The Impact of Perceived Economic Policy Uncertainty on Corporate ESG

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Abstract. The ESG rating system has received more and more attention as an important reference for measuring corporate sustainability, and the external economic environment is considered to be an important factor affecting corporate ESG performance, however the perception of corporate economic policy uncertainty, as an important external economic environment, and how it affects corporate ESG performance has not yet been adequately investigated. This paper uses the annual report data of A-share listed enterprises from 2010 to 2020, and through a two-way fixed effects model, firstly, we carry out a benchmark regression, and then this paper carries out a heterogeneity analysis to explore the differential impact of economic policy uncertainty on enterprises by comparing the ESG scores of enterprises with different characteristics, and the mechanism study finds that economic policy uncertainty can affect the ESG performance of enterprises through the channels of enterprise digitisation and enterprise scale, in which economic policy uncertainty can influence the ESG performance of enterprises through the channels of enterprise digitisation and enterprise scale. ESG performance, in which economic policy uncertainty slows down the process of enterprise digitisation and reduces enterprise ESG performance; economic policy uncertainty cut down enterprise size and reduces enterprise ESG performance.

Keywords: Economic Policy Uncertainty; Corporate ESG; Corporate Digitalisation; Firm Size.

1. Introduction

With economic and social development, sustainability plays an increasingly important role in economic development. Following the publication of Silent Spring by the American scientist Carson in 1962, the concept of sustainable development was put forward in the mid-1980s in pursuit of the coordinated development of the three aspects of the economy, society and the environment, and the core idea is that economic growth should be based on the ability of ecological sustainability and social sustainability. In 2015, the United Nations adopted the "Transforming Our World - 2030 Agenda for Sustainable Development", which puts forward 17 United Nations Sustainable Development Goals (SDGs), and China, as a supporter and practitioner of the UN's 2030 Agenda for Sustainable Development, has made a major deployment of deepening the reform of the ecological civilisation system in the new era of a new journey in the Decision of the Third Plenary Session of the 20th CPC Central Committee and has made a major deployment of reforming the ecological civilisation system from the perspective of perfecting the ecological civilisation foundation to sounding the ecological environment governance system. system, improving the ecological environment governance system, and improving the mechanism for green and low-carbon development in 3 areas, and put forward a series of reform initiatives.2024 On 12 April, the Shanghai Stock Exchange, the Shenzhen Stock Exchange, and the Beijing Stock Exchange simultaneously issued the "Self-disciplinary Supervisory Guidelines for Listed Companies - Sustainability Reporting (for Trial Implementation)", which requires that the prescribed index sample companies and companies listed both domestically and internationally should disclose sustainability reports (ESG reports). China's ESG development has entered the fast lane, with the elevated ESG disclosure requirements for listed companies and the record-setting scale of domestic green bond issuance, which has made enterprises realise that while pursuing economic benefits, they should shoulder the responsibility of protecting the environment, the obligation of contributing to the society, as well as optimising and upgrading their internal corporate governance structure. Corporate ESG performance has a significant impact on enterprises,

and good ESG ratings make it more likely for enterprises to gain the trust of regulators, win the recognition of investors and consumers, accumulate valuable social capital, and lay a solid foundation for their future development. Therefore, the study of ESG performance has strong practical significance.

There are many factors affecting firms' ESG ratings, Kai Wang et al. (2024) find that network group shareholding can effectively enhance firms' ESG performance, Lili Zhou et al. (2024) find that chain shareholders promote firms' ESG performance; T.Y. Shu et al. (2024) find that green tax reforms can enhance the ESG performance of heavily polluting firms; and Tingfang Wu et al. (2024) argue that an increase in the degree of firms' environmental uncertainty would reduce firms' ESG scores. Wang Haojun et al. (2024) find that industry association affiliation significantly improves firms' ESG performance, and further research shows that industry association affiliation improves firms' ESG performance through the transmission paths of lowering firms' perceived uncertainty, improving management integrity, and suppressing executives' negative ethical behaviours, and that this enhancement is more significant in non-state-owned firms, in firms that are not affiliated with the government, and in firms that have higher levels of media attention and analysts' attention. and the higher media attention and analysts' attention. Deng Chuyao et al. (2024) find a significant positive correlation between institutional investors' shareholding and corporate ESG performance, and a significant contribution to the three dimensions of environmental (E), social responsibility (S) and corporate governance (G) performance, which supports the "effective monitoring hypothesis" of institutional investors. Among the many influencing factors, the perceived economic policy uncertainty of enterprises, as an important external economic environment, has a significant impact on the ESG ratings of enterprises. Economic uncertainty is an important factor affecting the economic development of countries, and its complexity and multi-dimensional impact cannot be ignored, not only in the macro level of national economic fluctuations and policy adjustments, but also in the micro enterprise's daily operations and decision-making. In the face of the changing economic policy environment, enterprises need to constantly adjust their business strategies to adapt to the new market rules, which is accompanied by high costs and risks, but also provides enterprises with new impetus and opportunities. Therefore, it is of great theoretical significance to study the influencing factors of ESG.

