

Enterprise Financialization, Risk Taking and Green Innovation

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Abstract

In recent years, the trend of financialization of the real economy has become increasingly obvious. However, financialization can not promote capital accumulation, but may crowd out green innovation. This paper selects China's A-share listed companies in 2011-2021 as a sample to analyze the adverse effects of corporate financialization and empirically test the impact of corporate financialization on green innovation output. The research results indicate that the financialization of enterprises inhibits the level of green innovation. The regression results were still significant after using instrumental variable method and substitution variable method. The research conclusion of this article has important reference value for promoting China's ecological civilization construction and achieving the "dual carbon" goal.

Keywords

Enterprise financialization; Risk taking; Green innovation; Internal and external supervision.

1. Introduction

The sixth plenary session of the 19th Central Committee of the Communist Party of China was held in 2021, which clearly stated that the current level of ecological civilization construction in China is still relatively low. We should more consciously promote low-carbon development and adhere to the path of green production and ecological good civilization development. In 2022, the report of the 20th National Congress of the Communist Party of China (CPC) for the first time included "actively and steadily promoting carbon peak carbon neutrality and accelerating the green transformation of the development mode". Green development has become the main direction of China's economic development in the new era. However, there is a long way to go to achieve carbon neutrality transformation. In the manufacturing industry, industries with "high energy consumption, high investment and high pollution" account for a relatively high proportion, and industrial structure transformation faces the problem of insufficient independent innovation [1]. Therefore, how to promote green technology innovation in enterprises, optimize production methods, and reduce production energy consumption is an urgent need to achieve the "dual carbon" goal.

In the context of high-quality development, balancing ecological environment and economic development is the key to achieving green transformation. Since then, innovation that is eco-friendly, resource-saving, and green and low-carbon has become one of the most effective and fundamental means to achieve green development goals. Unlike traditional technological innovation, green innovation takes into account both the economic goals of the innovation theme and the environmental consequences caused by economic behavior [2]. China's green development path and industrial transformation and upgrading cannot do without the input and output of green technology from enterprises. In the context of green development, enterprises engaged in green innovation not only receive government subsidies, but also the environmental benefits brought by green innovation can play a role in resource conservation and environmental protection [3]. In addition, with the deepening of green concepts in people's hearts, modern consumers' consumption concepts are gradually shifting towards sustainable

development and environmental protection. By enhancing the output capacity of green technology, enterprises can improve their intangible assets, meet the needs of green consumption, and thus achieve higher market competitiveness [4].

Green innovation, which can simultaneously balance economic development and environmental benefits, has become one of the important paths to promote sustainable economic development [5]. However, with the increasing problem of overcapacity and market saturation, more and more physical enterprises are entering the financial field motivated by capital profit seeking, by allocating a large amount of financial assets to obtain excess profits, forming a trend of corporate financialization. Previous studies have shown that physical enterprises' transition from reality to emptiness does not necessarily lead to optimized resource allocation, and may even reduce R&D investment to a certain extent, affecting innovation quality [6]. Green innovation, as a special type of innovation with high investment, will inevitably be influenced by the financialization of enterprises. Previous studies have shown that the level of green innovation in enterprises is influenced by various factors such as executive characteristics [7], digital finance, government subsidies [8], and social responsibility [9]. However, in the context of high-quality development, there is little research on the impact of enterprises' transition from reality to virtual reality on green innovation. In addition, although green innovation can bring competitive advantages and long-term benefits to enterprises, compared to traditional technological innovation, it has the characteristics of long cycle, high investment, and high risk, facing higher risks and challenges. This leads to green innovation being influenced by the level of enterprise risk taking, and high-risk enterprises are more willing and capable of green innovation. When a company invests a large amount of funds in financialization, it will inevitably crowd out the funds used for physical investment, reducing the level of risk taking by the company [10]. To sum up, few scholars have studied the impact of corporate financialization on green innovation, and there is no research on the mesomeric effect of risk taking between corporate financialization and green innovation.

In view of this, this article selects A-share listed companies as the research sample, with a research interval of 2011-2022. We empirically tested the impact of corporate financialization on green innovation and explored its mechanism of action. The level of internal control and analyst attention will have a certain impact on the relationship between the two. Enterprises with strict internal and external supervision will weaken their degree of financialization, which has a positive effect on green innovation.

