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Article

Research on Co-Creation Mechanisms and Innovation Strategies of ESG and Real Estate Enterprises Empowered by New Quality Productivity

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Abstract: As a resource-intensive industry, real estate firms have become the focus of research on how to improve ESG performance and cope with environmental and social responsibility pressures. The rise of new-quality productivity provides enterprises with the impetus to innovate, especially driven by technological and digital transformation, which enables real estate enterprises to better achieve green and sustainable development while optimizing resource allocation and enhancing productivity. This study examines the impact of new quality productivity on the ESG performance of real estate companies, using data from 1,200 real estate companies in Shanghai and Shenzhen A-shares over the period 2015-2024 for empirical analysis. It is found that there is a significant positive correlation between new quality productivity and firms' ESG performance. Specifically, the improvement of new quality productivity can significantly promote firms' ESG performance, especially the effect is more significant in firms with higher technology level. In addition, financing constraints play a partial mediating role in this process. The empirical results show that real estate firms can further enhance their market competitiveness by optimizing resource allocation, reducing environmental impacts, enhancing social responsibility and optimizing governance structure while improving the level of new quality productivity. Data analysis shows that the positive impact of new quality productivity on corporate ESG is particularly prominent among high-growth enterprises, and the digital transformation and technological innovation of enterprises have become key factors driving this process. The study suggests that enhancing new quality productivity not only helps to promote the high-quality development of enterprises, but also provides an important guarantee for the sustainable development of the real estate industry.

Keywords: New Quality Productivity, Real Estate Enterprises, ESG Performance, Financing Constraints, Digital Transformation, Technological Innovation

1. Introduction

As China's economy shifts from high-speed development to high-quality development, the state has put forward higher requirements for corporate environmental pollution and social responsibility, and China's 14th Five-Year Plan includes "carbon peaking" and "carbon neutrality", and has certain quantitative requirements [1]. In this context, academics have gradually added sustainable development elements to the research of corporate innovation strategies and co-creation mechanisms, and the perspective of the research is transitioning from traditional financial indicators to the dual dimensions

of sustainable development concepts and financial indicators [2-3]. ESG is an acronym for Environmental, Social and Governance, which is an investment concept and enterprise evaluation standard focusing on three kinds of non-financial performance of enterprises' environmental, social and corporate governance, and focuses more on the analysis of non-economic information, which is an important evaluation system to measure the sustainable development of enterprises [4-7]. ESG performance is an extension of ESG concept, and is the result of rating agencies' ESG rating of enterprises, which can comprehensively evaluate the fulfillment of enterprises' social responsibility, and gradually promote the importance of enterprises' social responsibility to investors. ESG performance is an extension of the ESG concept, and is the result of rating agencies' ESG ratings of enterprises, which can comprehensively evaluate the fulfillment of corporate social responsibility, show investors more directly and clearly the fulfillment of corporate responsibility, improve the importance of corporate social responsibility, and gradually promote the transformation of corporate goals from single pursuit of profit maximization to the pursuit of social value maximization [8-9]. The development and research of ESG not only satisfies the core essence of enterprises' pursuit of green development, but also is an important focus point to help China's economic high-quality development.

As an important support industry for national economic development, real estate enterprises are both an important subject of labor-management relations and a major national carbon emitter [10]. Nowadays, China's real estate industry faces the problems of huge number of new buildings and excessive carbon emissions from stock buildings, with annual carbon emissions from engineering and construction reaching 11% of the world. The stock of buildings 65 billion square meters, its carbon emissions account for about 20% of the national total [11]. In order to achieve the "dual carbon" goal, the Ministry of Housing and Urban-Rural Development and the National Development and Reform Commission (NDRC) issued the Action Plan for the Creation of Green Buildings, which requires that by 2022, 70% of new urban buildings in China will have green floor area, energy intensity will be reduced by 80% by 2030, and the current near-zero-energy building and renovation rate will be increased by 6 times [12-13]. This policy program puts forward high requirements for real estate enterprises, facing such challenges, real estate enterprises must take environmental protection and green building as an entry point, and pay attention to corporate ESG performance [14-16]. In the whole life cycle of the building to save resources, protect the environment, reduce pollution, to provide people with healthy, applicable and efficient use of space, so that man and nature can live in harmony [17]. Some analyses point out that real estate companies with good performance in the field of ESG in the future are expected to gain more favor from investors.