Based on the above background, it is of strong practical significance to study the impact of perceived economic policy uncertainty on corporate ESG ratings. This paper plans to study the impact of perceived economic policy uncertainty on corporate ESG performance through a two-way fixed-effects model using data from the annual reports of A-share-listed enterprises from 2010 to 2020, while it plans to explore whether the regression structure is robust by replacing the word frequency of economic policy uncertainty with the sentence frequency as well as by adding the industry fixed-effects, and then conducts heterogeneity analyses by comparing eastern and western enterprises, state-owned versus non-state-owned firms, and young versus old firms in terms of ESG scores to explore the differential impact of economic policy uncertainty on firms. Meanwhile, this paper will further analyse through which variables economic policy uncertainty affects firms' ESG ratings. It is expected to help enterprises consider external environmental factors more comprehensively when making strategies and decisions so as to make more scientific and reasonable decisions, and it is expected to help policymakers pay more attention to the long-term development and social responsibility of enterprises when formulating economic policies, so as to formulate more scientific and reasonable policies that are conducive to the common development of enterprises and society.

2. Literature Review

2.1 Research on Corporate ESG Performance

The concept of ESG was first proposed by the United Nations Global Compact in 2004, and with the development of the economy, ESG has gradually developed into ESG responsible investment. Renneboog et al. (2008) believe that ESG responsible investment is a kind of investment mode in

which the scope of investment is closely related to the ethical viewpoint, and it will take the initiative to exclude the content that violates the ethical viewpoint. With the rapid development of the economy and the emergence of social and environmental issues, the content of ESG has been further enriched and gradually developed into socially responsible investment, which puts forward the idea of pursuing both financial and social objectives. Subsequently, at the beginning of the 21st century, corporate governance became a new focus of attention, at which time the new concept of ESG was formally put forward, i.e., ESG is divided into three dimensions, namely, corporate governance, environment and social responsibility. On this basis, scholars have conducted numerous discussions on the connotation of the concept of ESG responsible investment, but the conclusions have not yet been agreed upon. Bollen (2007), by analysing the concept of ESG responsible investment, argues that the purpose of investors' ESG responsible investment not only includes improving financial performance, but also wants to obtain social recognition through ESG responsible investment, which in turn improves non-financial performance: and scholars believe that companies engage in ESG responsible investment only to allow external investors to fully understand the company's investment strategy (Nicholls, 2010). In recent years, ESG has become a "wind vane" for the sustainable development of Chinese enterprises, and since 2024, China's ESG regulatory policies have been released intensively, and corporate ESG disclosure has increased in quantity and quality. Scholars in China generally believe that ESG investment is to effectively control risks and obtain lasting and efficient returns, and to take environmental, social responsibility and corporate governance factors into consideration when making investment decisions (Gao See et al., 2017); other scholars believe that ESG responsible investment is an investment model that bundles corporate interests with social values, and that public interest is taken into consideration when making investment decisions, and is no longer a factor in corporate governance (Gao See et al., 2017). public interest into consideration, no longer simply consider only the maximisation of the company's interests, but more comprehensively consider factors such as the environment, society and corporate governance, in order to promote the balanced development of the company's operation and society, and to achieve sustainable value appreciation of the company's value while promoting the long-term development of society (Sun Shuzhang et al., 2021).

In terms of factors influencing ESG ratings, Zhou Lili et al. (2024) find that chain shareholders have a positive effect on corporate ESG performance, and the mechanism analysis reveals that chain shareholders improve corporate ESG performance by increasing the level of analysts' attention and the quality of internal control, i.e., chain shareholders have an informational effect and a governance effect on corporate ESG performance. Li Ying et al.2024 found that clients included in carbon emissions trading pilots can significantly improve corporate ESG performance, and a sub-dimensional study of corporate ESG performance shows that clients included in carbon emissions trading pilots have a significant effect on corporate performance in the E and S dimensions, while the effect on corporate performance in the G dimension is not significant. The above studies mainly explore the influencing factors of ESG responsibility performance of listed companies from the micro perspective, and the macro environment also has a certain impact on the ESG responsibility performance of listed companies. There are also some scholars that economic policy uncertainty affects the ESG ratings of listed companies, but there are still few studies in this area, which is also a starting point for this paper.