Possible contributions of this article: Firstly, this article enriches research on the economic consequences of corporate financialization from a new perspective. At present, academic research on the economic consequences of corporate financialization mainly focuses on various aspects such as corporate governance, shareholder value, and corporate investment. A few scholars have combined financialization with innovation for research, but in the context of "dual carbon", there is little literature on the impact of corporate financialization on the level of green innovation. This article is based on principal-agent theory, technological innovation theory, and other theories to empirically test the impact of corporate financialization on green innovation level, and to examine whether the green innovation level of enterprises with higher financialization level is low. Secondly, it enriches the research on the influencing factors of green innovation. This study indicates that seeking financialization by enterprises will suppress the level of green innovation. Therefore, this article expands the perspective of research related to green innovation. Thirdly, the research conclusions of this article can provide reference for listed companies and regulatory authorities. For listed companies, providing a micro practical foundation for enhancing their technological innovation capabilities is of great significance for achieving sustainable development for enterprises in the critical stage of transformation and upgrading, as well as preventing excessive financialization of physical enterprises; For regulatory authorities, they can guide enterprises to allocate financial assets reasonably based

on their own operating conditions, fully leverage the "reservoir" role of financial assets, and mitigate the adverse effects of excessive financialization.

2. Literature review

The existing literature mainly focuses on the economic consequences of corporate financialization from a company perspective, but does not form a unified conclusion; The research on green innovation mainly starts from the internal and external environment. The following will review the existing literature from two aspects: the economic consequences of enterprise financialization and the influencing factors of green innovation.

2.1. The Economic Consequences of Enterprise Financialization

With the development of economic globalization and neoliberalism, the trend of financialization has accelerated. Enterprise financialization is a manifestation of financialization at the micro level, where more and more non-financial enterprises are participating in financial activities, and the proportion of profits from financial activities is increasing. At present, there is no consensus in academic research on the economic consequences of financialization, and there are two mainstream views, namely the "reservoir effect" and the "crowding out effect". On the one hand, due to the strong liquidity of financial assets compared to other physical assets, moderate allocation of financial assets can be seen as a preventive savings, which can improve the profitability of enterprises [11], reduce the sensitivity of cash flow to investment expenses, effectively alleviate the financing difficulties faced by enterprises, and strengthen enterprise value [12]. When a company has too much surplus funds, it can use the surplus funds to invest in financial assets with high returns and strong liquidity [13]. This not only improves the efficiency of internal fund utilization, but also disperses operational risks and reduces management costs [14], serving as a "reservoir". When there is a shortage of funds, companies can sell their financial assets, and the realization of financial assets can help companies quickly fill the funding gap [15], which is beneficial for improving business conditions in the short term and alleviating the pressure of fund shortage. In addition, the financialization of enterprises can enhance the connection with external financial institutions, and the improvement of trust between both parties is conducive to expanding financing channels and reducing the cost of financing for enterprises [16]. On the other hand, according to the theory of resource allocation, due to the higher return rate of financial channels compared to operating channels, which is driven by speculative arbitrage, increasing the allocation scale of financial assets by management will inevitably squeeze out funds available for production and business operations [17], which is known as the "crowding out effect". This viewpoint holds that the financialization of enterprises will reduce investment in physical businesses and be detrimental to the long-term accumulation of capital. At the same time, due to the high risk in the financial sector, which is greatly affected by monetary policy and interest rate fluctuations, financial investment returns are uncertain and the probability of investment failure is high. This "risk contagion effect" may be transferred to entities, causing enterprises to face significant operational and financial risks, and enterprise audit fees will also increase [18]. The financialization of enterprises can easily cause management to be short-sighted and focus more on the benefits brought by short-term investments. The increase in the share of financial asset investment has expanded the dispersion of cost plus distribution and reduced the efficiency of resource allocation [19].

2.2. The influencing factors of green innovation

Green innovation refers to an innovative activity that involves both green product innovation and green process innovation, which causes less pollution to the ecological environment and is easy to recycle. Expanding end-of-life treatment technologies and clean processes is beneficial

for enterprises to achieve energy conservation, consumption reduction, and green sustainable development goals [20]. At present, research on the influencing factors of green innovation mainly focuses on two aspects: internal characteristics and external environment.