From the perspective of new quality productivity, this study explores how it can improve the ESG performance of enterprises by facilitating their digital transformation and thus improving their ESG performance. Specifically, this paper will verify the impact of new quality productivity on the ESG performance of real estate firms through empirical analysis and explore the mediating role played by financing constraints in this process. Through regression analysis on the data of 1,200 real estate companies in the Shanghai and Shenzhen A-share markets, the results of the study show that the improvement of new quality productivity can effectively alleviate the financing constraints, which in turn enhances the performance of firms in terms of environmental, social responsibility and governance.

In addition, this study will analyze the heterogeneity of different types of firms and explore the differences between new quality productivity and ESG performance of different firms, especially the impact of firms' growth and technology level on this relationship. Through such an analysis, it can provide theoretical support and practical guidance on how real estate firms can improve their ESG performance driven by new quality productivity.

2. Rationale and research hypotheses

2.1. New quality productivity

The “newness” of NQP is mainly reflected in the renewal of production factors and the strengthening of innovation drive [18-19]. Unlike traditional factors such as land, labor and capital, on which traditional productivity relies, new-quality productivity emphasizes the centrality of new types of factors such as knowledge, data and information. The renewal of such factors not only transforms production activities from material dependence to knowledge-intensive, but also promotes the intelligence and digitalization of production methods. For example, the widespread use of data and information has led to more precise resource allocation and more efficient production processes, which have contributed to an increase in overall productivity. In addition, technological innovation has become the fundamental driving force of new quality productivity. Innovation drivers such as

new-generation information technology, artificial intelligence, big data and the Internet of Things (IoT) have become the core factors driving productivity progress.

The "quality" of new productivity is reflected in the pursuit of high-quality development. Unlike traditional productivity, which relies on scale expansion and labor-intensive growth patterns, new quality productivity emphasizes the optimization of production structure and the improvement of production efficiency. It pays more attention to the efficient use of resources, environmental friendliness and the enhancement of innovation capacity, and promotes the transformation of production activities from "quantitative accumulation" to "qualitative leap". By optimizing resource allocation, enhancing factor productivity and reducing environmental loads, new quality productivity strives to meet the needs of economic growth while achieving the dual goals of resource conservation and ecological protection.

The difference between new and traditional productivity is that it not only focuses on material production, but also emphasizes the role of intangible factors such as knowledge and information. While traditional productivity relies more on a large amount of resource inputs, with land, labor and capital at its core, new-quality productivity relies on the deep integration of data, technology and human capital. Innovation activities are no longer subsidiary production links, but the core driver of productivity enhancement. The path to realizing the new quality productivity is more dependent on scientific and technological progress and innovation capacity to achieve sustainable economic growth and high-quality development.

Nonetheless, there is a close link between new and traditional productivity. The new quality productivity is developed on the basis of the traditional productivity, and is the inheritance and expansion of the traditional productivity. Traditional material factors still play an important role in the new quality productivity system, while the introduction and reinforcement of innovative factors make the level of productivity constantly improve and adapt to the new requirements of modern economic development.

The theory of new quality productivity is characterized by obvious innovativeness and sustainability. Firstly, in the industrial field, it promotes the development of production mode in the direction of high technology content, intelligence and greening. Secondly, the new quality productivity shows a high degree of technological intensity, emphasizing the central position of knowledge, data and information in the production process. Finally, environmental protection and sustainability have become its intrinsic qualities, enhancing resource utilization through innovation and realizing a win-win situation for both economic and ecological benefits. New quality productivity is not only an extension of traditional productivity, but also a future-oriented productivity model, providing solid support for high-quality economic development.