2.2 Studies Related to Macroeconomic Policy Uncertainty

Macro-environment is an important and uncontrollable external environment for firms, and changes in the macro-environment profoundly affect business decisions. Macroeconomic Policy Uncertainty (Economic Policy Uncertainty) means that economic entities cannot predict if, when and how authorities such as the government will adjust their current economic strategies (Gulen & Ion, 2016). Economic Policy Uncertainty can have different levels of impacts on the macroeconomy and micro firms. In terms of macroeconomic impacts, frequent shocks to the economic environment not only lead to continued fluctuations in macroeconomic variables such as GDP and inflation rates, but

also have an impact on the economic cycle (Ma & Yikun, 2016). Xu and Wang Wenfu (2018) argued that the deepening degree of economic policy uncertainty can have a negative impact on consumer demand. Economic policy uncertainty affects many aspects of micro firms. Liu Jie and Wang Shenghua (2024) argue that the impact of economic policy uncertainty on economic output has a significant time-varying characteristic, and that increased economic policy uncertainty has a strong inhibitory effect on economic output in the short term, with a weaker effect in the long term, and the impact varies significantly across different stages of development; high entrepreneurial confidence can promote output growth, with the degree of impact being enhanced and then weakened; however, economic policy Increased uncertainty affects the current rational recognition component and future expectation component of entrepreneurs on economic operation, thus producing a negative impact on entrepreneurial confidence. In terms of enterprise investment, most scholars believe that increased economic policy uncertainty will make enterprises more cautious about investment projects. In a complex and volatile business environment, firms will increase their cash flow holdings out of the need to protect themselves. The likelihood of liquidity shortage of enterprises will increase with the increase of economic policy uncertainty, so enterprises need to hold a large amount of cash to cope with the complex changes in the environment (Wu Jinghua et al., 2014). This phenomenon is more obvious in non-state-owned enterprises in China (Zhang Guangli et al., 2017). On the financing side of enterprises, the high degree of economic policy uncertainty prevents investors from reliably estimating future value based on stock prices, reducing investors' willingness and leading to a significant increase in the financing cost of enterprises (Yan Huahong and Chen Ya, 2019). From the supply side of capital, economic policy uncertainty reduces the willingness of residents to save, leading to a reduction in supply provided by banks and other financial institutions (Tian Guoqiang and Li Shuangjian, 2020). In terms of firms' innovation output, by analysing empirical data of A-share non-financial listed companies in Shanghai and Shenzhen, Qiaoxin Xie and Jinghe Chen (2023) find that economic policy uncertainty shocks inhibit the adjustment magnitude of firms' innovation inputs; the inhibitory effect of economic policy uncertainty shocks on the adjustment magnitude of innovation inputs is relatively small in strong financial pressure firms and state-owned enterprises. Regarding economic policy uncertainty and enterprise risk, it was found that enterprises have a risk-averse tendency when economic policy uncertainty rises (Wang Chaoyang et al., 2018). In order to prevent the break of the capital chain, enterprises tend to hold more cash or easily realisable assets, resulting in a decline in the conversion rate of investment and financing and expected capital gains of enterprises (Peng Yuchao and He Shan, 2020).

In summary, on economic policy uncertainty, existing researchers and scholars have thoroughly analysed the concept of economic policy uncertainty and its measurement method, the impact of economic policy uncertainty on the macroeconomy, and the impact of economic policy uncertainty on micro-enterprises at the macro and micro levels. There is a relative lack of existing research on the mechanisms of how economic policy uncertainty affects firms' ESG ratings. In view of this, this study further examines the channels that increase firms' ESG ratings on the basis of exploring how economic policy uncertainty affects firms' ESG ratings and complements the various factors that affect firms' ESG ratings.

2.3 Literature Review

After combing through a number of literatures, it is found that the articles on corporate ESG research are mainly from the micro perspective, and few scholars study the factors influencing the ESG responsibility performance of listed companies from the perspective of the external macro environment. This paper explores the influencing factors of ESG responsibility performance of listed companies from the perspective of external macro environment and further analyses and researches the influencing paths, with a view to enriching the related literature on ESG responsibility performance of listed companies. The articles on the study of economic policy uncertainty mainly focus on the economic aspects including enterprise development, high enterprise innovation, enterprise risk, etc. The existing scholars on the study of economic policy uncertainty on the ESG

performance of listed companies are mainly from one dimension of ESG, exploring the influence of economic policy uncertainty on it, and the existing scholars take ESG as a whole and study the economic policy uncertainty on its the impact of economic policy uncertainty on it.

