

# *ESG Performance, R&D Innovation and High Quality Development of Corporate: A Perspective Based on Firm Performance*

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**Abstract:** Corporate performance of ESG plays an important role in promoting high-quality development. There is an intrinsic link between corporate ESG performance and innovation investment and corporate performance. This paper analyzes the relationship between them using data from Chinese listed companies over the period 2010-2020. The ESG performance, R&D investment and corporate performance scores of Chinese companies show a decreasing trend during the sample years. Chinese firms have a limited role of ESG on corporate performance during the sample years. Corporate innovation plays a negative role on corporate performance. Corporate ESG has a mediating role between corporate innovation and corporate performance.

## 1. Introduction

The concept of ESG (Environmental, Social, Governance) was first introduced by the United Nations Environment Programme in 2004, which advocates enterprises should consider ESG performance in three main areas: environment, social responsibility and governance, including the need to pay attention to environmental protection, social responsibility and corporate governance. In the new stage of high-quality economic development, achieving higher quality, more efficient, more equitable and more sustainable development has become the direction and goal of corporate development.

Therefore, under the guidance of high-quality economic development, how to achieve sustainable development at the enterprise level and based on innovation to achieve sustainable development of enterprises has become an important issue of concern to the academic community in recent years. Under the guidance of the current five development concepts, the construction of ecological civilisation has been placed at a strategic level in the overall development of the whole country, and the awakening of the inner consciousness of enterprises, the external institutional pressure they face and the stakeholder issues have also attracted widespread public attention. In recent years, China's economy has shifted from a stage of rapid growth to a stage of high-quality development. The report of the 19th Party Congress clearly states that it is necessary to "promote the transformation of the

quality, efficiency and dynamics of economic development and improve total factor productivity". With the rapid development of the economy, ESG disclosure and green innovation play an important role in corporate value. This paper will further examine why companies with excellent ESG performance are more likely to achieve long-term value.

## 2. Review of the Literature

Both corporate ESG performance and its 3 dimensions significantly enhance corporate performance. Both corporate ESG performance and its 3 dimensions significantly enhance corporate innovation. The results of the intrinsic mechanism test indicate that there is a mediating effect of corporate innovation in the relationship between corporate ESG performance and its three dimensions and corporate performance. The results of heterogeneity analysis indicate that ESG performance and its three dimensions contribute more to corporate performance in firms with lower levels of corporate performance; ESG performance and its three dimensions contribute more to corporate performance in non-state-owned firms; ESG performance and its three dimensions have a more significant effect on corporate performance in firms in highly environmentally sensitive industries[1]. In the context of the new era, the establishment of a sound ESG system with Chinese characteristics can improve the accuracy of investment and provide important financial guarantees and boosting power for green transformation and high-quality development by mobilizing multifaceted subjects and integrating multidimensional indicators. Then, based on the overall understanding of ESG system, they construct a theoretical analysis model to explore the potential impact and mechanism of this system on green transformation and high-quality development; finally, from three levels: sound constraint mechanism, focus on comprehensive evaluation and regulation of financing. Finally, the further establishment and improvement of the ESG system with Chinese characteristics is discussed from three levels: sound constraint mechanism, focus on comprehensive evaluation, and regulation of financing constraints[2]. The ESG performance has a significant effect on the book value and market value of enterprises. ESG performance achieves value effects through different channels of action: on the one hand, ESG responsibility fulfillment performance significantly reduces financing costs and alleviates the financial burden of enterprises, thus promoting the book value of enterprises; on the other hand, good evaluation of ESG responsibility fulfillment significantly enhances market attention and releases more positive signals, which in turn increases the market value of enterprises. In the eastern region, ESG performance of enterprises has a stronger value effect[3]. The ESG performance of the sample companies is at an average level, and the phenomenon of polarization is more prominent, with most of the top-ranked companies having uneven and uncoordinated conditions in the three dimensions of environment, society and governance[4].

Furthermore, The imbalance between financial supply and demand is further exacerbated by higher environmental risks, and that in-depth implementation of ESG investment concepts and vigorous promotion of ESG-related information disclosure[5]. A number of concepts such as environmental, social and corporate governance (ESG), which have become more common in the international community to ensure financial support for high-quality development, can also be widely promoted from the regulatory level. The logical unity of ESG and the high quality development of the Chinese economy. The ESG performance of firms has an important role in high-quality development[6]. The ESG scoring system has different degrees of positive effects on listed companies in different industries[7]. There is a U-shaped relationship between corporate ESG performance and financial performance, and this U-shaped relationship is strengthened by competitive strategy. The social indicators included in ESG have the most significant U-shaped impact on financial performance[8]. The companies with high ESG scores tend to exhibit better performance levels and that media attention has a moderating role in the effect of ESG on corporate performance[9]. ESG

performance has a significant positive impact on enterprise value; For non-state-owned enterprises, small-scale enterprises and enterprises in non-polluting industries, ESG performance plays a more obvious role in promoting enterprise value[10].

In summary, the academic community has conducted useful research on ESG performance, research investment and corporate performance from different perspectives, and has made some research progress. However, there are still shortcomings in the studies that have been conducted. Firstly, the research on ESG is still controversial, and the findings of scholars are varied and do not accurately identify the role of ESG for companies. Secondly, the current research on ESG is not comprehensive enough, as it basically focuses on the impact of ESG performance on innovation success and lacks research on other aspects.

