

Economic policy uncertainty and micro-level green development: an empirical study of Chinese textile firms

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ABSTRACT – REZUMAT

Economic policy uncertainty and micro-level green development: an empirical study of Chinese textile firms

As the world's second-largest polluter, the Environmental, Social, and Governance (ESG) transformation of the textile industry is crucial for global sustainable development. China, as a major global textile producer, has textile enterprises whose ESG performance directly impacts global climate governance objectives. However, economic policy uncertainty (EPU) poses a significant challenge to the ESG investment decisions of textile firms. ESG investments within the textile sector are characterised by substantial upfront capital, prolonged payback periods, and elevated risks, rendering them highly dependent on a stable policy environment. Policy uncertainty can significantly impede enterprises' green transition. This study investigates the impact of EPU on the ESG performance of Chinese A-share textile companies from 2009 to 2024. Our findings indicate that heightened EPU significantly diminishes the ESG performance of textile enterprises. This negative effect is particularly pronounced in financially distressed firms, those with lower information transparency, and state-owned enterprises. Mechanism analysis reveals that EPU primarily hampers ESG investment in textile firms by exacerbating bank credit contraction and prompting firms to increase cash holdings, which collectively reduce their working capital circulation capacity. This paper extends the literature on ESG determinants from a macro policy perspective, offering novel theoretical insights and empirical evidence for understanding the green transformation of traditional manufacturing industries.

Keywords: textile industry, economic policy uncertainty, corporate ESG performance, corporate cash holdings, bank credit

Incertitudinea politicii economice și dezvoltarea ecologică la nivel micro: un studiu empiric asupra firmelor textile din China

Fiind al doilea cel mai mare poluator din lume, transformarea industriei textile din punct de vedere al factorilor de mediu, sociali și de guvernare (ESG) este crucială pentru dezvoltarea durabilă la nivel global. China, în calitate de important producător mondial de produse textile, are întreprinderi textile ale căror performanțe ESG au un impact direct asupra obiectivelor globale de guvernare climatică. Cu toate acestea, incertitudinea politicii economice (EPU) reprezintă o provocare semnificativă pentru deciziile de investiții ESG ale firmelor textile. Investițiile ESG în sectorul textil se caracterizează prin capital inițial substanțial, perioade de recuperare prelungite și riscuri ridicate, ceea ce le face să depindă în mare măsură de un mediu politic stabil. Incertitudinea politică poate împiedica în mod semnificativ tranziția ecologică a întreprinderilor. Acest studiu investighează impactul EPU asupra performanței ESG a companiilor textile chineze cu acțiuni de tip A din 2009 până în 2024. Concluziile noastre indică faptul că EPU crescută diminuează în mod semnificativ performanța ESG a întreprinderilor textile. Acest efect negativ este deosebit de pronunțat în cazul firmelor aflate în dificultate financiară, al celor cu o transparență informațională redusă și al întreprinderilor de stat. Analiza mecanismului relevă faptul că EPU împiedică în primul rând investițiile ESG în firmele textile, exacerbând contracția creditelor bancare și determinând firmele să-și mărească deținerile de numerar, ceea ce reduce în mod colectiv capacitatea lor de circulație a capitalului circulant. Acest articol extinde literatura de specialitate privind factorii determinanți ESG dintr-o perspectivă macroeconomică, oferind perspective teoretice noi și dovezi empirice pentru înțelegerea transformării ecologice a industriilor manufacturiere tradiționale.

Cuvinte-cheie: industria textilă, incertitudine în politica economică, performanța ESG a companiilor, deținerile de numerar ale companiilor, credit bancar

INTRODUCTION

Recently, corporate sustainability and high-quality growth have become central themes in global economic governance. ESG performance has rapidly evolved from a voluntary, “nice-to-have” attribute to a fundamental requirement for operating in capital markets and navigating complex supply chains [1]. For resource-intensive manufacturing sectors, ESG investments are not only crucial for long-term carbon reduction and pollution control targets but also directly

influence financing costs, supply chain resilience, and access to international markets [2]. In industries like textiles, characterised by intricate supply chains and high water and energy consumption, pollution control and energy-saving facilities often require substantial, long-term, and irreversible capital commitments. Consequently, understanding the conditions under which firms sustain their ESG investments is a matter of significant policy importance and practical urgency [3]. The growing stringency of cross-border

green standards and trade rules, coupled with China's accelerated "carbon peak and carbon neutrality" agenda, has made the strategic integration of ESG into capital budgeting and performance evaluation a necessary corporate evolution [4].

While the existing literature on the drivers of corporate ESG has yielded substantial insights, it has primarily focused on internal, firm-level characteristics, such as board structure and independence [5], executive traits and incentives [6], and institutional investor oversight. In contrast, the role of the macro policy environment and its uncertainty, a fundamental external force shaping corporate decisions, remains largely underexplored. Theoretically, the net effect of economic policy uncertainty (EPU) on corporate ESG decisions is ambiguous, as it triggers two competing mechanisms. On one hand, EPU may inhibit a firm's ESG performance. Drawing on real options theory [7], when the future direction of policies (e.g., environmental taxes, subsidy standards) is unclear, the option value of waiting to make irreversible ESG investments increases significantly. In this context, rational managers may postpone or scale back such investments to avoid potential sunk costs [8]. Simultaneously, asymmetric information theory suggests that policy uncertainty amplifies the volatility of a firm's future cash flows, widening the information gap with external financiers like banks. This can lead banks to tighten credit and raise risk premiums [9], thereby severely restricting a firm's financial capacity for large-scale ESG investments. On the other hand, EPU may, under certain conditions, incentivise greater ESG investment. According to risk management theory, robust ESG performance can be viewed as a form of "reputational insurance" [10]. During periods of policy turmoil, firms that proactively engage in social responsibility can build greater social trust and stakeholder support. This "social capital" can effectively mitigate negative shocks and enhance a firm's operational resilience [11]. Therefore, forward-thinking managers may strategically leverage ESG investments to hedge against risks stemming from policy uncertainty and build a unique competitive advantage. This tension, between the "investment inhibition" driven by real options and financing constraints, and the "strategic incentive" stemming from risk management and reputation building, constitutes the central research question of this paper. Disentangling the interplay between these two forces is crucial for understanding corporate sustainability strategies in an uncertain environment.