The findings of related studies are characterised by the following: most of the literature focuses on the impact of economic policy uncertainty on firms' finances, while fewer articles focus on the impact of perceived economic policy uncertainty on firms' ESG performance; the impact of economic policy uncertainty on firms is multi-faceted, with positive as well as negative impacts; and the literature examining the impact of firms' ESG performance on firms is more diverse, while there are fewer articles exploring how it drives firms' ESG performance is less well documented. The focus and limitations in the above studies provide direction for the research in this paper.

The innovations of this paper are as follows: (1) This paper focuses on the impact of economic policy uncertainty from the perspective of ESG as a whole, and the empirical study shows that the higher the degree of economic policy uncertainty, the lower the willingness of listed companies to fulfil their ESG responsibilities, which provides new empirical evidence to study the economic consequences of economic policy uncertainty. (2) This paper enriches the research related to the influencing factors of listed companies' ESG performance. Existing scholars mainly study the influencing factors of ESG responsibility performance of listed companies from the perspective of micro-behaviour, and few scholars explore their influencing factors from the macro perspective. This paper mainly starts from the perspective of external macroeconomic policy uncertainty to explore its impact on ESG performance of listed companies.(3) This paper takes enterprise size and enterprise digitisation as mediating variables to study the path of economic policy uncertainty on enterprise ESG impact.(4) This paper carries out a heterogeneity analysis on the relationship between economic policy uncertainty and ESG performance of listed companies, and analyzes the relationship between economic policy uncertainty and ESG performance of listed companies according to the location of the enterprises, ownership, and age, which is of some reference and significance for subsequent studies.

3. Theoretical Analysis and Research Design

3.1 Data Sources and Descriptive Statistics

In this paper, companies listed on the Shenzhen Stock Exchange and the Shanghai Stock Exchange from 2010 to 2020 are used as the sample, with corporate financial data from the Cathay Pacific database (CSMAR), and economic policy uncertainty from the index published annually by Baker et al. (2016). In addition, this paper refers to previous literature and treats the sample according to the following principles: ① Excluding ST and PT listed companies, and excluding companies in the financial and real estate industries. (ii) Winsorize the tails at 1% and 99% levels for all continuous variables except business risk and economic policy uncertainty. (iii) Samples with missing values are excluded. After a series of treatments, the paper ends up with 28,313 benchmark regression samples.

From the descriptive statistics of the main variables in Table 1, the minimum value of the explanatory variable ESG is 1, and the maximum value is 9, indicating that there is a significant difference in the ESG performance of the sample enterprises, and the standard deviation is 1.119, which indicates that the variable ESG shows a normal distribution and meets the research conditions. The minimum value of the explanatory variable words is 0, and the maximum value is 1.323, indicating that there is a difference in the enterprises' perception of the economic policy uncertainty index in these years, which indicates that the uncertainty of China's economic policy has changed significantly in the past years. From the results of other variables, it can be seen that the difference between the extremes is significant, indicating that the sample selection covers a wide range, which can reflect the actual situation of macroeconomics and business operations, making this study of great practical significance.

Table 1. Results of descriptive statistics for the main variables

variant	(1) observed value	(2) average value	(3) (statistics) standard deviation	(4) minimum value	(5) maximum values
AD_code	28,313	351,705	127,749	110,000	659,006
Income	28,296	1.021e+10	7.390e+10	0	2.966e+12
AL_ratio	25,123	0.436	0.210	0.00708	1.957
fix_asset_ratio	28,298	0.215	0.166	7.86e-06	0.971
netprofit_ratio	28,312	0.0359	0.775	-48.32	108.4
cash_per	28,316	0.168	0.139	-0.165	1
state_owned	27,839	0.377	0.485	0	1
directors	28,317	9.403	2.416	0	31
independent_directors	28,317	0.378	0.0656	0	0.800
firm_age	28,316	11.17	7.412	1	31
ESG	28,798	6.485	1.119	1	9
fepu_word	28,798	0.0883	0.101	0	1.323

3.2 Variable Design

1. Core explanatory variable: economic policy uncertainty

The core explanatory variable of this paper is firms' perception of economic policy uncertainty (FEPU for short). The current economics literature mainly measures economic policy uncertainty at the national or regional level (e.g., Baker et al., 2016), and there is less literature on measuring economic policy uncertainty at the firm level. In this paper, we adopt the enterprise economic policy uncertainty index constructed by Nie Huihua et al. (2020), i.e., using the text of annual reports of listed companies, we adopt the Pvthon web crawler technology and jieba lexicon software to construct the FEPU of each enterprise, and we do it in the following way: we summarise a list of "economic policy words" and a list of "uncertainty words" through manual reading, and then we use a list of "economic policy words" and a list of "uncertainty words". list and a list of "uncertainty words", if both "economic policy words" and "uncertainty words" appear in a sentence, the sentence is considered to be the annual report of a listed company. If both "economic policy words" and "uncertainty words" appear in a sentence, it is considered to be a statement by the author of the annual report of the listed company that the company is facing economic policy uncertainty, and the sentence is recognised as an "economic policy uncertainty sentence". The part of the annual report that involves policy analysis is mainly "Discussion and Analysis of Business Situation", assuming that the number of words in this part is M, and the number of uncertain words contained in the sentence that indicates economic policy uncertainty is N, then the ratio of the number of uncertain words, N/M, is the economic policy uncertainty faced by the enterprise (FEPU).