### 3. Research Design

#### 3.1. Sample Selection and Data Sources

In this paper, 3,729 listed companies in the A-share market that have conducted ESG social responsibility scores from 2010 to 2020 were selected as the research sample, and the scores were based on the information disclosed by listed companies on their own and negative information in three major areas: total ESG score, innovation score and performance. Companies with missing key financial data were excluded, and a total of 3024 sample data were obtained. The mean values of each of the overall ESG total score, innovation score and performance of the 3024 listed companies from 2010 to 2020 were calculated. The processing and econometric analysis of the research data in this paper was completed through Excel 2016.

#### 3.2. ESG Score Evaluation

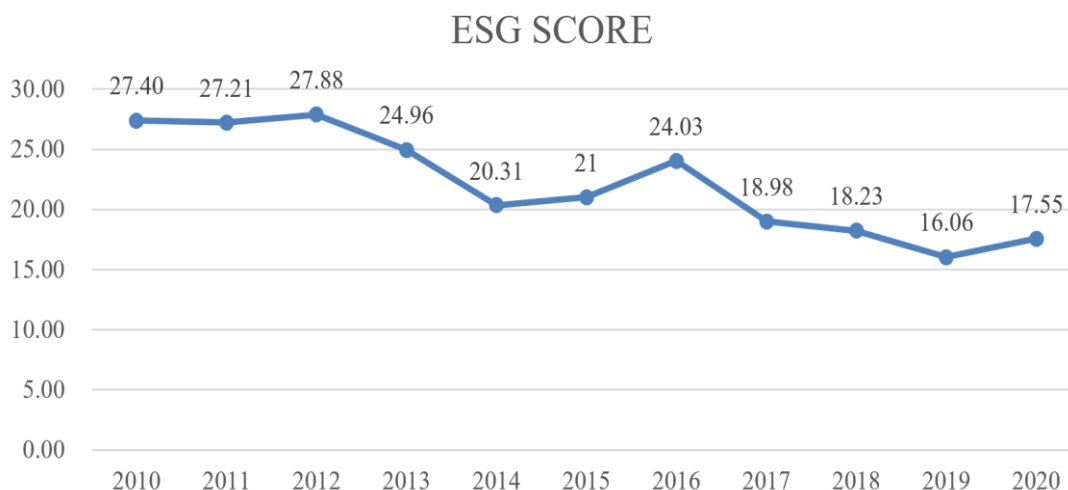


Figure 1: ESG Score.

As shown in Figure 1, according to the total ESG score statistics, from 2010 to 2020, the ESG scores of 3024 listed companies are trending from high to low, fluctuating up and down. The Figure shows that the ESG data score fluctuates little during the 10 years and is relatively stable.

### 3.3. Innovation Score

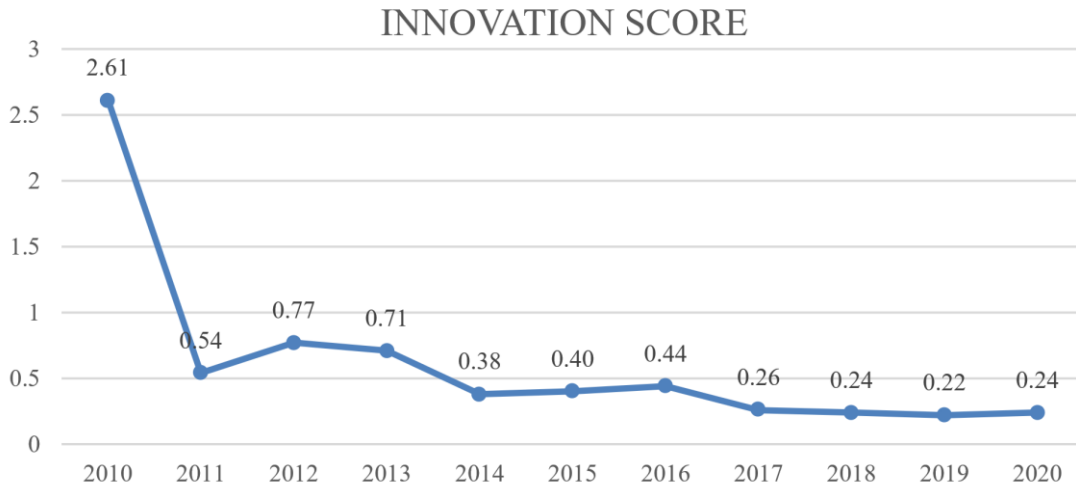


Figure 2: Innovation Score.

As shown in Figure 2, the trend in the Innovation Score is usually from high to low, with the Innovation Score showing a downward trend from 2010 to 2011, with a large decline. 2011 to 2020 also shows an up and down, erratic trend, but the fluctuations are not particularly pronounced. The trend from 2016 to 2019 is the most stable, with the least upward and downward fluctuations.

### 3.4. Business Performance Score

The trend in performance from 2010 to 2020 is from high to low, with performance mainly trending gradually downwards, partly up and down, with a moderate decline. The mean value is trending up and down, with an unstable trend. As can be seen from the graph the fluctuations in the data between the 10 years are small and relatively stable. As shown in Figure 3.