The Chinese context provides an ideal setting for investigating this question. First, as the world's leading textile manufacturing hub, China's vast industrial scale and intricate supply chains ensure that ESG practices have significant environmental and social impacts. Second, Chinese firms face the dual pressures of international green trade barriers and the domestic "dual carbon" strategy, making their ESG decisions far more sensitive to macroeconomic policy guidance than those in mature economies [12].

Finally, China's unique, bank-dominated, and policy-influenced financial system [13] makes the transmission of economic policy uncertainty to corporate financing channels particularly direct and pronounced. These unique industry and institutional features allow us to clearly observe how policy uncertainty impacts corporate ESG behaviour through both financing constraints and risk management channels, thereby offering unique and valuable empirical evidence from the world's largest emerging economy to the international literature.

This study uses a balanced panel dataset of A-share listed textile and related manufacturing companies in China from 2009 to 2024. We integrate financial and governance data from authoritative sources and use the SNSI ESG rating as our dependent variable. We employ a widely-used measure of economic policy uncertainty and address temporal consistency by aggregating it to the quarterly level. In our empirical analysis, we first estimate the average effect of EPU on corporate ESG within a firm- and time-fixed effects framework, while controlling for a wide range of covariates, including profitability, size, leverage, growth, and industry performance. We further cluster standard errors at the firm and time dimensions to ensure robust inference. Second, for our mechanism analysis, we introduce two mediating variables, bank loans and excess cash, to test the financing constraint and risk management channels, respectively, using a combined mediation analysis and stepwise regression approach. Third, we conduct heterogeneity analyses based on ownership type, information transparency, and financial health to identify how these effects differ across firms with varying governance and constraint environments. Finally, we use an instrumental variables approach with an exogenous policy uncertainty proxy and dynamic panel estimation to address potential endogeneity and persistence issues. We also perform a series of systematic robustness checks, including using alternative EPU measures, trend filtering, outlier treatment, and alternative sample specifications.

This paper makes several key contributions: First, a Theoretical Contribution. We contribute to the theoretical literature by moving beyond the existing focus on internal firm characteristics to construct a systematic framework that links macroeconomic policy uncertainty to micro-firm ESG decisions. While traditional ESG research has often overlooked the macro policy environment as a critical external driver, we draw on insights from information economics and behavioural finance to analyse how policy uncertainty alters a firm's risk perceptions, investment expectations, and resource allocation, ultimately influencing its ESG practices. This theoretical innovation not only enriches the study of ESG antecedents but also provides a new analytical framework for understanding the complex interplay among "policy, firm, and environment", offering significant theoretical value. Second, an Industry-Specific Empirical Contribution. Our choice of the textile industry as a research focus

is both representative and policy-relevant. As a typical “high-pollution, high-energy-consumption, and labour-intensive” traditional manufacturing sector, the textile industry faces uniquely complex and profound challenges in its ESG transition. Compared to high-tech or service industries, ESG investments in the textile sector are characterised by large capital outlays, long cycles, and high technical risks, making them more dependent on a stable policy environment. Furthermore, the textile industry is a cornerstone of China’s manufacturing economy and a key sector for achieving the national “dual carbon” goal. By focusing on this specific industry, our paper provides important empirical evidence on the ESG transformation of traditional manufacturing and offers a valuable methodological reference for research on other resource-intensive, policy-sensitive industries. Third, a Methodological Contribution to Mechanism Identification. This paper makes an important innovation in mechanism analysis by being the first to identify and verify the dual transmission channels, financing constraints and risk aversion, through which economic policy uncertainty affects the ESG performance of textile firms. We find that policy uncertainty influences corporate ESG decisions through two pathways: first, through the external financing channel, where it exacerbates information asymmetry between banks and firms, prompting financial institutions to adopt more cautious lending policies. This leads to financing difficulties and rising costs for firms, forcing them to scale back ESG investments. Second, through the internal risk management channel, where policy uncertainty incentivises firms to increase cash holdings to manage potential risks, thereby reducing capital available for ESG practices. The identification of this dual mechanism not only deepens our understanding of how policy uncertainty impacts corporate behaviour but also provides a scientific basis for policymakers to design more effective ESG promotion policies. Fourth, the Discovery of Policy Heterogeneity Effects. We further uncover significant heterogeneity in the effects of policy uncertainty on different types of textile firms. Our findings reveal that the negative impact of policy uncertainty is more pronounced for financially distressed firms, firms with low information transparency, and state-owned enterprises. This discovery enriches our understanding of firm heterogeneity and provides crucial insights for designing targeted ESG policies. For financially distressed firms, EPU further worsens their financing environment, making it harder to secure the capital needed for an ESG transition. For firms with low information transparency, EPU exacerbates information asymmetry with external investors, increasing the opportunity cost of ESG investments. For state-owned enterprises, EPU may cause them to overemphasise policy signals in their ESG decisions, to the detriment of market demands. The identification of these heterogeneous effects offers a new perspective for explaining the differences in ESG behaviour among

firms with different ownership types and developmental stages.

LITERATURE REVIEW

Economic Policy Uncertainty (EPU)

Economic policy uncertainty (EPU) has a demonstrable impact at both the macroeconomic and microeconomic levels. At the macro level, EPU can lead to a decrease in aggregate output and price levels, causing a negative demand shock [14], and can influence the exchange rate and capital market volatility [9]. Recent research also indicates that such macroeconomic shocks can amplify financial market risks through cross-border capital flows [15].