2. Explanatory variables: corporate ESG performance

The explanatory variable ESG is from the Guotai Junan database, firm size and firm digitisation are mediating variables, and industry and time are control variables.

3. Control variables

Referring to the practice of previous scholars, this paper controls for the following variables: operating income (income), asset-liability ratio (AL_ratio), the ratio of total fixed assets to total assets (fix_asset_ratio), the ratio of net profit to total assets (netprofit_ratio), and the ratio of cash to total assets (cash_per), Whether state-owned (state_owned), number of directors, percentage of independent directors, age of the company (firm_age), administrative division code (AD_code).

3.3 Modelling

$$\mathrm{ESG}_{it} = \beta_0 + \beta_1 \cdot \mathrm{fepu\_word}_{it} + \lambda \cdot \mathrm{X}_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (1)$$

This paper uses a two-way fixed effects model, controlling for both individual fixed effects and time fixed effects to estimate the relationship between perceived economic policy uncertainty and firms' ESG scores. In the formula, β_0 is the intercept term, β_1 is the coefficient parameter corresponding to the explanatory variables, x_{it} denotes the control variables, μ_i denotes the individual fixed effects that do not change over time, v_t denotes the time fixed effects that do not change by individual, andεit is the residual term. The model is shown in (1)

4. Analysis of Empirical Results

4.1 Baseline Regression

Table 2. Benchmark regression before and after adding control variables and fixed effects

VARIABLES	(1) ESG	(2) ESG	(3) ESG
fepu_word	-0.219***	-0.289***	-0.279***
	(-3.24)	(-4.13)	(-3.96)
Income		0.000***	0.000***
		(5.84)	(5.75)
AL_ratio		-0.380***	-0.363***
		(-6.33)	(-6.01)
fix_asset_ratio		-0.044	-0.041
		(-0.59)	(-0.55)
netprofit_ratio		0.550***	0.553***
		(5.28)	(5.13)
cash_per		0.057	0.044
		(0.89)	(0.68)
state_owned			0.014
			(0.31)
directors			-0.010***
			(-3.22)
independent_directors			-0.101
			(-0.97)
firm_age			231.650
			(0.00)
AD_code			-0.000
			(-1.07)
Observations	28,332	24,894	24,471
R-squared	0.620	0.651	0.651
Company FE	YES	YES	YES
Year FE	YES	YES	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2 shows the regression results of , column 1 only controls the explanatory variables and the explanatory variables for regression analysis, from the regression results, economic policy uncertainty has an inhibitory effect on the ESG performance of enterprises, column 2 increases the variables related to the financial indicators of the control enterprise, column 3 increases the variables related to the management indicators of the control enterprise, and gradually enhances the control, from the regression results before and after the addition of the control variables , the coefficients of word frequency (fepu_word) are all significantly negative at the 1% level, indicating that the increase of economic policy uncertainty has a significant inhibitory effect on the ESG performance of

enterprises, and the higher the economic policy uncertainty, the more enterprises tend to take less social responsibility. The main reason for this may be that increased economic policy uncertainty causes enterprises to scale down their investment and reduce their development speed to reduce risk, thus reducing social responsibility; increased economic policy uncertainty slows down the digitisation process of enterprises, thus making them less willing to fulfil their social responsibility and lowering their ESG scores.

4.2 Robustness Test

1. Substitution of explanatory variables

In this paper, the economic policy uncertainty indicator of firms constructed by Nie Huihua et al. (2020) is used in the benchmark regression to construct the frequency of economic policy uncertainty words (FEPU) for each firm. The robustness test uses the frequency of the sentence (fepu_sentence) to replace the explanatory variable fepu_word, and the regression coefficient in the table is -0.018, which still indicates that the increase of economic policy uncertainty has a significant dampening effect on corporate ESG performance.