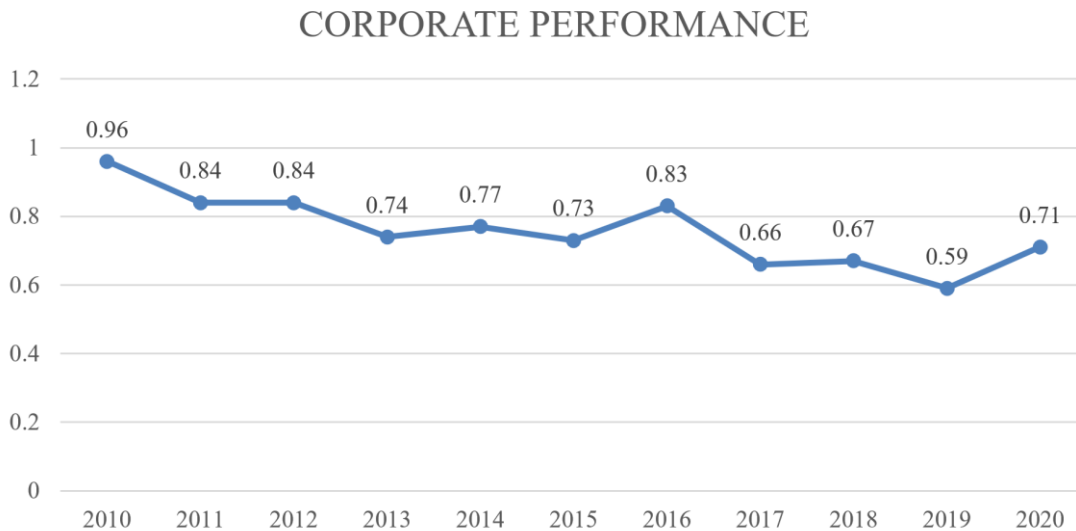


Figure 3: Corporate Performance.

The relationship between the total ESG score, the innovation score and the Performance performance score is analysed through the following equations:

$$Ratio = \frac{ESG * Innovation}{Performance} \quad (1)$$

The following conclusions were drawn from the data:

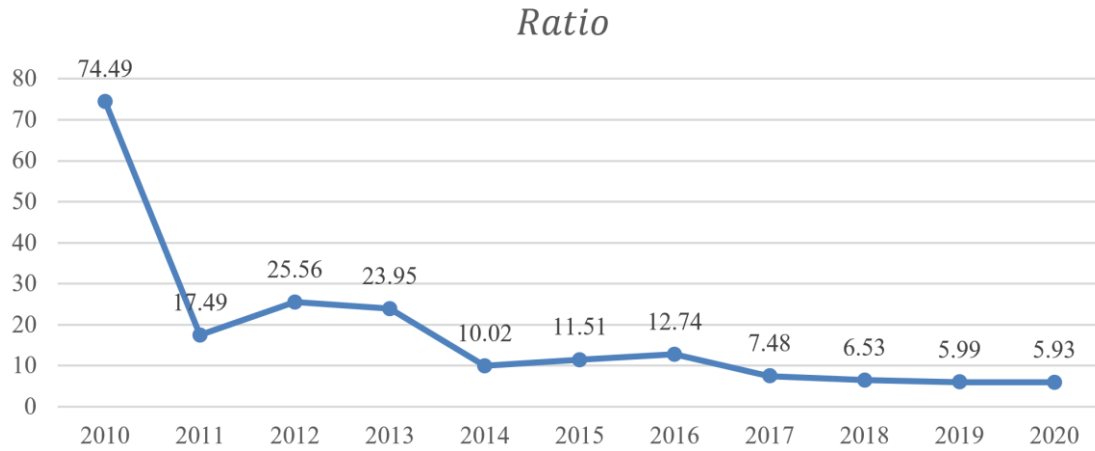


Figure 4: ESG and innovation scores relative to corporate performance metrics.

As shown in Figure 4, the relationship between ESG score, innovation score, and performance was analysed through the formula and the mean findings are shown in the graph. There is a downward trend from 2010 to 2011 with a large decline. 2011 to 2020 is an up and down trend with less fluctuation, and 2017 to 2019 is the most stable with the least fluctuation.