External factors such as economic policies, environmental regulations, market factors, etc. Against the backdrop of frequent changes in economic policies, the uncertainty of economic policies has an inverted "U" shaped impact on green innovation in enterprises, and there is industry heterogeneity. Specifically, this relationship is more pronounced in capital and technology intensive industries, while it does not have a significant impact in resource and labor intensive industries [21]. Empirically tested the specific impact of seven environmental regulations on green innovation and found that the number of environmental legislation, the amount of simultaneous investment, and the amount of pollution charges have a positive impact on the time lag effect of green innovation [22]; The immediate effect of environmental law enforcement and the number of people on green innovation has significantly improved. In terms of market factor research, the development of the capital market can significantly promote technological innovation in green industries, especially the stock market [23]. However, the attention of China's capital market to green innovation is not very high, and it cannot play a good incentive role [24].

The research on the impact of internal characteristics on green innovation mainly focuses on executive characteristics, equity nature, and information disclosure. In terms of executive characteristics, Jian zu Wu and Xinyi Hua used listed companies in the Shanghai and Shenzhen A-share manufacturing industry from 2010 to 2018 as samples to verify that executive team attention has a positive impact on corporate innovation strategies. The more attention the executive team allocates on environmental protection issues and solutions, the more green innovation patents the enterprise has. In addition, the stronger the openness of CEOs, the more conducive they are to green innovation in enterprises, mainly because an open CEO can enhance the risk taking level and R&D investment scale of enterprises, attracting more financing. Regarding the impact of property rights on green innovation, You hui Zhong and Zhi jiang Yang's research shows that state-owned enterprises have a higher willingness to green innovation compared to private enterprises, and their level of green innovation is also higher [25]. The cumulative number of years of green technology innovation is longer. In terms of information disclosure, the disclosure of corporate environmental information can alleviate financing constraints and enhance the level of green technology innovation of enterprises by increasing credit financing. Zhi mai Yu analyzed the relationship between management tone and green innovation based on speech act, and the research confirmed the concept of information increment, that is, the more active the management tone, the higher the level of green innovation of enterprises [26].

3. Theoretical analysis and research hypotheses

The allocation of financial assets by enterprises will squeeze out the funds originally used for research and development investment and fixed assets. Compared to traditional innovation, there is already more investment in green innovation, and the financialization of enterprises will inevitably affect the sustainability of green innovation. Therefore, this article believes that enterprises seeking financialization will suppress green innovation, and risk taking plays a certain intermediary role in it.

3.1. Enterprise financialization and green innovation

Firstly, the financialization of enterprises may exacerbate financing pressure and hinder the implementation of green innovation activities. For listed companies, credit financing is one of their most important financing channels. However, bank financing restrictions are mostly applied, and the purpose of declared funds and their debt repayment ability are usually strictly

reviewed. Fixed assets investment is conducive to improving the level of operation and enhancing the ability of sustainable operation. Compared with financial asset investment with high liquidity risk, it is easier to obtain credit approval [27]. In addition, green innovation projects tend to invest more, and the approval of such projects with high uncertainty will also be more stringent. Therefore, enterprises with more financial asset allocation will face greater financing pressure. Secondly, based on the theory of flow management, in order to ensure the daily business activities of enterprises, the proportion of current assets in asset allocation must be maintained at a certain level to ensure that enterprises have the ability to cope with uncertain external shocks. However, under the motivation of pursuing profit through capital, companies tend to invest in financial assets with higher returns, thereby reducing investment in physical businesses and increasing operational and financial risks. The overall resources of enterprises are limited, and excessive allocation of financial assets will inevitably squeeze out the funds required for research and development investment. Therefore, under the theory of liquidity management, there is a crowding out effect between financial asset investment and green innovation, and the financialization of enterprises will suppress the level of green innovation. Finally, based on the principal-agent theory, managers have a certain term of office, and during a specific period, management may engage in short-sighted financial investment behavior in response to short-term performance evaluations. Although green innovation is beneficial for the sustainable development of enterprises, it requires more investment in the short term, and the risks and uncertainties are high. Previous literature has shown that management myopia can inhibit long-term investment [28,32]. Therefore, the allocation of financial assets caused by management myopia is more unfavorable for green innovation. Based on the above analysis, this article proposes the following assumptions:

H1: Corporate financialization will suppress the level of green innovation

3.2. Enterprise financialization, risk taking, and green innovation

The investment decision-making behavior of a company can to some extent reflect its level of risk taking. In investment decision-making, risk taking is manifested as the tendency of enterprises to pay for high yield and high-risk investment projects [29]. Enterprises with high risk taking tend to prefer risks, prefer projects with high yield and long term, and pay more attention to the sustainable development ability of enterprises, which helps to accelerate capital accumulation and improve the company's market value [30]. On the contrary, although lower risk taking faces lower risk of capital chain breakage, it often lacks vitality and suppresses its development potential. Compared to Western countries, the risk taking level of listed companies in China is relatively low [31], and in recent years, non-financial enterprises have "shifted from real to virtual", and the scale of financial asset investment has become increasingly large. According to resource allocation theory, excessive allocation of financial assets will occupy production capital. Although short-term returns are high, in the long run, it will ultimately damage the sustainable operation ability of the enterprise, and the risk taking ability will also be reduced. Green innovation has the characteristics of high resource investment, high risk, and long cycle, and is easily affected by external environmental uncertainty [32]. When making investment decisions, enterprises must balance the relationship between risk and return. The characteristics of green innovation make them extremely sensitive to the impact of environmental uncertainty and have higher risk. Therefore, the risk preference and willingness of enterprises determine the level of green innovation, and enterprises with high risk bearing levels are more capable and willing to engage in green innovation. Therefore, the reason why corporate financialization inhibits green innovation may be related to its risk taking. Based on this, this article proposes the following assumptions:

H2: Risk taking plays a mediating role in the impact of corporate financialization on green innovation

4. Research Design

4.1. Sample Source and Data Selection

This article intends to use data from official websites such as Guotai An Database, National Bureau of Statistics, National Data, and the Ministry of Industry and Information Technology to select A-share companies listed from 2011 to 2021 as research samples. After excluding the financial industry and samples with gaps, 13038 annual observations of companies are obtained.

4.2. Variable definition and description

4.2.1. The dependent variable.

Green innovation (GTI) refers to the study by Lian Chao et al. [33], which measures green innovation from the perspective of innovation output. The green innovation level of enterprises is measured by adding 1 logarithmic value to the number of green innovation patent applications.

4.2.2. Explanatory variables.

Enterprise financialization (Fin) refers to the research by Du Yong et al [34]. and is measured using the following disclosure method: (trading financial assets+derivative financial assets+net loans and advances issued+net available for sale financial assets+net held-to-maturity investments+net investment real estate)/total assets.

4.2.3. Control variables.

Referring to relevant research, this article sets 12 control variables: company size (SIZE), asset liability ratio (LEV), proportion of independent directors (INDEP), whether the chairman concurrently serves as general manager (DUAL), company age (AGE), top shareholder shareholding ratio (TOP1), equity balance system (BALANCE), monthly excess turnover rate (DTURN), revenue growth rate (GROWTH), and management expense rate (MFEE), The specific variable definitions are shown in Table 1 below.

Table 1 Variable names and their descriptions

Variable Name	Variable symbol	Specific definition
Green innovation	GTI	Ln (number of green patent applications+1)
Enterprise financialization	FIN	(Trading financial assets+derivative financial assets+net amount of loans and advances issued+net amount of available for sale financial assets+net amount of held-to-maturity investments+net amount of investment real estate)/Total assets
Proportion of independent directors	INDEP	Number of independent directors/total number of directors
Does the chairman also serve as the general manager	DUAL	Take 1 for combining two positions, otherwise take 0
Company age	FIRMAGE	Ln (year of the year - company year+1)
Shareholding ratio of the largest shareholder	TOP1	Total number of shares held by the largest shareholder/total number of shares
Equity balance system	BALANCE	Second largest shareholder's shareholding ratio/first largest shareholder's individual shareholding ratio
Monthly average excess turnover rate	DETURN	Monthly average turnover rate of stocks for the current year - Monthly average turnover rate of stocks for the previous year
Operating revenue growth rate	GROWTH	Current year's operating revenue/previous year's operating revenue - 1
Management fee rate	MFEE	Management expenses/operating income