2.2. Corporate ESG

ESG is a system of frameworks that includes environmental (E), social (S), and governance (G) factors [20-21], which is derived from responsible investment. The Principles for Responsible Investment (PRI) defines responsible investment as "strategies and practices that incorporate environmental, social, and governance (ESG) factors into investment decisions and active ownership". As such, ESG is often the criteria and strategy used by investors to evaluate corporate behavior and future financial performance. As an investment philosophy for evaluating corporate sustainability, the three fundamental ESG factors are key points to consider in the investment analysis and decision-making process, and ESG also helps companies themselves measure the sustainability and social impact of their business activities. The European Banking Authority (EBA) describes ESG factors as "environmental, social or governance matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign or individual". Therefore, ESG, as a value of sustainable and coordinated development that takes into account economic, social and governance benefits, an investment philosophy that pursues long-term value growth, and a comprehensive and specific governance approach, is also highly compatible with China's concept of green, low-carbon and high-quality development, and is able to effectively connect macro-green, low-carbon and high-quality development with micro-corporate sustainable governance behaviors.

2.3. The Impact of New Quality Productivity on ESG Performance of Real Estate Firms

The development of new quality productivity not only promotes the transformation of production methods, but also has a profound impact on corporate ESG (environmental, social and governance) performance.

From the environmental (E) dimension, new quality productivity in agriculture helps to reduce the

carbon footprint of agricultural production and improve the efficiency of resource use through scientific and technological innovation, especially the application of digital technology and green technology. The new production models all provide technology for real estate companies to reduce energy consumption and waste emissions. For example, the use of big data, Internet of Things (IoT) and Artificial Intelligence (AI) to optimize the real estate production chain can accurately deploy resources and reduce ineffective waste, while avoiding excessive land development and environmental damage, which can improve the environmental performance of real estate companies, and also enable them to demonstrate a higher sense of social responsibility in environmental protection, and to meet the requirements of the government and the market for environmental protection standards.

From the social (S) dimension, agribusinesses must fulfill their social responsibilities at a higher standard as social housing safety concerns continue to grow. New quality productivity can effectively improve housing quality monitoring and traceability systems by introducing intelligent and digital means to ensure housing safety and housing quality traceability. At the same time, technological advances have led to improved labor conditions in production. For example, the application of intelligent machinery and equipment reduces dependence on low-skilled labor, improves labor efficiency and safety in production, reduces labor intensity, and improves workers' working conditions. In addition, the new quality productivity through refined management enables real estate enterprises to create more employment opportunities while enhancing output value, promoting the development of the social economy and improving the overall welfare of society.

From the governance (G) dimension, the improvement of new quality productivity promotes the optimization of the governance structure of real estate enterprises. The introduction of digital and intelligent technologies has made the operation of real estate enterprises more transparent and the flow of information smoother, providing technical support for the improvement of the corporate governance system. Through the establishment of a digital supply chain management platform, enterprises can monitor all aspects of the production process in real time, improve the enterprise's risk identification and response capabilities, help to improve the efficiency of the internal management of the enterprise, but also enhance the enterprise's external degree of trust, reduce the risk of information asymmetry, so that the enterprise in the face of investors, consumers, and the government and other stakeholders to show higher credibility and sense of responsibility. Digital means can also promote the standardization of corporate disclosure and reporting on environmental, social and governance information, further improving corporate governance and enhancing market and social acceptance.

2.4. Research hypotheses

Based on the above theoretical analysis, the following research hypotheses are proposed:

H1: The development of new quality productivity has a significant contribution to the ESG performance of real estate companies.

H2: Digital new quality productivity can improve corporate ESG performance by alleviating financing constraints and then improving corporate ESG performance.