### 3.5. Corporate ESG Performance and Performance

#### 3.5.1. Quadratic Fit of ESG and Corporate Performance

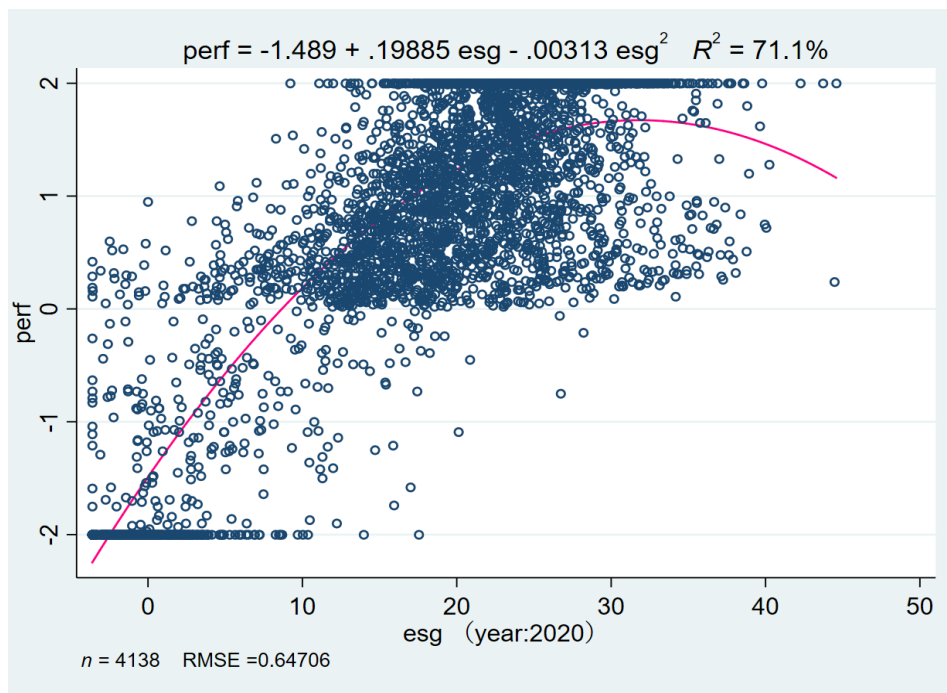


Figure 5: Quadratic Fit of ESG and Corporate Performance.

Although ESG performance of companies has become a hot issue in academic research nowadays, it also promotes high quality development of companies. However, is it true that the higher the ESG

score is, the better the business performance of a company? Is there a purely linear relationship between ESG performance and business performance? Is there a non-linear relationship?

We obtained the following graph by quadratically fitting the ESG performance score to the business performance score in 2020. As shown in Figure 5, we can see that there is a clear quadratic relationship between corporate ESG performance and operating performance. In the lower range of ESG score, there is a positive relationship between ESG performance and business performance. However, when a firm's ESG score exceeds a certain threshold, such as the interval where the ESG score is greater than 30, there is an inverse relationship between a firm's ESG performance and its business performance. In other words, there is an inverted "U" shape relationship between ESG performance and business performance. Therefore, to explore the high-quality development of enterprises from the perspective of ESG performance, we should not only emphasize the ESG score of enterprises, but also focus on the construction and optimization of ESG evaluation system and indicators suitable for enterprises and industries.

### 3.5.2. Analysis of ESG's Sub-metrics

In terms of the relationship between each sub-indicator of ESG indicators and corporate performance, each sub-indicator has different roles. Firstly, from the primary fit of each sub-indicator (As shown in Figure 7-10). Only the component indicator of corporate responsibility to shareholders has a significant positive relationship with corporate performance. And the explanatory degree of this indicator reaches 73.1%. All other sub-indicators fail the significance test for the primary fit line with corporate performance. Their explanatory strength is not statistically significant. Similarly, we fitted the quadratic relationship between each component indicator of ESG index and corporate performance (As shown in Figure 11-14). From the fitted plot of the quadratic relationship, only the component indicator of corporate responsibility to shareholders has a significant quadratic relationship with corporate performance, but the coefficient of the quadratic term of this quadratic fitted equation is very small and almost negligible. Through the above primary and secondary fitting analysis, therefore, we believe that the current corporate protection of the inclination towards shareholders' interests has led to the fact that the role of ESG performance on corporate performance has not been able to be truly realized.

### 3.6. Analysis of the Intermediation Effect of ESG

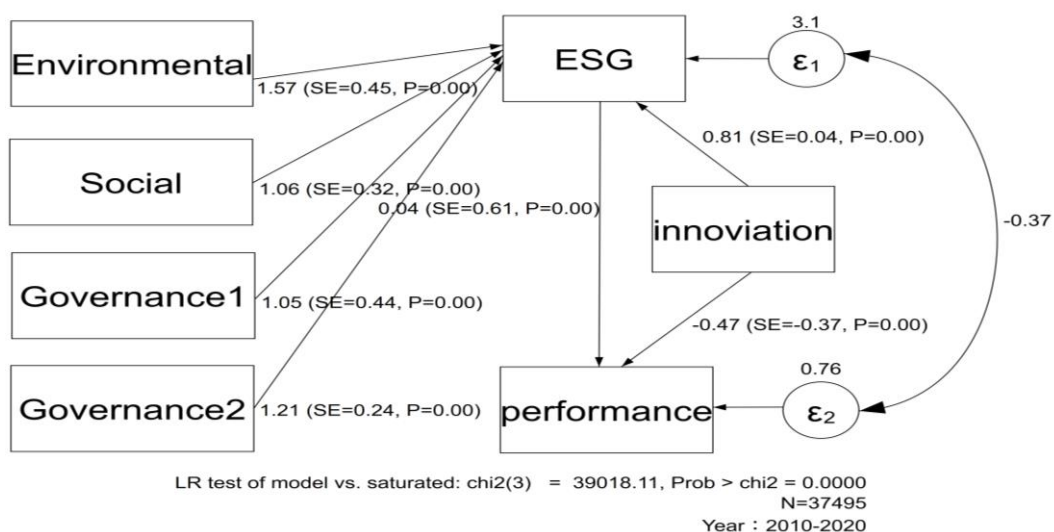


Figure 6: SEM diagram.