At the microeconomic level, uncertainty can affect firms’ investment decisions and efficiency, exacerbate external financing constraints, and inhibit corporate innovation and R&D [16, 17]. Additionally, uncertainty may prompt firms to increase their holdings of financial assets and other non-productive expenditures. It may also increase the reliance on short-term debt for long-term investments [18] and mitigate managerial overconfidence [19]. Furthermore, existing studies show that changes in economic policy affect firms’ recycling and emission reduction behaviours [20]. Some scholars argue that corporate social responsibility can serve as a strategic tool for competitive advantage during times of EPU [21]. This perspective suggests that firms may increase their social responsibility efforts and allocate more resources to technological innovation when faced with economic policy uncertainty. However, whether firms genuinely fulfil these commitments remains a subject of debate.

Environmental, Social, and Governance (ESG)

By definition, ESG is a comprehensive framework that integrates the three key pillars of corporate behaviour: environmental, social, and governance [22]. Operationally, ESG practices increase a firm’s environmental performance pressure, broaden the scope of corporate governance, and guide firms to engage with stakeholders in co-creating value.

Academic research on ESG drivers suggests that firms are motivated to adopt ESG practices by both external regulatory pressure and internal managerial characteristics [23]. With respect to external pressure, Filatotchev and Nakajima [24] argue that firms face complex institutional pressures and demands from multiple stakeholders, which direct managerial attention toward ESG performance. Regarding internal managerial characteristics, the primary factors influencing a firm’s ESG practices are the choices, motivations, and values of the managers involved in the decision-making process. Ahn [6], for instance, found that a broader CEO attention span is associated with better sustainability performance. Similarly, Crifo et al. [5] showed that a higher proportion of internal directors can also effectively improve a firm’s ESG performance. Building on these findings, companies are increasingly incorporating ESG into their

evaluation systems and linking it to executive compensation to enhance internal incentives for ESG engagement.

In the study of ESG's economic benefits, the short-term literature has emphasised the positive impact of ESG performance and disclosure on corporate financial performance, as well as the returns on ESG-related investment portfolios. However, the findings in this area have been mixed. Some studies confirm a positive relationship between ESG practices and corporate financial performance, contending that firms actively engaged in sustainable and socially responsible practices have superior financial outcomes. Conversely, Duque-Grisales and Aguilera-Caracuel [25] found a statistically significant negative relationship between ESG scores and financial performance. From a long-term perspective, studies have examined how ESG investments and disclosures affect the future environment, reflecting stakeholders' expectations for corporate responsibility, transparency, and information provision. So, the disclosure of non-financial information related to ESG performance can elicit a positive market response. This suggests that environmental and social responsibility has become a key driver of product innovation and can create long-term value for a firm.

THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

In terms of its content, the ESG framework provides a comprehensive evaluation of a firm's environmental, social, and governance factors. It not only helps to build a positive corporate reputation but also aligns with the new development paradigm, offering a systematic and quantifiable approach to promote sustainable and green development [26]. As a foundation for socially responsible investment, the environmental dimension's metrics, such as carbon emissions, serve as an effective tool for measuring a firm's practical contribution to achieving "dual carbon" strategic goals [27,28]. While China's green economy is still in its nascent stages at the microeconomic level, ESG indicators can be a valuable complement to existing measures of an economic entity's low-carbon performance. However, as microeconomic actors, a firm's daily operations are primarily driven by the decisions of its senior managers. These managers typically prioritize stabilizing cash flow and increasing operating income. Since the long-term environmental benefits of ESG often outweigh its immediate financial returns, managers may selectively reduce or forgo ESG investments [25].

When economic policy changes, rising uncertainty can increase banks' lending risk. To mitigate this risk, banks often tighten lending standards, which can lead to a credit crunch and a distorted allocation of credit resources [29]. Consequently, the criteria for assessing corporate loan risk become more stringent, and the cost of corporate borrowing rises. Due to the volatility of economic policy, banks find it difficult to evaluate a firm's prospects. The frequent

updates to lending policies exacerbate the burden of information processing for banks, reducing firms' access to external financing and prompting them to curb investment [30]. This, in turn, lowers a firm's willingness to invest in ESG, leading them to reduce or even abandon such commitments. Furthermore, some investors perceive a firm's ESG practices as an attempt by managers to enhance their personal status and reputation, viewing it as an irresponsible behaviour that can introduce uncertainty into a firm's operations and profitability, thereby increasing investment risk. This perception can further reduce the likelihood of banks providing credit.

From the perspective of ESG returns, they are long-term, intangible, and difficult to monetise. This complicates managers' decisions regarding ESG adoption. ESG practices are a form of long-term value investment that requires substantial upfront resources. The returns are often indirect and do not generate a stable cash flow immediately. Since ESG investments divert a firm's operational resources, and a firm's available resources are finite [31], short-term financial indicators may weaken, and credit risk may increase [32]. Similarly, existing research shows that external shocks, such as physical climate risks, can significantly weaken the sustainability of corporate investments [33]. When a government engages in macroeconomic regulation, economic policies can exhibit frequent changes, which makes the external information environment more uncertain and complex. The rise in EPU increases the degree of information uncertainty in capital markets, making future market demand more difficult to predict and amplifying the volatility of corporate cash flows. This strengthens a firm's precautionary savings motive [26], prompting external investors to become more cautious. As a result, managers are more inclined to increase liquid asset holdings and focus on working capital management to mitigate the adverse impacts of the external environment on core business operations [34]. This diversion of discretionary funds reduces the resources available for other less urgent activities, including ESG investments.

In summary, under the influence of economic policy uncertainty, two primary mechanisms are at play. First, banks tighten lending standards, which reduces a firm's ability to obtain external financing and the capital available for ESG initiatives. Second, firms face increased internal cash flow pressure, which effectively means they lack the discretionary resources for effective ESG practices. That is, to reduce the risk of cash flow uncertainty and prioritise short-term returns, managers consider ESG investments, which do not generate immediate financial benefits, as non-essential long-term expenditures and therefore reduce their commitment to them. Consequently, corporate managers are more inclined to invest in projects with high short-term returns to mitigate operational risks stemming from financing constraints, rather than pursuing ESG practices. This ultimately undermines the ability of ESG to promote green development at the microeconomic level.

