept and absorb the dividends of green financial policies to the greatest extent.

Therefore, not only the enterprises need to introduce innovative ideas, but also the managers and financial institutions should actively serve and participate in green industry scientific and technological innovation and accelerate the cultivation of green scientific and technological innovation achievements, which is also the general trend.

At present, as a financial sector, on the whole, green finance in China started late; the economic development level of different regions is unbalanced, and the development level of green finance is also different. State-owned banks make up the majority of green financial institutions, and many of these institutions do not actively support green technology innovation.

So explore the present enterprise active green technology innovation sustainable development path, how to effectively improve the financial sector actively broaden the channel of green financial products, breakthrough enterprise financing bottleneck, promote the role of green finance in promoting enterprise innovation, at the same time on how to avoid information differences, effective cohesion green technology innovation enterprise and supply and demand between the financial sector, stimulate financial institutions in promoting the development of enterprise green innovation, promote green finance and enterprise green technology innovation in sustainable development and ecological environment protection, has certain practical significance.

**Objectives**

- Assess the impact of green finance policies on green technology innovation of enterprises. The research aims to explore the impact mechanism of green finance policies formulated by the government on green technology innovation of enterprises, especially through the influence of green credit and green bonds provided by financial institutions.

- Explore the intermediary role of financial constraints in the relationship between green finance and green technology innovation: Study the intermediate role of enterprise financing constraints on the correlation between green finance and green technology innovation, in order to gain a deeper understanding of the role and mechanism of financing constraints in the implementation process of the government's green finance policies.
RESEARCH ON THE IMPACT OF GREEN FINANCE

-Analyze the relationship between enterprise ESG management performance score and financing constraints: By studying the correlation between enterprise ESG management performance score and financing constraints, explore the role of enterprise ESG development concept in financing constraints so as to put forward relevant suggestions to encourage enterprises to obtain green financial support.

Literature review

Research related to green technology innovation
Allenby (2006) divides the industrial ecosystem and proposes the three-level evolution theory of the industrial ecosystem. The primary industrial ecosystem is from unlimited resources to unlimited waste; the second level is from limited resources to limited waste; the internal resources and wastes of the system are restricted by environmental capacity and resource quantity; and level 3 is a closed circulation system, which is an ideal industrial ecosystem.

Horbach et al. (2012), based on a German industrial data survey, points out that customer demand is another important source of enterprise ecological innovation; use products with improved environmental performance and improve the efficiency of materials; reduce energy consumption; reduce waste and dangerous substances; use process innovation is very important; and the improvement of technical ability to trigger green technology innovation has a positive role.

Foxon & Pearson (2006) analyzed the formulation and substantive progress of low-carbon innovation policies in the UK and put forward further development suggestions based on the guiding principles of sustainable innovation policies, believing that only the same market and policy tools can promote the innovation of low-carbon technologies and the development of renewable energy technologies.

Zhang & Zhou (2015) believe that most of the research on the selection of green technology innovation strategies focuses on what kind of green technology innovation strategy should be chosen and lacks research on the specific implementation and management of green technology innovation strategies.

Guo et al. (2023) put forward through research that the "double chain" integration of innovation chain and capital chain can significantly promote green technology innovation, and the upgrading of industrial structure or the improvement of environmental regulation level will strengthen the role of the integration of innovation chain and capital chain in promoting green technology innovation. It is believed that green technology innovation is the driving force for sustainable growth and development, and the inevitable requirement for high-quality development and the coordinated development of factors are important ways to stimulate the vitality of green technology innovation.

Liu (2023) discussed how the social responsibility performance of enterprises significantly promotes the improvement of the green technology innovation ability of enterprises at the present stage.

The paper shows that, in terms of action mechanisms, financing constraints play an intermediary role in the improvement of enterprises' social responsibility and green technology innovation ability.
Research on green finance-related

Since the 1990s, some scholars have begun to study green finance. Ma (2015), based on the relevant theoretical framework and international experience, combined with the actual situation in China, thinks China's building a green financial system helps start a new growth point, improve economic growth potential, accelerate the industrial structure, energy structure, and transportation structure of green transformation, improve the technical content of the economy, alleviate the pressure on financial environmental problems, and maintain the international image of China's responsible big country.