Since corporate innovation affects the ESG performance of firms, there may be a mediating effect of ESG between corporate innovation and corporate performance. We examine this mediating effect through the structural equation SEM, and the regression results are shown in Figure 6. The overall goodness-of-fit of the equation passed the significance test. The coefficients of each variable passed the significance test. The sample time period is from 2010 to 2020. Since it is panel data, the total sample size is 37495. by standardizing the coefficients of each variable, it can be found that the direct effect of corporate ESG on the performance of corporate performance is 0.04, while the effect of corporate innovation on corporate performance is -0.47 significant at 1% level, and the indirect effect of corporate innovation on corporate performance is 0.03 ( $0.81 \times 0.04$ ). Thus, the total effect of corporate innovation on firm performance is -0.44 ( $-0.47 + 0.03$ ). As shown in Figure 6.

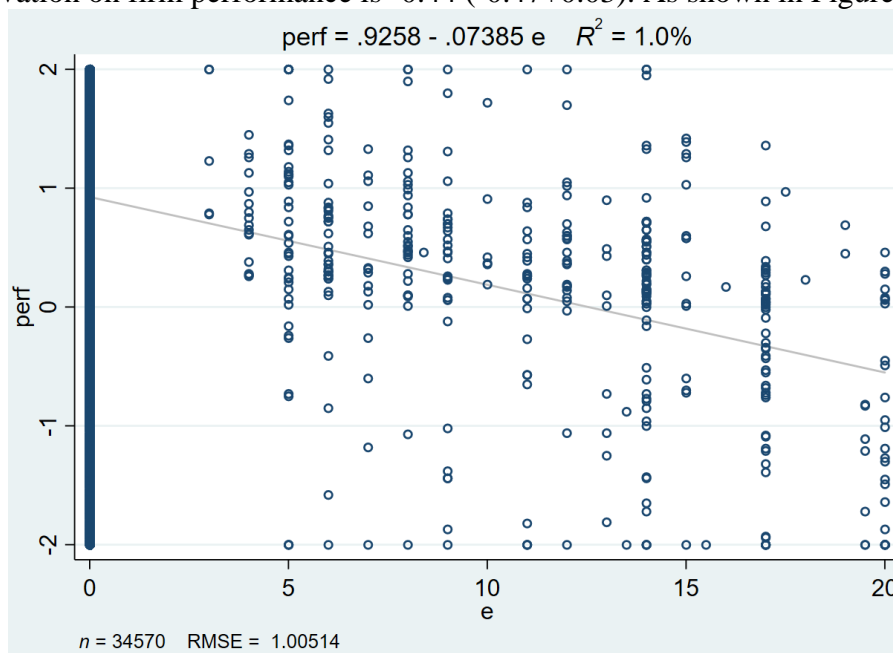


Figure 7: Primary fit of E(environment) and Performance.

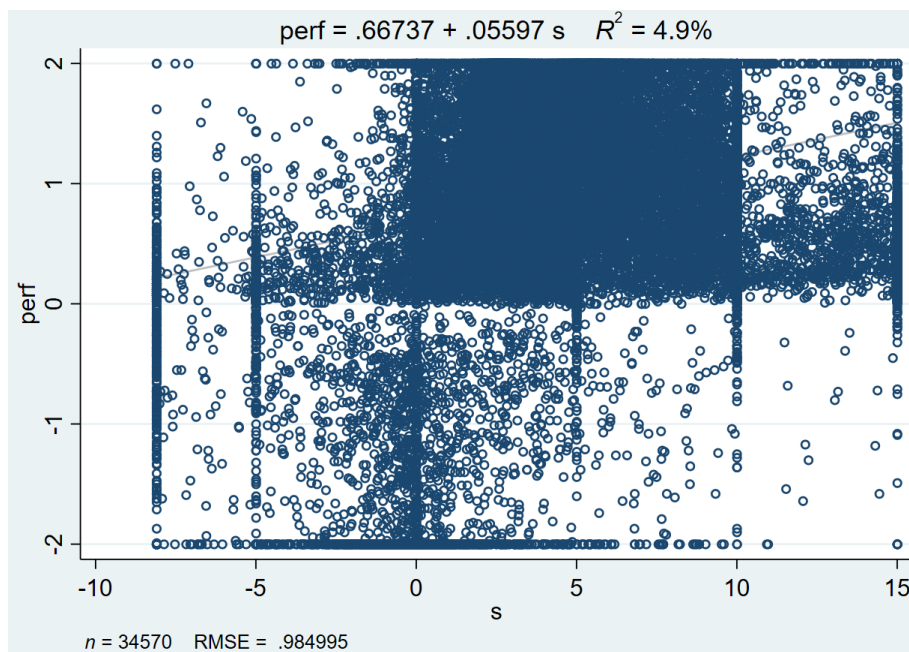


Figure 8: Primary fit of S(social) and Performance.