3. Study design

3.1. Sample Selection and Data Sources

Based on the consideration of research content and data accessibility, 1,200 real estate companies in the Shanghai and Shenzhen A-share markets from 2015 to 2024 are selected as the research sample. The CSI ESG rating is used to measure ESG compliance performance, and the data for the rest of the indicators are all sourced from the Cathay Pacific database. To ensure the validity and reliability of the data, the sample data are processed as follows: (1) The samples of ST and *ST listed companies with poor operation are excluded. (2) Considering the special characteristics of the financial industry, the sample of companies in the financial industry is excluded. (3) In order to avoid the interference of delisted companies to the study, the sample of listed companies that have been delisted is excluded. (4) The sample of listed companies with missing observations is excluded. (5) Perform Winsor2 tail reduction processing to avoid the impact of extreme values on the study. After the above processing steps, 12,462 sample data are finally retained.

3.2. Definition of variables

3.2.1. Explained variables

The explanatory variable is ESG compliance performance, which occupies an important position in

corporate management.The main ESG rating agencies are CSI, wind, and Runling Global. Given the significant advantages of CSI's ESG ratings in terms of time span, coverage and authority, it is chosen as the benchmark for measuring corporate ESG compliance performance. To facilitate the subsequent empirical analysis, the nine grades (from C to AAA) in CSI's ESG ratings are quantified and assigned a score from 1 to 9, respectively. The higher the score, the better the ESG compliance performance.

3.2.2. Core explanatory variables

The core explanatory variable is enterprise new quality productivity (DNQP). In order to comprehensively and accurately measure this key indicator, the enterprise new quality productivity measurement index system is constructed.

3.2.3. Intermediate variables

Based on the research hypotheses, financing constraints (FA) was selected as the mediating variable. The SA index of the firms was calculated by the number of years of listing and the size of the firms.

3.2.4. Control variables

Control variables include: shareholding concentration (SHARE), measured by the number of shares held by the largest shareholder as a share of the total number of shares. Management shareholding (MSHARE), measured by the number of shares held by management as a proportion of the total number of shares. Net profit margin on total assets (ROE), measured as the ratio of net profit to total assets. Cash Ratio (CASH), measured as the ratio of total cash and cash equivalents to total assets. Size of the firm (SIZE), characterized by the natural logarithm of the firm's total assets; Age of the enterprise (AGE), measured as the natural logarithm of the statistical year minus the year the enterprise was established plus one. The nature of ownership (SOE) is assigned a value of 1 for state-owned enterprises and 0 for non-state-owned enterprises. Financial leverage (LEV), characterized by the ratio of total liabilities to total assets of a firm. The variables are defined as shown in Table 1.

Table 1. Variable definition

Variable type	Variable name	Variable symbol
Explained variable	ESG	ESG
Interpretation variable	New productivity	DNQP
Mediation variable	Financing constraint	SA
Control variable	Equity concentration	SHARE
	Management shareholding ratio	MSHARE
	Total return on equity	ROE
	Cash ratio	CASH
	Enterprise size	SIZE
	Enterprise age	AGE
	Property rights	SOE
	Financial leverage	LEV

3.3. Modeling

3.3.1. Basic regression model

To test the research hypothesis H1, the basic regression model (1) was constructed:

$$ESG_{it} = \alpha_0 + \alpha_1 DNQP_{it} + \sum Control_{it} + \sum Ind + \sum Year + \varepsilon_{it} \quad (1)$$

Where, ESG_{it} is the model explanatory variable, which represents the new quality productivity of firm i in year t; $DNQP_{it}$ is the core explanatory variable of the model, which represents the level of new quality productivity of firm i in year t, and $Control_{it}$ represents the control variables, $\sum Ind$ and $\sum Year$ represent industry fixed effects and year fixed effects, respectively, and ε_{it} represents the random disturbance term.

3.3.2. Mediated effects model

To test the research hypothesis H2, the mediation effect model (2) was constructed:

$$ESG_{it} = \gamma_0 + \gamma_1 DNQP_{it} + \gamma_2 SA_{it} + \sum Control_{it} + \sum Ind + \sum Year + \varepsilon_{it} \quad (2)$$

where SA_{it} is the model mediator variable that represents the financing constraints of firm i in year t.