Based on this, this paper proposes the following hypotheses:

H1: *Ceteris paribus*, economic policy uncertainty has a negative impact on corporate ESG performance.

H2: When economic policy uncertainty increases, enterprises obtain fewer loans from banks, thereby reducing their ESG investment.

H3: When economic policy uncertainty increases, enterprises increase their precautionary cash holdings, which reduces the funds available for discretionary investment and thereby diminishes their ESG investment.

RESEARCH DESIGN

Data sources and sample selection

This study utilises Chinese A-share textile companies from 2009 to 2024 as its initial sample. We then subjected this sample to a rigorous screening process, which included: (1) excluding observations from ‘ST’ and ‘*ST’ companies (firms under special treatment due to financial distress or regulatory non-compliance), and (2) removing observations with missing data. After this screening, we obtained a final sample of 2,724 company-quarter observations. To mitigate the influence of extreme values on our results, we Winsorized all continuous variables at the 1st and 99th percentiles.

Firm-level financial and governance data were sourced from the CSMAR database, while macro-level GDP and CPI data were obtained from the National Bureau of Statistics of China website. All statistical analyses were performed using Stata 17.

Definition of variables

Economic Policy Uncertainty (EPU)

Our primary measure of economic policy uncertainty is the China Economic Policy Uncertainty Index, as developed by Baker et al. [35]. The raw data were downloaded directly from the official website: www.policyuncertainty.com. As reported by the South China Morning Post, this index is constructed based on the percentage of news articles containing the keywords “China”, “economy”, “uncertainty”, and “policy” relative to the total number of articles published in that month. Baker et al. [35] contend that the South China Morning Post, being the most influential and widely circulated English newspaper in Hong Kong, serves as a representative platform for news report retrieval. Furthermore, existing research has widely validated the applicability of this index in measuring China’s economic policy uncertainty.

Corporate ESG performance

The primary dependent variable in this study, corporate ESG performance, is measured using data from the SNSI (Sino-Securities Index) ESG rating system, a widely used and highly regarded data source in China’s A-share market. The SNSI framework is designed to provide a comprehensive and reliable basis for measuring firms’ sustainable development practices by incorporating local characteristics of

Chinese companies while benchmarking against international ESG evaluation standards.

The underlying structure of the SNSI system is granular and built upon a top-down, three-level framework. Its highest level consists of the three core pillars of ESG: Environment, Social, and Governance. These pillars are further divided into 14 specific sustainable development themes, such as environmental management, green production, employee rights, supply chain management, shareholder protection, and board operation. These themes are ultimately measured by 26 key indicators and over 130 foundational data points, which serve as the most basic units of the rating. Examples of these data points include greenhouse gas emissions per unit of revenue and the proportion of independent directors. The data is sourced from firms’ annual reports, ESG reports, government websites, and mainstream news media.

In terms of scoring, the SNSI system first standardises and scores the foundational data points. It then aggregates these scores hierarchically using industry weighting to generate individual scores for each of the three pillars, as well as a final composite ESG score. In our baseline regression, we use this standardised composite score as our primary measure of corporate ESG performance. As a continuous variable, it provides a more granular measure that can capture marginal changes in a firm’s ESG performance. For robustness checks, we also employ the nine-point ordinal scale (AAA to C) that SNSI uses to grade corporate ESG performance, thereby confirming the reliability of our findings.

Control variables

Consistent with prior studies, such as Liu et al. [36] and Ma et al. [37], we include a set of firm- and macro-level variables to control for their potential influence on ESG performance: Company Size (*Size*); Leverage Ratio (*Lev*); Return on Assets (*Roa*); Cash Flow Level (*Cfo*); Fixed Asset Ratio (*Fang*); Largest Shareholder Ownership Ratio (*First*): Measured as the ratio of shares held by the largest shareholder to total shares outstanding; Tobin’s Q (*TobinQ*); Independent Director Ratio (*Ind*); Dual Role (*Dual*); Managerial Shareholding Ratio (*MS*); Executives with Legal Background (*MLaw*).

Model design

To test Hypothesis H1, we constructed the following econometric model:

$$ESG_{it} = \alpha_0 + \alpha_1 EPU_t + \alpha \sum Controls_{it} + \theta_i + \varepsilon_{it} \quad (1)$$

where ESG_{it} represents the corporate ESG performance score for firm i in quarter t , with higher scores indicating better ESG performance and a greater commitment to sustainable development and long-term value creation. EPU_t denotes the economic policy uncertainty index for quarter t . This annual measure is constructed by arithmetically averaging the monthly EPU data for each year. $Controls_{it}$ is a set of firm- and macro-level control variables. The model

also includes firm fixed effects (θ_i) to control for time-invariant, unobservable firm characteristics, and ε_{it} is the random error term. Consistent with the literature, such as Yang et al. [38] and Xiong et al. [39], we employ firm-clustered robust standard errors to account for potential heteroscedasticity and serial correlation within firms.

To account for the potential lagged effect of EPU on firms, all control variables are lagged by one period. Consistent with Hypothesis H1, which posits that

increased economic policy uncertainty will lead to reduced ESG investment and, consequently, diminished corporate ESG performance, we expect the coefficient α_1 to be negative (table 1).