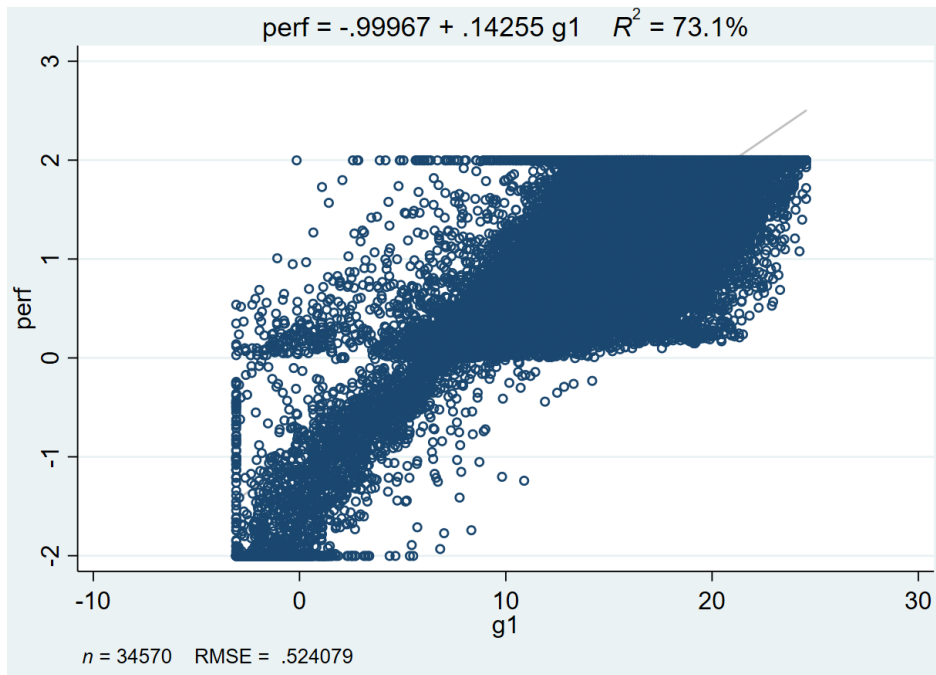


Figure 9: Primary fit of G1(Shareholder Rights Protection) and Performance.

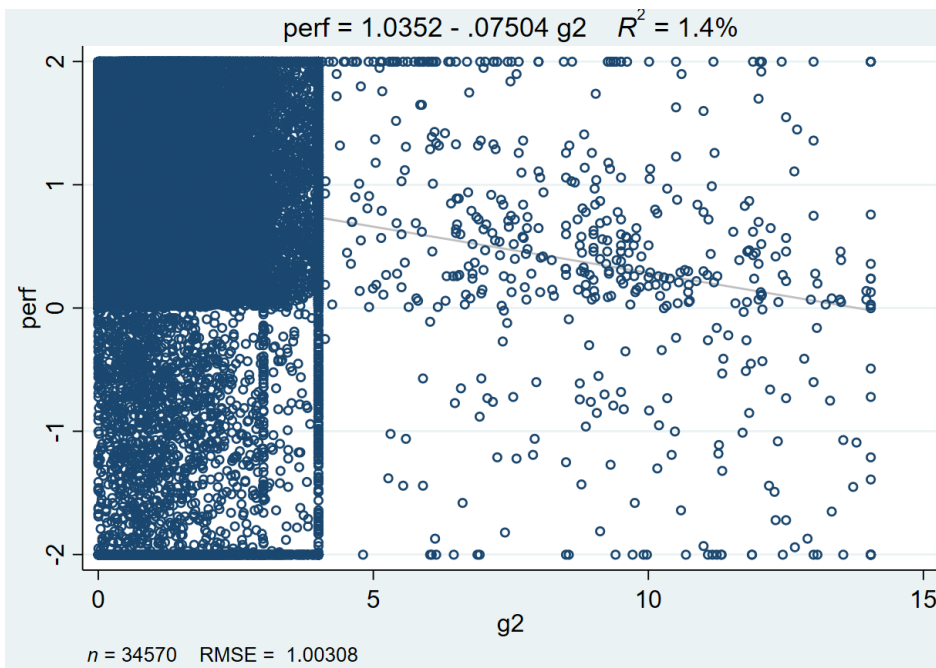


Figure 10: Primary fit of G2(Employee Rights Protection) and Performance.