4. Analysis of empirical results

4.1. Descriptive statistics

The results of descriptive statistics are shown in Table 2. The maximum and minimum values of the explanatory variable enterprise ESG performance (ESG) are 5.849 and 1.374, respectively, and the ESG performance of the sample enterprises varies greatly, the mean value of enterprise ESG performance (ESG) is 4.562, the median is 4.011, and the standard deviation is 1.028, which indicates that most of the sample enterprises have a good ESG performance, and the ESG performance of the enterprises is normally distributed that satisfies the research conditions. The maximum value of the explanatory variable new quality productivity (DNQP) is 5.749, the minimum value is 0, and the mean value is 2.074, and there is a large gap in the level of new quality productivity of real estate enterprises. The mediating variable financing constraints (SA) has a minimum value of 1.689, a maximum value of 16.075, and a standard deviation of 3.074, indicating that the financing constraints of the sample firms vary widely. The minimum value of the net profit margin on total assets (ROE) is -0.547 and the maximum value is 3.428, which indicates that the sample firms have a wide range of operating conditions, with some firms experiencing negative growth. The minimum value of enterprise size (SIZE) is 20.846, and the maximum value is 27.482, and the maximum and minimum values of each control variable differ greatly, which indicates that the sample enterprises are selected in a larger range, with obvious differences, which is conducive to the control of the study.

Table 2. Descriptive statistics

Variable	Observed value	Mean	Median	SD	Minimum	Maximum
ESG	12462	4.562	4.011	1.028	1.374	5.849
DNQP	12462	2.074	3.685	1.223	0	5.749
SA	12462	14.899	10.486	1.074	1.689	16.075
SHARE	12462	22.562	16.415	6.496	20.462	28.415
MSHARE	12462	20.623	15.428	4.623	18.749	30.546
ROE	12462	0.085	1.384	0.389	-0.547	3.428
CASH	12462	0.786	0.416	1.068	0.048	6.817
SIZE	12462	21.634	24.526	2.526	20.846	27.482
AGE	12462	2.294	2.963	0.617	1.065	4.856
SOE	12462	0.306	0.011	0.469	0	1
LEV	12462	0.463	0.401	0.203	0.071	0.886

4.2. Correlation analysis

The results of the correlation analysis of the variables are shown in Table 3. The Pearson coefficient between ESG and new quality productivity (DNQP) of real estate companies is 0.036, which is significant at 1% level. Meanwhile, the VIF value of each variable is less than 1.87, and the average VIF value is 1.38, indicating that there is no serious multicollinearity problem in each variable.

Table 3. Correlation analysis results

	ESG	DNQP	SA	SHARE	MSHARE	ROE	CASH	SIZE	AGE	SOE	LEV
ESG	1										
DNQP	0.036***	1									
SA	0.189***	0.168***	1								
SHARE	0.112***	-0.015***	0.074***	1							
MSHARE	0.059***	0.011***	0.065***	-0.013	1						
ROE	0.018*	-0.003	-0.002	-0.012	-0.138***	1					
CASH	0.123***	0.065***	0.034***	-0.031***	-0.038***	0.692***	1				
SIZE	0.158***	0.096***	0.112***	0.345***	0.416***	0.587***	0.694***	1			
AGE	-0.172***	0.006	0.463***	0.412***	0.348***	0.326***	0.224***	0.198***	1		
SOE	0.005***	-0.051***	0.089***	-0.158***	-0.008	0.006	0.132***	0.002	0.003	1	
LEV	-0.048***	-0.039***	0.022***	0.073***	0.036***	0.698***	0.426***	0.321***	0.241***	0.267***	1

4.3. Benchmark regression analysis

The results of the benchmark regressions are shown in Table 4. Column (1) reports the results without controlling variables and fixed effects, column (2) controls for industry fixed effects and year fixed effects, column (3) adds control variables, and column (4) controls for firm fixed effects and year fixed effects and adds control variables. The regression results from columns (1) to (4) show that the regression coefficients of new quality productivity are all significant at the 2% level, indicating that the development of new quality productivity can promote the high-quality development of real estate firms' ESG, and hypothesis H1 is verified.