4.3. Model construction

4.3.1. Model construction of the impact of corporate financialization on green innovation

In order to test the impact of corporate financialization on green innovation, this article constructs the following model for testing based on the research of Jia zhi Xie [36] and others:

$$GTI = \alpha_0 + \alpha_1 FIN_{i,t} + \sum CONTROLS + \varepsilon_{i,t} \tag{1}$$

4.3.2. Model Construction of the Role Path of Enterprise Finance on Green Innovation

To test whether risk taking constitutes the mechanism by which corporate financialization affects green innovation, this article draws on the research of Yu Minggui et al. [37] and measures the level of risk taking (RISK) using the volatility of corporate profits. Build a model (2).

$$RISK = \beta_0 + \beta_1 FIN_{i,t} + \sum CONTROLS + \varepsilon_{i,t} \tag{2}$$

5. Empirical Results and Analysis

5.1. Descriptive Statistics

Table 2 presents the descriptive statistical analysis results of the dependent variable, independent variable, and some control variables in this article. The average values of enterprise financialization and green innovation are 0.035 and 1.686, respectively, which are basically consistent with existing literature research results. The standard deviation of green innovation level is 1.016, indicating that there are significant differences in the attention and output of listed companies towards green innovation. The maximum value of corporate financialization is 0.748, and the minimum value is 0.009, indicating that the degree of corporate financialization varies among different companies in the sample. In the control variables, the maximum and minimum values of company size are 28.636 and 16.161, respectively, with a standard deviation of 1.416, indicating significant differences in the size of each company in the sample. The maximum and minimum values of asset liability ratios are 29.454 and 0.442, respectively, indicating significant differences in asset liability ratios among companies in the sample. The distribution of descriptive statistical values for other control variables is relatively reasonable.

Table 2 Descriptive Statistical Results

	Sample size	Average	Standard deviation	Minimum	Median	Maximum
GPAT	13038	1.686	1.016	0.693	1.386	6.900
FIN	13038	0.035	0.068	0.000	0.009	0.748
SIZE	13038	22.524	1.416	16.161	22.297	28.636
LEV	13038	0.449	0.329	-0.195	0.442	29.454
INDEP	13023	0.375	0.057	0.125	0.357	0.800
DUAL	12888	0.267	0.443	0.000	0.000	1.000
FIRMAGE	13038	2.841	0.367	0.693	2.89	4.143
TOP1	13038	0.349	0.154	0.003	0.328	0.900
BALANCE	13038	0.733	0.622	0.004	0.569	4.000

5.2. Multiple regression analysis

5.2.1. Basic regression results

Table 3 provides the regression results of the impact of the degree of financialization of listed companies on the level of green innovation. Columns (1) and (2) respectively report the impact of corporate financialization on green innovation after OLS regression, with and without control variables added. The third column reports the regression results of the relationship between the industry and the year after control. From the first row of the table, it can be seen that the coefficients of corporate financialization are significantly negative, indicating that the higher the degree of corporate financialization, the lower the output of green innovation. The above conclusion validates hypothesis 1 of this article.

Table 3 Basic Regression Results

	(1)	(2)	(3)
FIN	-0.825*** (-6.29)	-0.533*** (-3.56)	-0.259* (-1.81)
SIZE		0.357*** (46.63)	0.405*** (52.91)
LEV		-0.047 (-1.41)	-0.023 (-0.71)
INDEP		0.936*** (5.86)	0.680*** (4.60)
DUAL		0.059*** (2.77)	0.004 (0.18)
FIRMAGE		-0.218*** (-8.37)	-0.192*** (-7.31)
TOP1		-0.275*** (-3.30)	-0.129* (-1.65)
BALANCE		0.021 (1.04)	-0.004 (-0.24)
DTURN		-0.002 (-0.11)	0.006 (0.32)
GROWTH		-0.001*** (-2.87)	-0.001** (-2.10)
MFEE		0.301*** (4.01)	0.201*** (2.80)
CONSTANTS	1.715*** (171.19)	-6.027*** (-33.39)	-7.715*** (-32.05)
N	13038	10142	10142
R2_A	0.003	0.223	0.369

5.2.2. Regression results of mechanism of action

Table 4 reports the regression results of Model 2, with column (1) reporting the basic regression results and column (2) reporting the regression results of the relationship between enterprise financialization and risk taking in Model (3). As shown in the table, there is a significant negative correlation between enterprise financialization and risk taking, indicating that the higher the degree of financialization, the worse the level of risk taking in enterprises. Previous studies have confirmed that high risk taking is beneficial for promoting green innovation in enterprises, However, corporate financialization suppresses the level of risk taking, so the regression results in Table (4) indicate that corporate financialization leads to unsatisfactory green innovation output by suppressing risk taking.