Table 3. Robustness test for replacing explanatory variables

variant	(1) ESG
fepu_sentence	-0.018***
	(-4.56)
Income	0.000***
	(5.73)
AL_ratio	-0.359***
	(-5.94)
fix_asset_ratio	-0.044
	(-0.59)
netprofit_ratio	0.553***
	(5.14)
cash_per	0.043
	(0.67)
state_owned	0.013
	(0.28)
directors	-0.010***
	(-3.24)
independent_directors	-0.102
	(-0.98)
firm_age	1,945.009
	(0.00)
AD_code	-0.000
	(-1.04)
Observations	24,471
R-squared	0.651
Company FE	YES
Ind FE	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. Increasing industry fixed effects

In the benchmark regression, controlling for both individual fixed effects and time fixed effects of firms, and adding control for industry fixed effects in the robustness test, the robustness test is conducted at different levels, and the regression coefficient is found to be -0.278, which indicates that the increase in economic policy uncertainty still has a significant inhibitory effect on firms' ESG performances in different industries.

Table 4. Robustness test for adding industry fixed effects

variant	(1) ESG
fepu_word	-0.278***
	(-3.93)
Income	0.000***
	(5.60)
AL_ratio	-0.374***
	(-6.21)
fix_asset_ratio	-0.057
	(-0.74)
netprofit_ratio	0.500***
	(4.89)
cash_per	0.016
	(0.25)
state_owned	0.021
	(0.46)
directors	-0.009***
	(-3.03)
independent_directors	-0.085
	(-0.82)
firm_age	-9.219
	(-0.00)
AD_code	-0.000
	(-1.13)
Observations	24,470
R-squared	0.654
Company FE	YES
Ind FE	YES

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

4.3 Heterogeneity Analysis

1. In China's socialist market economy environment, there are significant differences between non-state and state-owned enterprises in a number of aspects such as access to resources, access to information, scale of production, bargaining power, etc., which further leads to different levels of response to economic policy uncertainty between non-state and state-owned enterprises. In Table 7, column 1 is for SOEs and column 2 is for non-SOEs, and the regression coefficients for SOEs are not as significant as those for non-SOEs, suggesting that economic policy uncertainty plays a more significant role in dampening the ESG performance of non-SOEs. The possible reason for this is that state-owned enterprises have a certain government background and mainly undertake the country's strategic development tasks, and are less sensitive to the market. In contrast, non-state-owned

enterprises are more market-conscious, and when economic policy uncertainty increases, they tend to be less concerned and less committed to ESG practices.

Table 5. Heterogeneity analysis of firm ownership

variant	(1) ESG	(2) ESG
fepu_word	-0.222**	-0.272***
	(-2.14)	(-2.60)
Income	0.000***	0.000***
	(3.15)	(8.34)
fix_asset_ratio	0.032	-0.176
	(0.28)	(-1.64)
netprofit_ratio	0.099	0.626***
	(0.43)	(4.81)
cash_per	-0.102	-0.180**
	(-0.78)	(-2.54)
directors	-0.010**	-0.012**
	(-2.34)	(-2.54)
independent_directors	0.111	-0.169
	(0.70)	(-1.21)
firm_age	346.130	17,034.424
	(0.00)	(0.00)
AD_code	-0.000	-0.000
	(-0.22)	(-1.40)
Observations	8,796	13,846
R-squared	0.668	0.580
Company FE	YES	YES
year FE	YES	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. In view of China's wide geographic scope and the differences in the development strategies, directions and stages of each region, in order to gain a deeper understanding of how regional characteristics affect the degree of corporate ESG scores on the perception of economic policy uncertainty, this paper divides the enterprises into eastern and western enterprises, and adopts the between-groups test to split the data and regress them according to the groups, and in Table 8, the first column is for the eastern enterprises, and the second column is for the western enterprises. western enterprises, comparing the results of the heteroskedasticity test of the two groups, it is found that the regression coefficients of the western enterprises are not as significant as those of the eastern enterprises, which indicates that the role of economic policy uncertainty in suppressing the ESG performance of the eastern enterprises is more significant. The possible reasons for this are that the western region is more supported by the state and has a lower level of marketisation, while the eastern region has a higher level of marketisation and greater market sensitivity.

3. According to the heterogeneity analysis of the age of enterprises, this paper divides enterprises into young enterprises and old enterprises, and still adopts the method of between-groups test, splits the data by group and carries out the regression, in Table 9, the first column is the old enterprises, the second column is the young enterprises, and compares the results of the heteroscedasticity test of two groups, and finds that the regression coefficients of the young enterprises are significant, which indicates that the economic policy uncertainty has a more significant role in suppressing the ESG performance of the eastern enterprises. role is more significant. The possible reason for this is that young firms usually need a large amount of capital for operations, expansion and market development in the start-up stage. Economic policy uncertainty affects firms' expectations of future economic policy formulation and implementation, among other things, thereby affecting their capital needs, and

banks and other financial institutions may tighten their credit policies during periods of economic policy uncertainty, making it more difficult and costly to obtain loans. This is a great challenge for young enterprises that rely on external financing and may lead to difficulties in obtaining adequate financial support. As a result, they are more susceptible and therefore more sensitive to economic policy uncertainty than older firms, so the regression coefficients will be more significant.