Table 4. Benchmark regression results

	(1)ESG	**(2)ESG**	**(3)ESG**	**(4)ESG**
DNQP	0.165***	0.072***	0.265***	0.032***
	(142.66)	(26.42)	(17.58)	(12.03)
SA			0.068***	0.018***
			(16.32)	(2.79)
SHARE			0.006***	0.004***
			(14.35)	(5.26)
MSHARE			3.125***	1.234***
			(36.05)	(8.75)
ROE			0.712***	0.198***
			(24.38)	(5.16)
CASH			0.623***	0.098***
			(7.89)	(1.64)
SIZE			0.056***	0.014***
			(15.25)	(2.66)
AGE			-0.143***	0.213***
			(-20.03)	(18.04)
SOE			0.623***	0.284***
			(24.87)	(5.89)
LEV			-0.486***	-0.498***
			(-24.53)	(-18.05)
Sample number	3.568***	4.715***	0.623***	2.745***
	(302.15)	(175.62)	(6.98)	(22.46)
constant_	NO	NO	YES	YES
Year	NO	YES	NO	YES
Industry	NO	YES	NO	YES
N	12462	12462	12462	12462

4.4. Mechanism testing

Based on the results of the benchmark regression above, this paper uses the mediation effect model to test the mechanism of the role of new quality productivity in influencing the ESG performance of real estate companies, and the specific results are shown in Table 5. Columns (1) and (2) show the results of the financing constraint mitigation mechanism test. Among them, the parameter estimates of new quality productivity (DNQP) affecting financing constraints (SA) are significantly negative at the 1% level, indicating that new quality productivity (DNQP) can alleviate financing constraints (SA). The coefficient estimate of financing constraints (SA) affecting firms' ESG performance is negative and passes the significance test at the 5% level, which proves that financing constraints (SA) impede firms' ESG performance improvement. The parameter estimates of new quality productivity (DNQP) affecting firms' ESG performance are significantly positive at the 10% level, indicating that new quality productivity (DNQP) can increase firms' ESG performance by alleviating financing constraints (SA) and thus increasing firms' ESG performance. Thus, the partial mediating role of the financing constraint alleviation mechanism (SA) is confirmed. In summary, new quality productivity (DNQP) can increase the ESG performance of real estate companies through the financing constraint alleviation mechanism (SA), and hypothesis H2 is valid.

Table 5. The mechanism test of new quality productivity and enterprise ESG performance

	SA	**ESG**
	(1)	**(2)**
DNQP	-0.312***	0.728***
	(-3.846)	(1.926)
SA		-3.947***
		(-2.548)
Control variables	YES	YES
Industry	YES	YES

Year	YES	YES
CONSTANT	1.485*** (4.926)	1.447*** (4.835)
N	12462	12462
Adj-R^2	0.726	0.674

4.5. Heterogeneity analysis

Enterprise growth represents the long-term profitability and sustained value-added ability of an enterprise, and is a centralized reflection of the enterprise's room for sustainable development. Corporate growth is measured using Tobin's Q and the total sample is divided into high-growth and low-growth corporate groups according to the annual industry median of Tobin's Q in order to test the heterogeneous impact of real estate corporate growth on the relationship between new quality productivity and corporate ESG performance. The level of enterprise technology is an important condition for tapping the development potential of digital new quality productivity. In accordance with the Guidelines for Industry Classification of Listed Companies (2012 Revision), the total sample is divided into high-tech and non-high-tech enterprise groups to verify the heterogeneity of real estate enterprises' technology level in terms of the impact of novelty productivity on enterprises' ESG performance. The results of the heterogeneity analysis of new quality productivity and real estate firms' ESG performance are shown in Table 6.

Comparing the regression results in columns (1) and (2) of Table 6, it can be seen that the parameter estimates of the impact of productivity on the ESG performance of high-growth firms are larger and more significant than those of low-growth firms, indicating that new-quality productivity has a greater role in driving the ESG performance of high-growth firms. The reason may be that high-growth enterprises usually have rich industrial resources and high-yield profit channels, which can provide an important material guarantee for the development of new quality productivity and thus significantly promote the ESG performance of enterprises. Low-growth firms often face obstacles such as narrow survival space, backward business model, and incomplete product structure, which makes the environment for the development of new quality productivity biased, and to a certain extent, leads to the limited effect of new quality productivity on the promotion of corporate ESG performance.