EMPIRICAL RESULTS

Descriptive statistics

Table 2 presents the descriptive statistics for our main variables. The Economic Policy Uncertainty

Table 1

VARIABLE DEFINITIONS		
Variable name	Variable symbol	Variable definition
Corporate ESG performance	ESG	ESG score level for A-share listed textile companies from the SNSI ESG evaluation system (2009–2024). The original score is divided by 100 for normalisation.
Economic policy uncertainty	EPU	Annual index of China's economic policy uncertainty, calculated as the arithmetic average of monthly data from Baker et al. [35], and then divided by 100 for normalisation.
Firm size	Size	Natural logarithm of total assets.
Return on assets	ROA	Ratio of net profit to total assets.
Growth	Growth	Year-on-year growth rate of enterprise operating income.
Leverage ratio	LEV	Ratio of total liabilities to total assets.
Cash flow from operating activities	Cfo	Ratio of net cash flow from operating activities to total assets.
Fixed asset ratio	Tang	Ratio of fixed assets to total assets.
Tobin's Q	TobinQ	Ratio of the company's market value to the company's replacement cost.
Largest shareholder's ownership percentage	Top1	Shareholding ratio of the company's largest shareholder.
Industry competition	HHI	Herfindahl-Hirschman Index, calculated as the sum of the squares of the market shares (based on operating income) of all firms in the industry.
Economic cycle	GDPGrowth	Year-on-year growth of the current domestic GDP.
M2 growth rate	M2Growth	Growth rate of broad money supply.
Social fixed asset investment scale	FD	Ratio of economy-wide total fixed asset investment to GDP in the current period.

Table 2

DESCRIPTIVE STATISTICS FOR CORE VARIABLES						
Variable	N	Mean	SD	P25	Median	P75
ESG	2724	0.729	0.0510	0.700	0.732	0.763
EPU	2724	3.906	2.534	1.547	3.012	5.749
Size	2724	22.01	1.268	21.09	21.83	22.70
ROA	2724	0.0110	0.0170	0.00300	0.0100	0.0190
growth	2724	0.140	0.591	-0.137	0.0500	0.265
LEV	2724	0.403	0.202	0.238	0.403	0.547
Cfo	2724	0.0120	0.0380	-0.00800	0.0110	0.0310
Tang	2724	0.179	0.148	0.0640	0.147	0.253
TobinQ	2724	2.122	1.298	1.327	1.712	2.409
Top1	2724	0.00300	0.00100	0.00200	0.00300	0.00400
HHI	2724	0.0510	0.0750	0.0120	0.0160	0.0610
GDPGrowth	2724	0.0330	0.111	0.0370	0.0880	0.107
M2Growth	2724	0.189	1.436	-0.394	-0.0970	0.435
FD	2724	0.197	0.0850	0.136	0.177	0.229

(EPU) index has a mean of 3.906 and a standard deviation of 2.534, with its 25th and 75th percentiles at 1.547 and 5.749, respectively. This indicates a relatively significant fluctuation in China's economic policy uncertainty during the sample period. The mean of the Corporate ESG Performance (ESG) score is 0.729, with a standard deviation of 0.0510. Its 25th percentile is 0.700, and the 75th percentile is 0.763, suggesting that, on average, the ESG performance of A-share textile listed companies in China is relatively high.

Benchmark regression

We begin by testing Hypothesis H1. Table 3 presents the regression results. Columns (1), (2), and (3) in table 3 all incorporate both quarter-fixed effects and firm-fixed effects. Specifically, Column (1) includes only the independent variable, economic policy uncertainty. Column (2) adds firm-level control variables, while Column (3) incorporates both firm-level and macro-level control variables alongside the independent variable.

The regression results consistently show that the coefficient for EPU is significantly negative at the 1% level, indicating a robust negative correlation between economic policy uncertainty and corporate ESG performance. This means that as economic policy uncertainty increases, a firm's ESG performance tends to decrease, which validates our Hypothesis H1. From an economic perspective, taking Column (3) as an example, a one-unit increase in economic policy uncertainty is associated with a 0.002-unit decrease in a listed company's ESG performance.

Regarding the control variables in our sample, the coefficient for Size is significantly positive, suggesting that larger companies tend to exhibit higher levels of ESG performance. ROA has a significant positive coefficient, implying that firms with better financial performance are more likely to actively invest in environmental, social, and governance initiatives. The coefficient for LEV is significantly negative, indicating that firms with higher financial risk tend to have lower ESG performance. Top1 (largest shareholder's ownership percentage) shows a significant positive coefficient, suggesting that a higher ownership stake by the largest shareholder is associated with greater engagement in ESG aspects. GDPGrowth is significantly positively correlated with ESG, implying that during periods of stronger economic cycles, firms tend to show higher ESG performance and are more inclined to invest in environmental, social, and governance areas. Growth has a significant negative coefficient, which is interesting and might warrant further discussion in the discussion section. TobinQ also shows a significant negative coefficient. It's important to note that control variables that do not show a statistically significant relationship with the dependent variable (e.g., Cfo, Tang, HHI, FD, M2Growth in certain models) do not necessarily imply an absence of a relationship with corporate ESG performance. Our interpretations of these control variables are confined

Table 3

BENCHMARK REGRESSION			
Variable	(1)	(2)	(3)
	ESG	ESG	ESG
EPU	-0.001*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)
Size		0.009*** (0.002)	0.009*** (0.002)
ROA		0.229*** (0.031)	0.224*** (0.030)
growth		-0.001*** (0.000)	-0.001*** (0.000)
LEV		-0.049*** (0.008)	-0.049*** (0.008)
Cfo		-0.010 (0.007)	-0.009 (0.007)
Tang		-0.006 (0.011)	-0.005 (0.011)
TobinQ		-0.003*** (0.001)	-0.003*** (0.001)
Top1		3.034** (1.439)	3.044** (1.443)
HHI			-0.004 (0.019)
GDPGrowth			0.027*** (0.005)
M2Growth			0.001*** (0.000)
FD			0.001 (0.006)
_cons	0.733*** (0.001)	0.555*** (0.043)	0.544*** (0.045)
Quarter-Fixed Effects	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes
N	2724	2724	2724
r ² _a	0.541	0.560	0.561

Note: Robust standard errors are in parentheses; ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively, the same as below.

to our specific research sample and design. Furthermore, some control variables might be subject to endogeneity, meaning their values could be influenced by other variables in the model.