Li & Xu (2016) believe that the importance of green finance in economic and social development lies in that it can directly restrain the environmental behavior of enterprises, encourage enterprises to adopt green production technology, indirectly guide the direction of social investment, prevent market failure, and solve the problems caused by the external economy; meanwhile, it is also conducive to resolving financial risks and realizing a green economy and sustainable development by promoting energy conservation and emission reduction and the development of green industry.

Yujia (2020) studies the current situation of green finance and the manufacturing industry in Zhejiang province, analyzes the internal mechanism of green finance in driving the transformation and upgrading of the manufacturing industry, and believes that green finance supports the transformation and upgrading of the manufacturing industry in terms of capital formation, capital orientation, credit catalysis, integration, and decentralization.

The green technology innovation activities of enterprises cannot go through various stages, such as demand surveys, technology research, and marketing, without the continuous investment of funds in the early stages, and innovation also has market risk. Financial institutions are important participants in the national green technology reform, and the green financial instruments of financial institutions are the main starting point for the government to promote the green technology innovation of enterprises. Good green financial policies can have a certain impact on the diversion of capital bias and green innovation projects.

ESG management-related studies

Rajesh (2020) proposed that green innovation is an important driving force for low-carbon transformation and sustainable development of enterprises, and ESG is the measure of sustainable development performance of enterprises. Huang (2021) proposed that the ESG report should disclose not only the negative externalities derived from the business activities but also the positive externalities of the business activities. Both should not be biased; otherwise, the optimal allocation of resources will become empty talk.

According to Li (2023), according to the theory of information asymmetry, ESG and other related information are difficult to disclose through the annual report quantitative specification disclosure, so the enterprise should disclose more of the ESG-related information to improve its performance in environmental pollution management and corporate governance information transparency, to help enterprises better meet the needs of employees, shareholders, suppliers, creditors, and the natural environment, and to form a stakeholder protection mechanism.

The signal of responsible investment by enterprises helps enterprises establish a good image, gain the trust of all kinds of investors, promote the flow of capital to enterprises with
good ESG performance, and reduce the financing constraints of such enterprises. So as to improve the enterprise financing environment, alleviate the financing constraints.

ESG information disclosure is an important window for enterprises to actively display their management culture and soft power and an effective platform for information exchange between enterprises and relevant investors and potential investors. With the development of society, investors not only pay attention to the financial return generated by their investment behavior but also to the positive impact of their investment behavior on social progress. More and more enterprises also realize the importance of ESG management disclosure.

Conceptual framework

Wang & Wu (2023) in Jisco Group, for example, studied the iron and steel enterprises in the "high-end, intelligent," and "green" transformation processes, green financial tools for green technology transformation, think green financial can assign the iron and steel enterprises high quality development nt paths, promote the iron and steel enterprises low carbon transformation innovation practices.

This study makes the following assumptions:

H1: Green finance has a positive impact on the green technology innovation of enterprises.

The G20 Green Finance Comprehensive Report released by the G20 Green Finance Research Group clearly points out that the development of green finance requires the internalization of environmental externalities and the strengthening of financial institutions' awareness of environmental risks so as to enhance environmentally friendly investment and curb polluting investment. Enterprises cannot separate their sustainable development from the assurance of cash flow. In order to reduce costs and improve efficiency, enterprises restricted by financing may pay more attention to green technology innovation so as to obtain green financial support.

Liu et al. (2018) empirically studied the relationship between green finance and corporate governance and financing constraints for small and medium-sized enterprises. The research believes that green finance can improve the level of "green credit" of enterprises, reduce information asymmetry, improve the loan willingness of banks and other financial institutions, and ease financing constraints.

We make the following assumptions based on the analysis above:

H2: Green finance has a negative impact on the impact of corporate financing constraints.

With the serious impact of environmental pollution in the world, enterprises can pay attention to the awareness of environmental protection, ecological protection, and sustainable development in the process of production and operation, which can win the trust of the public, help to evaluate the level of "green credit" of enterprises, and improve the willingness of banks and other financial institutions to lend to them. When carrying out financial business, enterprises need to divert funds into the development of resource-saving technology and the protection of the ecological environment and help the market and consumers establish the concept of green consumption through their daily operations.
Kang & Wu (2022) believe that the financing constraints of green enterprises are affected by the asset size, market interest rate, and operating income of green enterprises. Green finance can effectively alleviate the financial constraints faced by green enterprises.