Comparing the regression results in columns (3) and (4) of Table 6, it is found that the parameter estimates of the impact of new quality productivity on the ESG performance of high-tech enterprises and the ESG performance of non-high-tech enterprises are 0.864 and 0.571, respectively, and pass the significance test at the 1% and 5% levels, respectively. It can be seen that new quality productivity enhances the ESG performance of high-tech firms more than that of non-high-tech firms. The reason for this is that compared with non-high-tech enterprises, high-tech enterprises are more capable of accomplishing disruptive digital innovations, giving rise to new industries, new modes, and new dynamics, and empowering the development of new-quality productivity, which in turn enhances the ESG performance of enterprises.

Table 6. The heterogeneity analysis results of ESG performance of new quality productivity

	High-growth enterprise	**Low-growth enterprise**	**High-tech enterprise**	**Non high-tech enterprise**
	(1)	**(2)**	**(3)**	**(4)**
DNQP	0.835*** (4.536)	0.745*** (2.694)	0.864*** (4.375)	0.571*** (2.638)
Control variables	YES	YES	YES	YES
Industry	YES	YES	YES	YES
Year	YES	YES	YES	YES
CONSTANT	1.568*** (4.856)	1.517*** (4.716)	1.354*** (4.937)	1.462*** (4.824)
N	7415	5047	6844	5618
Adj-R^2	0.711	0.736	0.728	0.727

5. Innovative strategies to improve corporate ESG performance with new quality productivity

(1) Deepen the reform of the science and technology system and create an environment for real estate technological innovation

Science and technology innovation can not only promote productivity improvement, but also play an important role in enhancing the green sustainability of agriculture, and have a far-reaching impact

on environmental, social responsibility and governance (ESG) performance and supply chain resilience. Therefore, deepening the reform of the science and technology system, especially in the innovation of technology research and development, technology application and technology promotion system, is the basis for modernizing the real estate industry and improving productivity and sustainability.

(2) Deepen the reform of market-oriented allocation of agriculture and promote the dynamic balance of supply and demand in the real estate market

Improving the market mechanism and optimizing the allocation of resources can effectively stimulate market vitality, promote the efficient flow of housing factors, and promote the dynamic adjustment of the balance of supply and demand. With the rapid development of the digital economy, the value of production and consumption data has gradually emerged, and the transparency and efficiency of the real estate market can be significantly enhanced through the optimal allocation of data elements. In order to stabilize the market, the Government should, on the basis of giving full play to the role of the market mechanism, improve the housing price protection, insurance and reserve systems.

6. Conclusion

The development of new quality productivity has a significant contribution to the ESG performance of real estate enterprises. The empirical results show that the regression coefficient of new quality productivity (DNQP) on corporate ESG performance is 0.165 ($p<0.01$), indicating that new quality productivity has a positive effect on real estate companies' ESG performance. In addition, financing constraints play a partly mediating role in this process, and alleviating financing constraints helps to improve firms' ESG performance. Through further analysis, high-growth firms are more sensitive to the response of new-quality productivity, and the improvement of ESG performance of high-growth firms is more significant compared to low-growth firms, with a regression coefficient of 0.835 ($p<0.01$). For technology-based enterprises, the impact of new quality productivity is also more significant, with a regression coefficient of 0.864 ($p<0.01$), indicating that high-tech enterprises are able to more effectively utilize new quality productivity to promote the realization of their ESG objectives.

In summary, real estate firms can better enhance their ESG performance by increasing their investment in new qualitative productivity, especially in the areas of high-growth and high-tech firms. At the same time, the easing of financing constraints provides firms with more flexible financial support, which in turn promotes the realization of ESG objectives. Therefore, policymakers should strengthen support for new and qualitative productivity and promote continuous innovation and improvement in ESG by enterprises.

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