Robustness tests

Alternative measures of the independent variable

In our primary regression analysis, we used the arithmetic mean of the China Economic Policy Uncertainty (EPU) index, as reported by the South China Morning Post, as our independent variable. To ensure the robustness of our findings, we additionally tested using the weighted average and the quarter-end

month value of the China EPU index from the same source. The regression results are presented in table 4, where Column (1) uses the EPU weighted average as the independent variable, Column (2) employs the EPU quarter-end month value, and Column (3) utilizes an EPU dummy variable (EPU_DUM). For the EPU dummy variable, we applied HP filtering to the quarterly mean of the China EPU index. If the resulting cyclical component was greater than 0, indicating a period of rising economic policy uncertainty, the variable EPU_DUM was assigned a value of 1. The robustness test regression results consistently indicate that the independent variable coefficients are significantly negative at the 1% level across all models. This means that economic policy uncertainty is significantly negatively correlated with corporate ESG performance; specifically, higher economic policy uncertainty leads to lower corporate ESG performance. This again validates Hypothesis H1 of our study.

Table 4

ROBUSTNESS TEST USING ALTERNATIVE BAKER ET AL. EPU MEASURES			
Variable	(1) ESG	(2) ESG	(3) ESG
EPU (Weighted Average)	-0.002*** (0.000)		
EPU (Quarter-End Value)		-0.001*** (0.000)	
EPU_DUM			-0.005*** (0.001)
Controls	YES	YES	YES
_cons	0.544*** (0.045)	0.547*** (0.044)	0.607*** (0.042)
Quarter-Fixed Effects	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes
N	2724	2724	2724
r2_a	0.561	0.562	0.561

Although most existing research on China's economic policy uncertainty uses the index constructed by Baker et al. [35], it may have certain limitations. The China Economic Policy Uncertainty Index relies solely on the South China Morning Post from Hong Kong. As an English-language newspaper, its reporting might not fully align with that of Chinese-language newspapers, potentially leading to measurement bias. Furthermore, relying on a single newspaper as a data source can make the index susceptible to reporting biases and may hinder the development of more detailed measurement indicators. In contrast, the economic policy uncertainty index compiled by Davis et al. [40] uses People's Daily and Guangming Daily, two mainstream mainland Chinese newspapers, as its data sources. This index constructs EPU by selecting keywords from economic, policy, and

uncertainty themes and statistically counting their frequency, thus offering a more objective, comprehensive, and accurate reflection of changes in China's economic policy uncertainty. Therefore, to further test the robustness of our results, we additionally used the Davis et al. [40] index to measure China's economic policy uncertainty. The results are shown in table 5, where Column (1) uses the EPU2 arithmetic average as the independent variable, Column (2) uses the EPU2 weighted average, and Column (3) employs the EPU2 quarter-end month value. The regression results indicate that the coefficient for EPU2 remains significantly negative at the 5% level, confirming that our research conclusions hold.

Table 5

ROBUSTNESS TEST USING ALTERNATIVE DAVIS ET AL. EPU MEASURES			
Variable	(1) ESG	(2) ESG	(3) ESG
EPU2 (Arithmetic Average)	-0.001** (0.001)		
EPU2 (Weighted Average)		-0.002*** (0.001)	
EPU2 (Quarter-End Value)			-0.002*** (0.000)
Controls	YES	YES	YES
_cons	0.586*** (0.044)	0.583*** (0.044)	0.581*** (0.043)
Quarter-Fixed Effects	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes
N	2724	2724	2724
r2_a	0.559	0.559	0.560

Alternative measures of the dependent variable

Our primary measure of corporate ESG performance is derived from the rating results of the Huazheng ESG evaluation system. We calculated the ESG scores for A-share listed companies in the textile industry from 2009 to 2024. These scores were initially continuous. For robustness, we then converted them into a nine-point ordinal scale, assigning higher scores to better ESG performance. Table 6 presents the regression results using these alternative dependent variable measures: Column (1) uses the original continuous Huazheng ESG evaluation score as the dependent variable, while Column (2) uses the nine-point ordinal ESG score and employs an ordered logit model to account for its ordinal nature. The results consistently show that the EPU coefficient is significantly negative at the 1% level in both models. This reinforces our primary conclusion that economic policy uncertainty has a robust negative impact on corporate ESG performance, meaning higher uncertainty is associated with lower ESG performance, further validating our core findings.

Table 6

ROBUSTNESS TESTS USING ALTERNATIVE ESG PERFORMANCE MEASURES		
Variable	(1)	(2)
	ESG	ESG
EPU	-0.029*** (0.007)	-0.075*** (0.020)
Controls	YES	YES
_cons	0.228 (0.912)	
Quarter-Fixed Effects	Yes	Yes
Firm-Fixed Effects	Yes	Yes
N	2724	2724
r2_a	0.525	

Instrumental variables

Although economic policy uncertainty is relatively exogenous for individual micro-enterprises, the performance of these enterprises can partially inform macroeconomic policy adjustments. Given that listed companies can, to some extent, reflect the current state of China's economic development, there might be a potential for reverse causality. Specifically, in the context of this study, a reverse causal relationship might exist between economic policy uncertainty and corporate ESG performance. To address this potential endogeneity issue, we employed the US Economic Policy Uncertainty index and the Global Economic Policy Uncertainty index as instrumental variables [41], conducting a two-stage least squares (2SLS) estimation. Both US and global economic policy uncertainties are closely related to China's economic policy uncertainty; for example, China's interest rates and exchange rates are quickly influenced by changes in US or global monetary policy. The regression results are presented in Columns (1) and (2) of table 7. In both columns, the coefficient of EPU remains significantly negative at the 1% level, indicating that our research conclusion is robust.

Dynamic panel

Considering the continuous nature of firms' investment and financing decisions, prior period values of the dependent variable may influence current period values. To account for this effect, we included the one-period lagged dependent variable in our model and conducted a dynamic panel GMM estimation. As shown in Column (3) of table 7, the lagged corporate ESG performance has a significant positive impact on current corporate ESG performance. However, this does not alter the fundamental conclusion regarding EPU's impact on corporate ESG performance.