We make the following assumptions based on the analysis above:

H3: Enterprise financing constraints have a negative impact on the effect of green technology innovation.

Zhang Yunmeng (2021), based on the theory of information asymmetry and research, found that financing constraints in the process of promoting green technology innovation played an intermediary effect. To put forward this, enterprises should strengthen their practices in the fields of ESG practice and information disclosure, improve enterprise ESG performance and corporate reputation and market evaluation, promote effective information transmission between the capital market and enterprises, help enterprises improve their financing problems, and promote the sustainable development of green technology innovation.

H4: Financing constraints play a partial intermediary role between green finance and green technology innovation.

H5: The ESG rating has a negative effect on green finance and financing constraints.

Xu & Cui (2020) research shows that low-carbon city pilot policies can induce enterprises to a certain extent. The overall level of green technology innovation activities is mainly reflected in the energy conservation and alternative energy production of patent applications. At the same time, putting forward the pilot policy of high-carbon industries, non-state-owned enterprises green technology innovation is more significant.

We make the following assumptions based on the analysis above:

H6: There is heterogeneity in the influence of green finance on green technology innovation.

![Figure 1 - Study model diagram](made by the author)

**Methodology**

**Literature research method**

Through the online literature resource library and library books, the existing research materials on green technology innovation, green finance, financing constraints, and ESG
management are collected and collated, which provides reference for the establishment of research methods and research content in this paper and lays the theoretical foundation of literature and related research.

Second, at the same time, through the sorting green financial comprehensive reports in recent years, the Chinese government-issued policy documents support the development of green technology innovation, and part of the annual report of listed companies data, the state intellectual property office's green patent authorization data, and the and the analysis of green finance and green technology innovation correlation provide support for the study of this paper.

**Qualitative analysis**

Through the study and research of green finance, financing constraints, the ESG management effect, and the relevant theoretical knowledge of green technology innovation in enterprises, the influence of green finance development on green technology innovation in enterprises is analyzed and determined.

**Method of quantitative analysis**

The China Statistical Yearbook, Guotai’an Data System, and Business Road Lvron information platform are used to collect the operation data of listed companies, build fixed-effect models, and analyze the specific impact of green finance development on the green technology innovation of enterprises.

Simultaneously, we employ the intermediary effect model and ESG management to investigate how the growth of green finance can enhance the green technology innovation activities of enterprises by alleviating financing constraints.

With the help of SPSS 27.0 statistical analysis tools, the sample data will undergo statistical analysis such as correlation analysis and linear regression analysis, test the circulation of green financial products, the degree of enterprise financing constraints, ESG management, and the effectiveness of green technology innovation results, and then draw empirical analysis conclusions.

Based on the research topic of this paper and the layout of the listed companies on each plate, we will share the listed companies as the research object. At the same time, the green finance since 2016 has gradually developed into an orderly development. Part of the 2022 data is not comprehensive, so the time from 2016 to 2021 data.

The data sources of this chapter mainly include two parts: first, the green technology innovation data of enterprises is measured by the amount of enterprise green patent authorization, and the data comes from the database system of the official website of the China Intellectual Property Office.

Second, the financial data of listed companies and the research data related to green finance are from the China Statistical Yearbook, the Guotai’an Professional Data Platform, and the Business Road Green Finance Professional Information Platform.
Results

Descriptive statistical analysis

Table 1 - Annual data statistics for each variable
(Data source: Guotai’an database)

<table>
<thead>
<tr>
<th>year</th>
<th>Green loan balance (One trillion yuan)</th>
<th>New green debt (One trillion yuan)</th>
<th>publish ESG The proportion of enterprises</th>
<th>ESG grade</th>
<th>Financing constraints FC average value</th>
<th>Green patent empower (Ten thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>5.2662</td>
<td>0.2233</td>
<td>0.2465</td>
<td>46.8972</td>
<td>0.4908</td>
<td>2.1216</td>
</tr>
<tr>
<td>2017</td>
<td>5.7647</td>
<td>0.2258</td>
<td>0.2311</td>
<td>46.7974</td>
<td>0.4731</td>
<td>2.5133</td>
</tr>
<tr>
<td>2018</td>
<td>6.9609</td>
<td>0.2261</td>
<td>0.2374</td>
<td>47.2932</td>
<td>0.4734</td>
<td>2.6579</td>
</tr>
<tr>
<td>2019</td>
<td>8.1750</td>
<td>0.3347</td>
<td>0.2494</td>
<td>48.9136</td>
<td>0.4423</td>
<td>2.8372</td>
</tr>
<tr>
<td>2020</td>
<td>10.3436</td>
<td>0.2941</td>
<td>0.2434</td>
<td>50.4197</td>
<td>0.4613</td>
<td>2.7791</td>
</tr>
<tr>
<td>2021</td>
<td>11.8992</td>
<td>0.6669</td>
<td>0.2395</td>
<td>51.6277</td>
<td>0.4571</td>
<td>3.0909</td>
</tr>
</tbody>
</table>