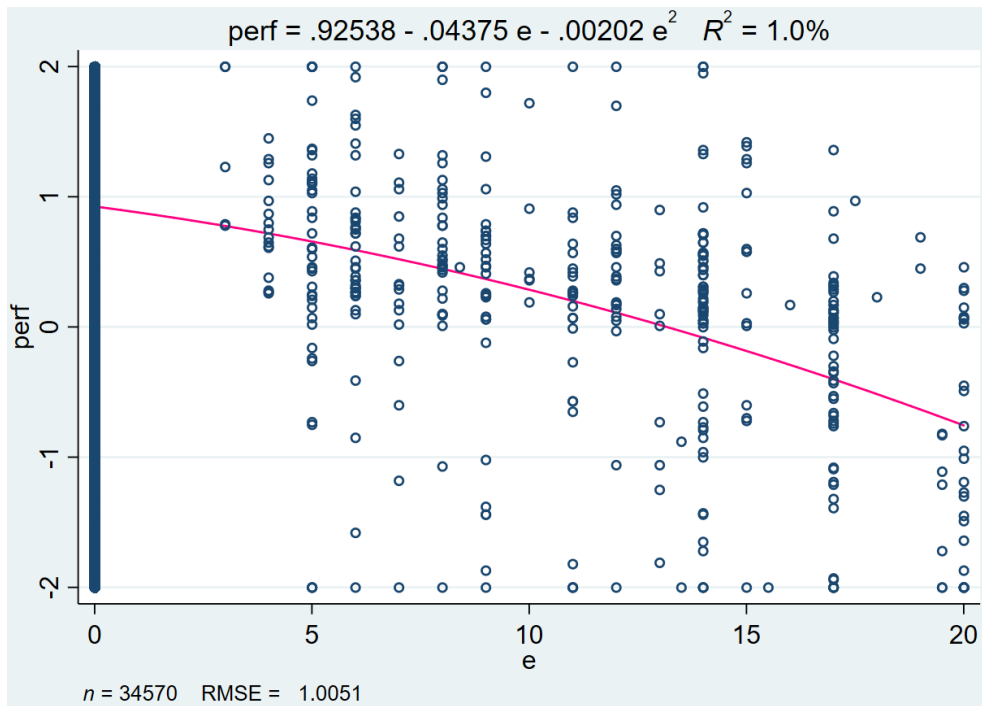


Figure 11: Quadratic fit of E(environment) and Performance.

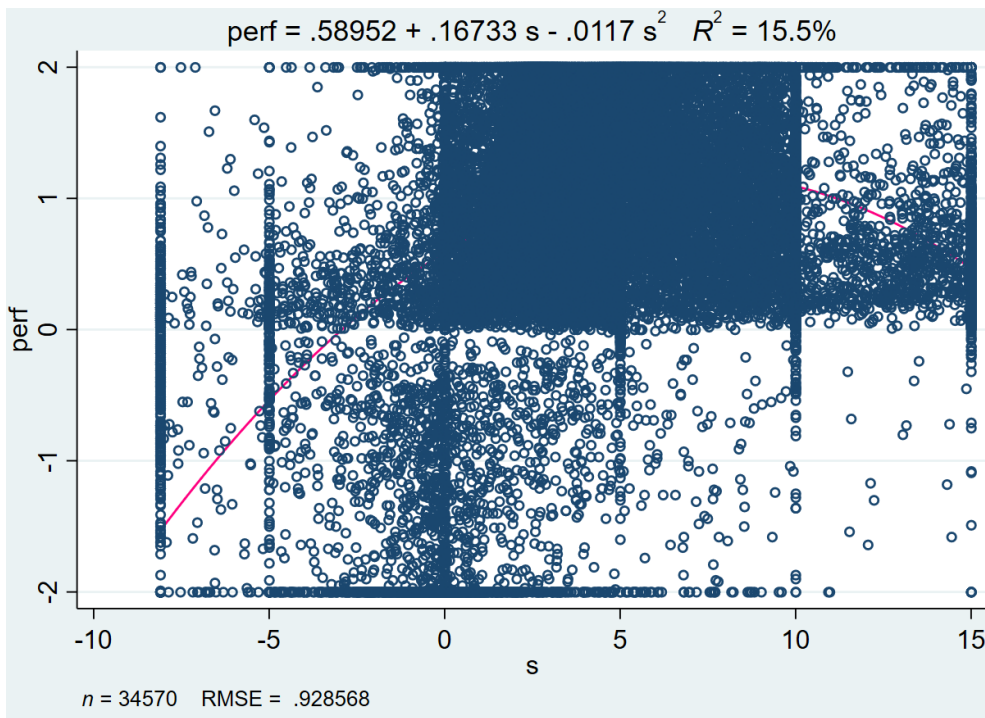


Figure 12: Quadratic fit of S(social) and Performance.

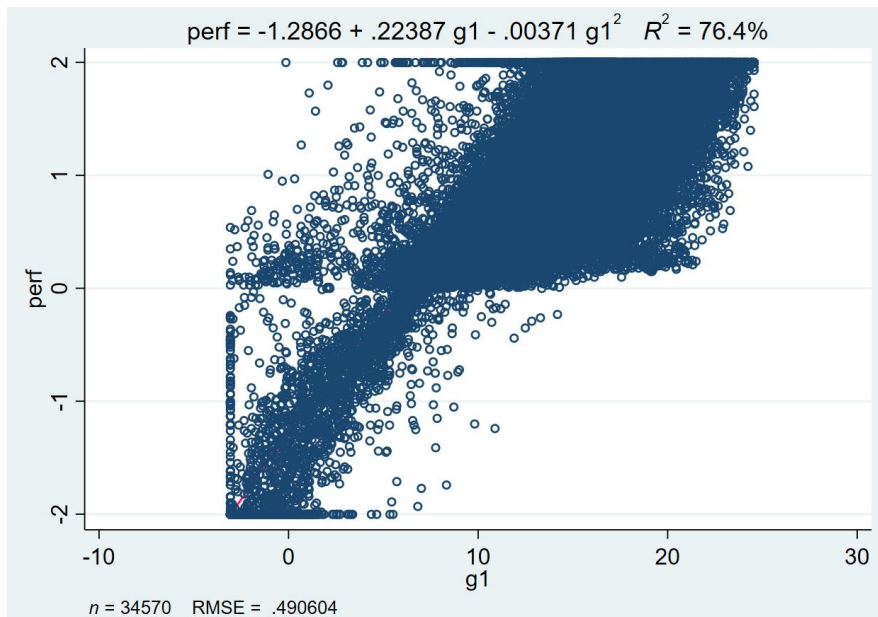


Figure 13: Quadratic fit of G1(Shareholder Rights Protection) and Performance.