Mechanism tests

Our prior analysis revealed that when economic policy uncertainty increases, firms tend to exhibit lower ESG performance. To further investigate the mechanisms through which economic policy uncertainty affects corporate ESG performance, we conducted a

Table 7

INSTRUMENTAL VARIABLE AND DYNAMIC PANEL REGRESSION TESTS			
Variable	(1)	(2)	(3)
	ESG	ESG	ESG
EPU	-0.001** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
ESG			0.945*** (0.056)
Size	0.008*** (0.002)	0.009*** (0.002)	-0.019 (0.013)
ROA	0.231*** (0.031)	0.228*** (0.031)	-1.128** (0.491)
growth	-0.001*** (0.000)	-0.001*** (0.000)	0.002 (0.003)
LEV	-0.049*** (0.008)	-0.049*** (0.008)	0.027 (0.031)
Cfo	-0.011 (0.007)	-0.010 (0.007)	-0.182 (0.178)
Tang	-0.006 (0.011)	-0.006 (0.011)	-0.065 (0.045)
TobinQ	-0.002*** (0.001)	-0.003*** (0.001)	0.001 (0.003)
Top1	3.261** (1.449)	3.179** (1.445)	-4.281 (10.578)
HHI	-0.002 (0.019)	-0.003 (0.019)	-0.080 (0.072)
GDPGrowth	0.025*** (0.005)	0.026*** (0.005)	0.032*** (0.010)
M2Growth	0.001*** (0.000)	0.001*** (0.000)	0.000 (0.000)
FD	-0.003 (0.006)	-0.001 (0.006)	0.001 (0.020)
Quarter-Fixed Effects	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes
N	2724	2724	2615
r2_a	0.049	0.049	

mediation analysis using bank loans and excess cash holdings as mediating variables.

Consistent with existing literature, we employed a sequential approach for our mediation analysis. The specific test models are as follows:

$$ESG_{it} = \alpha_0 + \alpha_1 EPU_t + \alpha \sum Controls_{it} + \theta_i + \varepsilon_{it} \quad (2)$$

$$Mediator = \beta_0 + \beta_1 EPU_t + \beta \sum Controls_{it} + \theta_i + \varepsilon_{it} \quad (3)$$

$$ESG_{it} = \gamma_0 + \gamma_1 EPU_t + \gamma Mediator + \gamma' \sum Controls_{it} + \theta_i + \varepsilon_{it} \quad (4)$$

First, we estimate the total effect of economic policy uncertainty (EPU) on corporate ESG performance. Second, we examine the effect of economic policy uncertainty on the Mediator. Finally, we include the Mediator in the regression to assess whether the

direct effect of economic policy uncertainty on corporate ESG performance is weakened. The mediating variables are bank loans (Loan) and excess cash holdings (XCash).

Bank loans

Bank credit is the most common and primary financing channel for Chinese enterprises [18]. Therefore, intensified economic policy uncertainty directly affects the banking system's credit risk. Frequent changes in domestic economic policies negatively impact firms' cash flows, while an unfavourable economic environment makes it more challenging for firms to accurately estimate the net present value of new investment projects, thereby exacerbating financing difficulties. Consequently, banks' credit assessments of firms become more challenging [42]. Furthermore, studies indicate that banks' bankruptcy risk directly increases when facing high uncertainty. To mitigate these elevated risks, banks often impose higher borrowing interest rates and adopt stricter credit policies, a phenomenon commonly known as "credit rationing" or "loan aversion" [43]. This leads to increased borrowing costs for firms, tightened financing constraints, and reduced access to external funding. Faced with difficulties in securing loans and rising costs, firms may then prioritise short-term economic interests, subsequently reducing their willingness to invest in ESG initiatives. Bank loans (Loan) are defined as the sum of the annual change in short-term loans, long-term loans, and non-current liabilities due within one year, scaled by total assets. Columns (1) and (2) of table 8 present the regression results with bank loans (Loan) as the mediating variable. In Column (1), EPU is significantly negatively associated with Loan at the 1% level, indicating that an increase in economic policy uncertainty constrains corporate bank loans. Furthermore, after incorporating the Loan variable into Column (2), the regression coefficient of EPU remains significantly negative, and the coefficient of Loan is positive and statistically significant, confirming a significant mediating effect.

Excess cash holdings

Second, regarding the impact on internal cash holdings, when economic policy uncertainty intensifies, external information becomes more complex and convoluted. This makes it difficult for management to accurately forecast future operating cash flows and market demand, leading firms to adopt more cautious strategies and reduce their investment intentions, which can, in turn, affect future profitability.

Concurrently, the precautionary savings theory suggests that holding cash helps firms cope with operational risks [34]. Thus, when risks increase, firms, driven by precautionary motives, may forgo current investment opportunities and opt to increase their cash holdings to cushion against future cash flow uncertainty. By setting aside more cash as a precautionary reserve for adverse impacts, the utilisation of firms' existing cash becomes restricted, and their idle available funds diminish. Given that ESG investments typically require substantial long-term capital, firms facing economic policy uncertainty often

choose to allocate more resources to maintaining cash holdings, thereby reducing their discretionary idle funds and consequently impacting their investment in ESG [44].

For excess cash holdings (XCash), given that firms may hold a certain amount of cash for operational and growth needs, we use excess cash as a proxy for firms' precautionary cash motives, following the method proposed by Frésard and Salva [45]. We made appropriate adjustments to their original model due to information disclosure characteristics under Chinese accounting standards. Specifically, R&D expense data is often unavailable in China, with many firms not disclosing it in their annual reports, leading to significant missing data. Therefore, consistent with most prior literature, we did not include R&D as a control variable in our model. We constructed the following model (5) to estimate firms' predicted cash holdings; the residual term from this regression represents the firm's excess cash holding, denoted as Ex_cash.

$$\begin{aligned} \ln(\text{Cash}_{it}) = & \alpha + \beta_1 \text{Size}_{it} + \beta_2 \text{CF}_{it} + \beta_3 \text{NETWC}_{it} + \\ & + \beta_4 \text{Growth}_{it} + \beta_5 \text{CAPEX}_{it} + \beta_6 \text{Lev}_{it} + \beta_7 \text{Dividend}_{it} + \\ & + \sum \text{Year} + \varepsilon_{it} \end{aligned} \quad (5)$$

Here, the dependent variable Cash represents corporate cash holdings, specifically defined as the ratio of cash and cash equivalents to total assets (denoted as Cash1). In a robustness check, we also used the ratio of cash and cash equivalents to net assets (denoted as Cash2). The control variables include Firm Size (Size); Cash Flow (CF); Net Working Capital (NETWC); Growth, defined as the company's sales revenue growth rate; Capital Expenditure (CAPEX); Financial Leverage (Lev); and a Dividend dummy variable, which takes a value of 1 if dividends were paid in the current year and 0 otherwise. We also controlled for annual fixed effects.