Table 2 - Descriptive statistics of the whole sample
(Source: results of the study)

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>N</th>
<th>min</th>
<th>max</th>
<th>mean</th>
<th>sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP_TechInfo</td>
<td>6</td>
<td>21216</td>
<td>30909</td>
<td>26666</td>
<td>0.32938</td>
</tr>
<tr>
<td>GrnLnBal</td>
<td>6</td>
<td>52662</td>
<td>118992</td>
<td>80682</td>
<td>2.6172</td>
</tr>
<tr>
<td>Grnbonds</td>
<td>6</td>
<td>0.2233</td>
<td>0.6669</td>
<td>0.3285</td>
<td>0.1719</td>
</tr>
<tr>
<td>FinConst</td>
<td>10182</td>
<td>0.0013</td>
<td>0.9871</td>
<td>0.4870</td>
<td>0.2703</td>
</tr>
<tr>
<td>ESGscoring</td>
<td>1948</td>
<td>34.125</td>
<td>75.125</td>
<td>49.801</td>
<td>6.2999</td>
</tr>
<tr>
<td>Age</td>
<td>10182</td>
<td>1</td>
<td>30</td>
<td>9.88</td>
<td>7.455</td>
</tr>
<tr>
<td>ParValueRate</td>
<td>1708</td>
<td>0.00</td>
<td>8.50</td>
<td>4.5132</td>
<td>1.31730</td>
</tr>
<tr>
<td>ESGNum</td>
<td>6</td>
<td>0.2311</td>
<td>0.2494</td>
<td>0.2412</td>
<td>0.0066</td>
</tr>
<tr>
<td>GrnCrLoanBal</td>
<td>21</td>
<td>255.1000</td>
<td>119005.40</td>
<td>23052.22</td>
<td>33653.23</td>
</tr>
</tbody>
</table>

As can be seen from the description results, variable green technology innovation (GP_TechInfo) for six consecutive years of green patent licensing data, the average of 20000, the minimum of 21216, and the maximum of 30000, combined with Tab. 3 annual data, although reduced in 2020 (related to the new crown outbreak), China’s green technology innovation overall is on the rise. 6666.0909.1

Correlation analysis

This paper uses the PSS software, and Tab. 3 reports the correlation coefficient between the main variables.
Table 3 - Correlation coefficients for the main variables
(Source: results of the study)

<table>
<thead>
<tr>
<th></th>
<th>GP_TechInfo</th>
<th>GrnLnBal</th>
<th>Grnbonds</th>
<th>FinConst</th>
<th>ESG scoring</th>
<th>Age</th>
<th>Total Assets</th>
<th>Asset Liability Ratio</th>
<th>Market To Book Ratio</th>
<th>ParValueRate</th>
<th>ESGNum</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP_TechInfo</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GrnLnBal</td>
<td>.943**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grnbonds</td>
<td>1.000**</td>
<td>.943**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FinConst</td>
<td>-.886*</td>
<td>-.771</td>
<td>-.886*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESGscoring</td>
<td>.886*</td>
<td>.943**</td>
<td>.886*</td>
<td>.943**</td>
<td>.886*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.657</td>
<td>0.771</td>
<td>0.657</td>
<td>-0.714</td>
<td>0.714</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TotalAssets</td>
<td>.886*</td>
<td>.943**</td>
<td>.886*</td>
<td>.829*</td>
<td>.829*</td>
<td>.886*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AssetLiabilityRatio</td>
<td>0.657</td>
<td>0.486</td>
<td>0.657</td>
<td>-0.543</td>
<td>0.543</td>
<td>0.29</td>
<td>0.257</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MarketToBookRatio</td>
<td>-0.429</td>
<td>-0.371</td>
<td>-0.429</td>
<td>-0.829*</td>
<td>-0.257</td>
<td>-0.143</td>
<td>-0.143</td>
<td>-0.314</td>
<td>-0.543</td>
<td>-0.543</td>
<td></td>
</tr>
<tr>
<td>ParValueRate</td>
<td>-0.029</td>
<td>-0.086</td>
<td>-0.029</td>
<td>-0.029</td>
<td>-0.314</td>
<td>-0.314</td>
<td>0.257</td>
<td>-0.314</td>
<td>-0.543</td>
<td>-0.543</td>
<td></td>
</tr>
<tr>
<td>ESGNum</td>
<td>0.2</td>
<td>0.314</td>
<td>0.314</td>
<td>0.314</td>
<td>0.314</td>
<td>0.314</td>
<td>0.257</td>
<td>-0.257</td>
<td>-0.543</td>
<td>-0.543</td>
<td>1</td>
</tr>
</tbody>
</table>
As can be seen from Tab. 3, green technology innovation achievements (GP_TechInfo), green credit allowance (GrnLnBal), and green bond issuance (Grnbonds) both show a positive correlation at the 5% level, which proves to some extent that green finance policy has good support for green technology innovation. The surplus of green credit and the issuance of green bonds showed a positive correlation trend at the 5% level, indicating that these two major green financial instruments both show a steady development trend and work together to promote the improvement of green technology innovation achievements.