Table 6. Heterogeneity analysis of regions where firms are located

variant	(1) ESG	(2) ESG
fepu_word	-0.262***	-0.391**
	(-2.81)	(-2.22)
Income	0.000***	0.000***
	(4.82)	(3.24)
AL_ratio	-0.375***	-0.182
	(-4.79)	(-1.14)
fix_asset_ratio	0.120	-0.402**
	(1.14)	(-2.22)
netprofit_ratio	0.477***	1.027***
	(3.65)	(4.25)
cash_per	0.030	0.008
	(0.37)	(0.05)
state_owned	-0.050	0.169*
	(-0.74)	(1.67)
directors	-0.012***	-0.005
	(-3.07)	(-0.62)
independent_directors	-0.144	0.090
	(-1.09)	(0.34)
firm_age	673,773.796	-3,198.304
	(0.00)	(-0.00)
AD_code	-0.000	-0.000
	(-1.56)	(-0.02)
Observations	15,074	3,908
R-squared	0.659	0.629
Company FE	YES	YES
year FE	YES	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Further Analysis

5.1 Research on the Digital Mechanism of Enterprises

Table 5 presents the regression results of the mechanism study, Column 1 shows that the coefficient of word frequency (fepu_word) is significantly negative at the 1% level, indicating that an increase in economic policy uncertainty slows down the process of digitisation of firms and that there is a mediating effect of digitisation of firms, and the regression results presented in Column 2 show that economic policy uncertainty, leads to a decrease in the level of digitisation of firms. The possible reason for this is that when economic policy uncertainty increases, it becomes more difficult for firms to anticipate future economic trends, which makes firms more cautious in making digitisation investments in order to avoid potential risks, and firms may choose to reduce or postpone their digitisation investment plans due to the fear that the investment will not be able to achieve the expected returns due to a drop in market demand or policy adjustments after the investment is made.

Table 7. Heterogeneity analysis of firm age

variant	(1) ESG	(2) ESG
fepu_word	-0.252*	-0.222**
	(-1.90)	(-2.21)
Income	0.000***	0.000***
	(2.73)	(2.86)
AL_ratio	-0.387***	-0.193**
	(-3.43)	(-2.07)
fix_asset_ratio	-0.140	-0.081
	(-1.05)	(-0.69)
netprofit_ratio	0.454**	0.277**
	(2.48)	(2.02)
cash_per	-0.122	0.019
	(-1.24)	(0.17)
state_owned	-0.143	0.073
	(-1.47)	(1.03)
directors	-0.004	-0.012***
	(-0.88)	(-2.99)
independent_directors	-0.186	-0.041
	(-1.07)	(-0.29)
firm_age	-204,192.807	-22,884.488
	(-0.00)	(-0.00)
AD_code	-0.000	-0.000
	(-0.48)	(-0.60)
Observations	9,456	11,656
R-squared	0.656	0.730
Company FE	YES	YES
year FE	YES	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Du, Chuanzhong and Li, Zehao (2024) found that digital transformation has a significant positive effect on ESG performance, and this conclusion still holds after several endogeneity treatments and robustness tests; they found that digital transformation can improve ESG performance by enhancing green innovation performance, suppressing short-sightedness of managers, and improving the efficiency of resource allocation. Liu, Fangyuan and Wu, Yunlong (2024) find that digital transformation can improve corporate ESG performance, especially in environmental and social responsibility, and the mechanism study finds that digital transformation can promote corporate financial performance and reduce corporate risk, which in turn promotes corporate green technological innovation, and thus contributes to the enhancement of corporate ESG performance.

5.2 Research on the Mechanism of Enterprise Scale

Table 6 presents the regression results of the alternative mechanism study, and column 1 shows that the regression coefficient is significantly negative at the -8.7 per cent level, suggesting that increased economic policy uncertainty slows down the growth rate of enterprise size or even downsizes enterprises. The possible reason for this is that in an environment of frequent economic policy adjustments, enterprises face greater variability in both the market environment and policy orientation, and in order to avoid potential risks and challenges, enterprises tend to adopt the strategy of downsizing in order to reduce costs, improve flexibility and anti-risk ability. In particular, enterprises with long production cycles and large fixed-asset investments are more vulnerable to economic policy uncertainty and situations such as mass layoffs.