Table 4 Regression results of mechanism of action

	(1)	(2)
FIN	-0.259* (-1.81)	-0.000** (-1.97)
RISK		
SIZE	0.405*** (52.91)	-0.004*** (-12.32)
LEV	-0.023 (-0.71)	0.010*** (6.86)
INDEP	0.680*** (4.60)	0.030*** (4.60)
DUAL	0.004 (0.18)	0.002** (2.52)
FIRMAGE	-0.192*** (-7.31)	0.001 (0.70)
TOP1	-0.129* (-1.65)	-0.021*** (-6.04)
BALANCE	-0.004 (-0.24)	0.000 (0.30)
DTURN	0.006 (0.32)	0.005*** (5.92)
GROWTH	-0.001** (-2.10)	0.000** (2.11)
MFEE	0.201*** (2.80)	0.011*** (3.44)
CONSTANTS	-7.715*** (-32.05)	0.115*** (10.69)
N	10142	10142
R2_A	0.369	0.103

5.3. Robustness test

5.3.1. Replace variables

In order to provide a more comprehensive description of financialization, this article draws on the research of Du Yong et al [38]. and replaces the explanatory variable with the dummy variable of whether a company purchases financial assets (ratio). The regression results are shown in column (1) of Table 5. After replacing the explanatory variable The coefficient of FIN is still significantly negative

5.3.2. instrumental variable method

To further address the potential endogeneity issues in the model, this article draws on the research of Wang Hongjian et al. and selects the ratio of investment income to net profit in the income statement as the instrumental variable. The reason for choosing this instrumental variable is that investment income belongs to the non daily operating income of the enterprise, which is highly related to financial asset allocation, but not to daily production and operation activities. When using the 2SLS method for regression analysis, the regression results of the second stage are shown in column (2) of Table 5. The coefficient in the first row is significantly

negative, indicating that the research conclusion of this article is still robust after considering endogeneity issues.

Table 5 Regression Results of robustness Test

	(1)	(2)
FIN	-0.068*** (-3.05)	-0.014* (-1.89)
SIZE	0.410*** (52.42)	0.289*** (14.24)
LEV	-0.019 (-0.61)	0.260*** (3.01)
INDEP	0.673*** (4.56)	0.485* (1.72)
DUAL	0.003 (0.14)	0.051 (1.58)
FIRIMAGE	-0.191*** (-7.28)	-0.148*** (-3.39)
TOP1	-0.140* (-1.78)	-0.189 (-1.35)
BALANCE	-0.006 (-0.31)	0.026 (0.83)
DTURN	0.008 (0.45)	0.010 (0.46)
GROWTH	-0.001** (-2.10)	0.005 (0.51)
MFEE	0.193*** (2.69)	0.829*** (3.93)
CONSTANTS	-7.778*** (-32.22)	-4.766*** (-10.32)
N	10142	10106
R2_A	0.369	0.139

5.4. Further analysis

5.4.1. The regulatory role of internal supervision

Internal control, as an important component of corporate governance mechanisms, has a significant impact on a company's investment and financing decisions. Firstly, one of the important reasons for the financialization of physical enterprises is that management, motivated by self-interest, invests a large amount of funds into the financial and real estate fields with short cycles and high returns. High quality internal control can not only reduce the company's earnings management behavior, but also effectively reduce agency costs, effectively solve the first and second types of agency problems[39], and suppress management's override behavior, Furthermore, it suppresses the allocation of financial assets by enterprises and reduces their degree of financialization; Secondly, internal control, as an important supervision

and constraint mechanism, can identify and respond to high-risk investment behaviors of enterprises through a series of control activities, and screen high-risk projects out of the investment ranks of enterprises [40]; Finally, effective internal control can improve the robustness of accounting, improve the quality of accounting information, send a good signal to the market, and then play a role in easing financing constraints. Therefore, strong internal supervision can suppress the degree of financialization of enterprises, alleviate financing constraints, and promote green innovation [41]. To further analyze the impact of internal control on the relationship between corporate financialization and innovation, this article establishes model (3). The internal control (IC) is logarithmized using the DiBo internal control index/1000 plus 1, where FI represents the multiplication term (FIN * IC) and MSHARE (management holding data/total equity) is added as the control variable. The regression results are shown in column (1) of Table 6, and the coefficient of FC is significantly positive, indicating that the supervisory role of internal control can improve the impact of corporate financialization on green innovation.