**Regression analysis**

After the descriptive statistics and correlation analysis of the selected data, we will make a regression analysis on the amount of green finance (the sum of the annual green credit balance and green bond increment), the ESG score, financing constraints, and the green technology innovation effect according to the previous hypothesis. The model summary analysis results are as follows:

<p>| Table 4 - Summary analysis of the multivariate models (Source: results of the study) |
|---|---|---|---|---|---|---|
| Model summary&lt;sup&gt;b&lt;/sup&gt; |</p>
<table>
<thead>
<tr>
<th>model</th>
<th>R</th>
<th>R square</th>
<th>Adjusted R square</th>
<th>Error in the standard estimation</th>
<th>Change statistics</th>
<th>Debin Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.999&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.998</td>
<td>0.989</td>
<td>0.0349</td>
<td>0.998</td>
<td>110.85</td>
</tr>
<tr>
<td>a. Predictor variables: (constant), FinConst, Grnbonds, GrnLnBal, ESGscoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Dependent variable: GP_TechInfo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| Table 5 - Summary analysis of green finance and financing constraint model (Source: results of the study) |
|---|---|---|---|---|---|---|---|
| Model summary&lt;sup&gt;b&lt;/sup&gt; |</p>
<table>
<thead>
<tr>
<th>model</th>
<th>R</th>
<th>R square</th>
<th>Adjusted R square</th>
<th>Error in the standard estimation</th>
<th>Change statistics</th>
<th>Debin Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.654&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.428</td>
<td>0.046</td>
<td>0.0162</td>
<td>0.428</td>
<td>1.121</td>
</tr>
<tr>
<td>a. Predictor variables: (constant), GrnLnBal, Grnbonds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Dependent variable: FinConst</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Source: This study was-organized</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


**Mediation effect analysis**

After the main effect regression analysis, we tested the intermediary effect of financing constraints (FC) on green technology innovation in green finance. First, the relationship between green finance and financing constraints is verified and analyzed.

**Regulatory effect analysis**

Later, we will further study the adjustment effect of verifying enterprise ESG management level on financing constraints.

Table 5 - Summary analysis of ESG and financing constraints
(Source: results of the study)

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R square</th>
<th>Adjusted R square</th>
<th>Error in the standard estimation</th>
<th>Debin Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.993(^{a})</td>
<td>0.985</td>
<td>0.982</td>
<td>0.0027344</td>
<td>2.005</td>
</tr>
</tbody>
</table>

\(^{a}\) Predictor variables: (constant), ESG score of A-share enterprises
Dependent variable: financing constraint FC

**Conclusion**

The growth of green finance is conducive to improving the level of green technology innovation. In order to promote the sustainable development of enterprises, enterprises must carry out green technology innovation, which is an investment with high investment and high risk. Enterprises need abundant funds for continuous investment and the ability to resist risks. Green finance provides financial guarantees for the green technology innovation of enterprises through green credit, green bonds, green insurance, green funds, and other carriers.