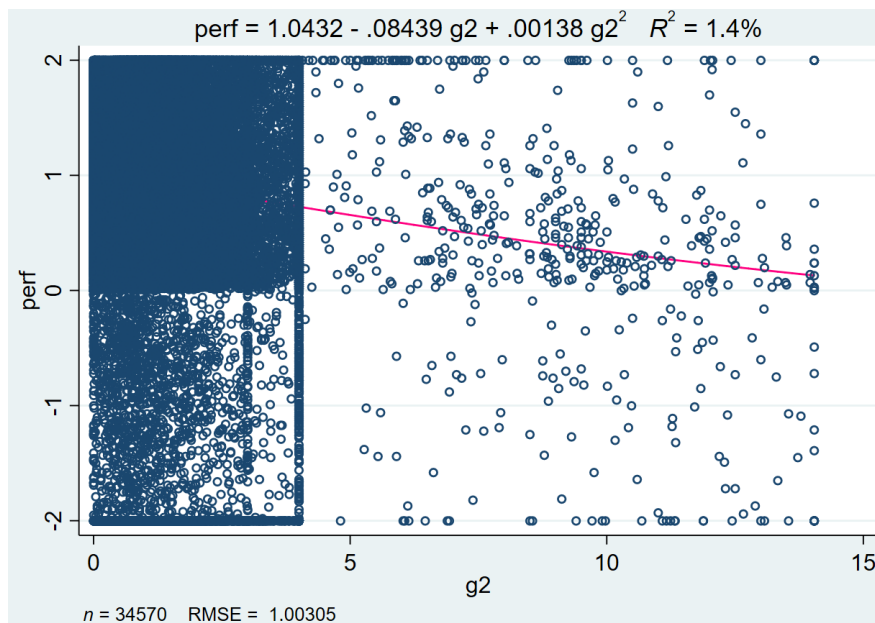


Figure 14: Quadratic fit of G2(Employee Rights Protection) and Performance.

#### 4. Conclusions

The analysis of the relationship between ESG score, innovation score and performance shows that from 2010 to 2011 there is a downward trend with a large decline, corporate ESG is not widely popularized and has little influence ability; from 2011 to 2020 is an up and down trend with less fluctuation, corporate ESG is gradually popularized; from 2017 to 2019 is the most stable with the least fluctuation, corporate ESG begins to be valued and promoted.

Based on the role of enterprise R&D in promoting the market value of enterprises, it is suggested that the government and social organisations can work together to create a corporate culture to stimulate enterprise activism and enthusiasm. In order to promote the upgrading of urban industries to support softness, it is also recommended that all sectors of society, on the one hand, create a good

competitive environment and do a good top-level design for digital infrastructure, and on the other hand, optimise the business environment, improve the market system and sound protection measures for enterprises, so that they can dare to carry out R&D and actively participate in it under dynamic conditions.

Relevant government departments should improve and perfect a complete ESG evaluation system with industry characteristics, standardise corporate ESG disclosure requirements, strengthen the supervision of corporate ESG disclosure, and establish effective incentives and penalties to more actively promote green and low-carbon transformation. In addition, enterprises should focus on cultivating employees' understanding of ESG values, and adopt technological innovation, R&D investment and other reasonable and legitimate measures to fulfil their social, environmental and governance responsibilities. They should also actively take responsibility for ESG disclosure and produce accurate ESG reports in strict accordance with relevant laws and regulations, so as to eliminate any false ESG reporting. The media should follow the principles of "objectivity, accuracy, comprehensiveness and truthfulness", and also take up their responsibility to the public, play the role of disseminating correct information, and present the image of the company to the public and investors in various industries in an objective and fair manner to help the company attract investment and thus enhance its business value.

As the ESG concept in China is still in its infancy, most listed companies and investors do not really recognize the importance of ESG responsibility, the relevant departments can step up their efforts to promote it, and can give corresponding policy preferences to companies that actively undertake ESG responsibility, such as tax relief, etc., and also make appropriate feedback to some companies with poor ESG performance. There are also some listed companies whose daily production will bring a certain degree of environmental hazards, especially the harmful substances such as waste water and exhaust gas from industrial production are not conducive to the sustainable development of the environment, under the current global warming environment, protecting the environment is an act that we cannot afford to delay, and enterprises should no longer take profit maximisation as the economic criterion, but should recognise the great significance of actively taking up the protection of the environment. In addition, listed companies should also pay attention to research and development and innovation, combining the fulfillment of ESG responsibilities while adding innovation investment, and focus on green technology innovation and promoting the high-quality development of our enterprises. From the perspective of investors, under the problems of global warming changes and governance of the environment, it can be seen that companies with better ESG performance have very good development prospects, and investors should not take profitability, asset size and other indicators as investment indicators for listed companies, but should fully recognise the understanding of the ESG concept, increase investment in ESG responsibility, and contribute to the sustainable development of China's ESG concept development and motivate companies to improve their ESG performance.

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