$$GTI = \gamma_0 + \gamma_1 FIN_{i,t} + \gamma_2 FI_{i,t} + \gamma_3 IC_{i,t} + \sum CONTROLS + \varepsilon_{i,t} \quad (3)$$

5.4.2. The regulatory role of external supervision

Based on stakeholder theory, the performance of the capital market affects the investment behavior of enterprises. Analysts, as information intermediaries between listed companies and stakeholders, play a certain external supervisory role. External analysts have a more professional investment philosophy and knowledge compared to creditors and investors, and their exploration of company annual reports and other information is also more in-depth [42]. They can transform first-hand information into characteristic information with incremental value to investors [43], which can reduce the degree of information asymmetry and alleviate the information troubles caused by the increase in business complexity caused by enterprise financialization for external information users. In addition, in the face of strict research and analysis by analysts, management will reduce earnings management behavior due to exposure pressure [44-45], promote information quality improvement, and thus alleviate financing constraints, which will be conducive to green innovation research and development investment [46]. Therefore, analyst attention can alleviate the negative impact of corporate financialization on green innovation. To confirm the above analysis, this article constructs model (4), where analyst attention is expressed as the logarithm of the number of analyst reports plus 1. The control variable increases the book to market ratio BM (book value/total market value) on the basis of basic regression, and removes LEV. The regression results are shown in column (2) of Table 6, where the coefficient of FR is significantly positive, indicating that external analyst supervision has played a certain moderating role in the relationship between corporate financialization and green innovation.

$$GTI = \delta_0 + \delta_1 FIN_{i,t} + \delta_2 FR_{i,t} + \delta_3 REPORTS_{i,t} + \sum CONTROLS + \varepsilon_{i,t} \quad (4)$$

Table 6 Further analysis of regression results

	(1)	(2)
FINRATIO	-1.618** (-2.06)	-0.706*** (-3.16)
FC	2.761* (1.76)	
FR		0.210** (2.07)
IC	0.327*** (3.58)	
REPORT		0.136*** (18.97)
SIZE	0.397*** (47.35)	
LEV	0.024 (0.66)	
INDEP	0.665*** (4.41)	1.381*** (8.23)
DUAL	0.008 (0.42)	-0.127*** (-5.83)
FIRMAGE	-0.179*** (-6.62)	0.109*** (3.99)
TOP1	-0.155* (-1.94)	0.411*** (4.65)
BALANCE	-0.008 (-0.44)	0.058*** (2.75)
DTURN	0.008 (0.47)	0.105*** (5.80)
GROWTH	-0.001** (-2.12)	-0.000 (-0.42)
MFEE	0.093 (1.01)	-0.322*** (-3.33)
MSHARE	0.015 (0.30)	
CONTANTS	-7.700*** (-30.11)	-0.074 (-0.36)
N	9856	10005
R2_A	0.366	0.199

6. Research Conclusion and Enlightenment

6.1. Research Conclusion

Through theoretical analysis and quantitative analysis, this paper selects A-share listed companies in 2011-2021 as the research sample, and finds that in the current financial market environment of China's real economy, non-financial enterprises have an obvious trend of

financialization, which is not conducive to the green innovation output of enterprises. Further research finds that internal control and analysts' attention play a negative role in regulating the relationship between enterprise financialization and green innovation. The research conclusion of this article can provide theoretical guidance for enterprises to reasonably allocate financial assets and manage risks, and strengthen their green awareness and internal control management.

6.2. Research inspiration

Based on the conclusion of this article, the following insights are drawn: for enterprises, they should not be too short-sighted and only focus on short-term benefits. They should allocate financial assets reasonably, strengthen environmental awareness, and, driven by national policy guidance, invest funds in green innovation research and development to achieve long-term development; For regulatory agencies, they should focus on the level of risk-taking of enterprises undergoing financialization, and external analysts can be used to mitigate the adverse effects of financialization on the long-term development of enterprises.

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