Among them, green credit, as a universal loan, is the primary tool of green finance and the core business of commercial banks. It has various advantages, such as a low interest rate and flexible approval. At the same time, in the research direction, the current state-owned banks in the green credit business occupy the vast majority of the market share.

Green insurance is an important guarantee for the risk reduction of enterprise green technology innovation. Green finance plays an important role in expanding the funding channels of enterprises, alleviating the capital pressure of enterprises, assisting enterprises in relevant industries to save energy and reduce carbon, strengthening pollution risk management, and promoting the improvement of green technology innovation achievements of enterprises.

The development of green finance can effectively alleviate the financing constraints of enterprises in green technology innovation. The study found that green bond issuance has a strong correlation with corporate financing constraints. In the process of planning to implement green technology innovation, enterprises need a large amount of capital investment at the initial stage, and innovation projects also have certain innovation risks, so a sufficient capital guarantee is very critical.

Financial institutions can provide flexible green technology innovation projects, favorable conditions for green credit special funds, enterprises can issue green bonds, guide
the common social responsibility and values of social investors to participate, raise social
investment from quantity to quality, and effectively alleviate enterprise innovation financing
constraints.

Financing constraints have an intermediary role between green finance and green
technology innovation. Through the study of sample data, we can confirm the green finance
through the enterprise financing constraints: the enterprise has sufficient money for
innovation, the enterprise has obtained long-term and stable financial support, and the
investment in green technology innovation will and strength eventually promote the green
technology innovation effect.

Good corporate ESG performance can promote corporate green technology innovation
by easing corporate financing constraints. Good corporate ESG performance is a
comprehensive display of the effectiveness of enterprises in social responsibility,
environmental management, and corporate governance, and it is another name card besides
corporate business performance. In the current social civilization, sustainable development is
gradually improving, and more and more attention is being paid to the form of good ESG
performance, which is more able to get the attention and support of enterprise stakeholders,
makes it easier to get positive media publicity, enhances enterprise visibility, and creates a
more relaxed social environment.

From the capital market, enterprise financing constraints have prompted enterprises to
continue to intensify the green technology innovation behavior motivation, thus making it
more conducive to promoting the promotion of green technology innovation.

There is regional heterogeneity in the influence of green finance on green technology
innovation, and the influence in eastern regions is higher than that in western regions.

**Recommendation**

Based on the above research conclusions, this paper proposes the following
countermeasures and suggestions:

The government should design the framework for green economy development at the
top level to encourage the development of green economies. The improvement of the social
environment, the sustainable economic development, is to promote the whole society, so we
need the government-level design to optimize the rational allocation of resources, in financial
policy limit "high energy consumption, high pollution" industry development space, guide
and motivate enterprises by improving waste disposal, pollution prevention, and technology
innovation such as green technology innovation activities, boost economic development with
high quality.

Financial institutions should actively practice the concept of green development and
broaden the channels of green financial services. Insufficient capital is an important
constraint for enterprises to carry out green technology innovation.

The current green financial support is far from meeting the needs of enterprises for
technological innovation, and the gap is huge. Financial institutions, as the main
implementers of the government's green financial policy, need to take the initiative to
understand market demand, to serve the market demand as the starting point of planning, to
expand the green financial channels as the main business, as far as possible, and to address
the to address the information asymmetry between market demand and information
technology innovation and development.
Financial institutions can also provide different financial policies in terms of financial support and interest rate according to their performance after a comprehensive evaluation of green technology innovation performance, so as to force "high energy consumption and high pollution" enterprises to carry out green technology activities.

Enterprises should pay attention to the promotion of the ESG development concept. At present, people have a higher demand for a better life. When choosing investment carriers, investors not only pay attention to the business performance of enterprises but also to the performance of their social responsibility and value. Investors often favor enterprises with strong social responsibility due to their lower risk.

Therefore, enterprises should pay full attention to ESG management, improve the quality of ESG information disclosure, fully display the enterprise development strategy and corporate culture construction in social responsibility, environmental protection, and corporate governance to investors, highlight the performance and highlights, and improve the enterprise positioning and the value of intangible assets.

Financial institutions and other social investment funds can evaluate the long-term investment value of the enterprise through its ESG management performance so that capital can flow to ESG-good enterprises to carry out green development projects and alleviate the financing constraints of the enterprise as far as possible, so as to promote the improvement of green technology innovation in the whole society.

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