Table 8. Mechanism study regression analysis

VARIABLES	(1) ln_digital
fepu_word	-0.278***
	(-4.58)
Income	0.000***
	(5.06)
AL_ratio	0.067
	(1.34)
fix_asset_ratio	-0.710***
	(-9.91)
netprofit_ratio	0.159**
	(2.34)
cash_per	-0.277***
	(-4.75)
state_owned	-0.086**
	(-2.15)
directors	0.012***
	(4.72)
independent_directors	-0.222***
	(-2.60)
firm_age	13.741
	(0.00)
AD_code	-0.000
	(-0.30)
Observations	24,466
R-squared	0.801

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9. Mechanism study regression analysis

VARIABLES	(1) size
fepu_word	-0.087**
	(-2.09)
Income	0.000***
	(5.86)
AL_ratio	1.315***
	(28.48)
netprofit_ratio	0.924***
	(9.00)
cash_per	0.073*
	(1.79)
state_owned	0.019
	(0.56)
directors	0.010***
	(5.77)
independent_directors	-0.188***
	(-3.30)
AD_code	0.000***
	(3.12)
Observations	21,585
R-squared	0.937

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

6. Conclusion

6.1 Conclusion of the Study

Does the increase in economic policy uncertainty promote or suppress corporate ESG performance? This paper conducts an empirical study using data from annual reports of listed firms from 2010 to 2020, and the results show that: (1) overall, the increase in economic policy uncertainty suppresses firms' ESG performance, and this conclusion still holds after a series of robustness tests; (2) mechanism studies find that economic policy uncertainty can affect firms' ESG performance through firm size and the degree of digitisation of firms (3) Heterogeneity analyses show that economic policy uncertainty significantly affects the ESG performance of non-state-owned, young, and eastern firms, and has no significant effect on the ESG performance of state-owned, mature, and western firms.

6.2 Policy Recommendations

1. Increased digitisation by listed companies

This paper finds that the dampening effect of economic policy uncertainty on the ESG responsibility performance of listed companies is more pronounced in non-state-owned enterprises (NSOEs) than in state-owned enterprises (SOEs). The reason may lie in the fact that SOEs are more closely connected to the government and have convenient access to information, while non-SOEs are in a weaker position in terms of information access. Therefore, in the face of the pressure of economic policy uncertainty, non-state-owned enterprises should strengthen their communication bridges with government departments and establish a regular information exchange mechanism to ensure that they can keep abreast of policy dynamics and provide strong support for decision-making. Secondly, enterprises should enhance internal management efficiency, optimise resource allocation and respond to market changes in a more flexible manner. Finally, listed companies should pay attention to ESG investment, which not only enhances corporate social image, but also builds a solid defence against risks in long-term development.

2. Encouraging young enterprises to enhance ESG performance

The conclusions of this paper show that young enterprises are more vulnerable to economic policy uncertainty than mature enterprises. For this reason, the state can encourage financial institutions to provide ESG-related financing support for young enterprises, such as green bonds and sustainable development-linked loans, through a variety of methods, including policy support, education and training, and financial and technical support, so as to reduce their financing costs. Selecting and recognising young enterprises with outstanding ESG performance, setting up industry benchmarks and inspiring more enterprises to actively fulfil their social responsibilities. Helping young enterprises grow and encouraging them to take on more social responsibility to enhance ESG performance will help promote high-quality economic development and sustainable social development.

3. Enhancing the stability of economic policies

Research has shown that economic policy uncertainty does weaken the willingness of listed companies to fulfil their ESG responsibilities, and there is a deep chain of logic behind this phenomenon. When economic policies are full of uncertainty, it is difficult for listed companies and other economic entities to accurately predict which policies will be introduced by the government and when they will be implemented, and this uncertainty greatly increases the risk of business operations and investment decisions. Faced with such an environment, listed companies will adopt a more cautious attitude when investing, prioritising short-term returns and risk control over long-term social responsibility and sustainable development goals. This leads to a potential squeeze on corporate investment in ESG as they need to focus their resources on addressing the immediate economic challenges posed by policy uncertainty.

In order to alleviate this problem, the Government should focus on continuity and stability when formulating economic policies, avoiding frequent changes that would bring unnecessary volatility to the market. At the same time, it is crucial to strengthen the level of information disclosure. The government should proactively, timely and accurately convey policy information to the market to

help listed companies better understand the intent and direction of the policy so that they can make more rational and long-term decisions. When listed companies are able to plan based on a clear and stable policy environment, they are more likely to integrate ESG concepts into their corporate strategies, actively fulfil their social responsibilities, and achieve a win-win situation for both economic and social benefits.

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