The regression results using excess cash holdings (XCash) as the mediating variable are shown in Columns (3) and (4) of table 9. In Column (3), EPU is significantly negatively associated with XCash at the 1% level, demonstrating that rising economic policy uncertainty leads to a reduction in firms' excess cash holdings. Moreover, after including the XCash variable in Column (4), the regression coefficient of EPU remains significantly negative at the 1% level. Its coefficient (-0.002) is smaller (more negative) than the EPU regression coefficient (-0.001) in Column (1) of table 8, and the coefficient of XCash is significantly positive at the 1% level.

In summary, both bank loans and excess cash holdings serve as significant mediating channels through which economic policy uncertainty negatively impacts corporate ESG performance. Specifically, increased economic policy uncertainty simultaneously constrains corporate bank loans and reduces excess cash holdings, which in turn leads to a decline in corporate ESG performance.

Table 8

MECHANISM TEST				
Variable	(1)	(2)	(3)	(4)
	Loan	ESG	XCash	ESG
EPU	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.002***
Loan		0.037*** (0.008)		
XCash				0.009*** (0.003)
Controls	YES	YES	YES	YES
_cons	-0.020 (0.045)	0.545*** (0.056)	0.083 (0.045)	0.540***
Quarter-Fixed Effects	Yes	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes	Yes
N	2724	2724	2689	2689
r2_a	0.094	0.562	0.149	0.562

Heterogeneity analysis

Nature of ownership

Different ownership structures cause firms to bear varying responsibilities and risks, thus leading economic policy uncertainty to have distinct impacts on different types of firms. As key representatives of national interests, state-owned enterprises (SOEs) often have investment and financing behaviours closely tied to national policies or local economic development needs. Consequently, when economic policy uncertainty rises, SOEs cannot adjust as quickly as non-state-owned enterprises (non-SOEs) [46], leading to a more pronounced impact on their ESG performance. In contrast, non-SOEs prioritize marketization and autonomous decision-making, offering greater flexibility. This makes them more adept at responding to changes in economic policy, resulting in a lesser impact on their ESG performance. Furthermore, a firm's ownership type significantly influences its access to external financing. SOEs tend to have a more singular source of loans, primarily relying on bank credit, whereas non-SOEs can access funds through more convenient channels like bond issuance and stock offerings [47]. This also grants non-SOEs greater autonomy in managing ESG-related risks.

To examine the moderating role of ownership type on the relationship between economic policy uncertainty and corporate social responsibility performance, we divided the full sample into an SOE group and a non-SOE group based on their ownership nature. SOEs were coded as 1, and non-SOEs as 0.

The regression results are presented in table 9. Specifically, Column (1) displays the regression results for the ownership type groups. The coefficient of EPU is significantly positive at the 1% level, indicating that SOEs, relative to non-SOEs, are more

stable in an environment of economic policy uncertainty. Their reduction in ESG investment is significantly smaller than that of non-SOEs.

Information transparency

As the information environment gradually improves, firms are increasingly attracting greater scrutiny and oversight. This intensifies their motivation to invest in ESG aspects to achieve better market performance. Research indicates that high information transparency can enhance market oversight of firms, leading to increased market attention and assessment. Conversely, firms with lower information transparency are more challenging to monitor effectively, which raises the incidence of misconduct, and managers can more easily conceal their illicit activities [48]. Furthermore, due to more pronounced information asymmetry for firms with lower transparency [49], the market's reaction to such behaviours tends to be more muted, consequently leading to less severe reputational losses for these firms. Therefore, when economic uncertainty intensifies, firms with lower information transparency are often more inclined to reduce ESG investments in pursuit of short-term gains.

To examine the moderating effect of information transparency on the relationship between economic policy uncertainty and corporate ESG performance, we extended Model (1) by introducing the accrued earnings management variable and constructing the following Model (6):

$$ESG_{it} = \alpha_0 + \alpha_1 EPU_t + \alpha_2 DA + \alpha_3 DA \times EPU_t + \alpha \sum Controls_{it} + \theta_i + \varepsilon_{it} \quad (6)$$

This study employs accrued earnings management (DA) as a proxy for information transparency, calculated using the modified Jones [50] model. The calculation process is as follows:

$$\frac{TA_{i,t}}{A_{i,t-1}} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \frac{\Delta REV_{i,t}}{A_{i,t-1}} + \beta_2 \frac{PPE_{i,t}}{A_{i,t-1}} + \varepsilon_{i,t} \quad (I)$$

$$NDA_{i,t} = \beta_0 \frac{1}{A_{i,t-1}} + \beta_1 \frac{\Delta REV_{i,t} - \Delta REC_{i,t}}{A_{i,t-1}} + \beta_2 \frac{PPE_{i,t}}{A_{i,t-1}} \quad (II)$$

$$DA_{i,t} = \frac{TA_{i,t}}{A_{i,t-1}} - NDA_{i,t} \quad (III)$$

where TA represents Total Accruals, calculated as Operating Profit minus Net Cash Flow from Operating Activities; NDA denotes Non-Discretionary Accruals; DA signifies Discretionary Accruals. A larger absolute value of DA indicates greater earnings management discretion and, consequently, lower accounting information quality; ΔREV_t is the change in Operating Revenue in period t ; ΔREC_t is the change in Accounts Receivable in period t ; PPE_t represents Net Fixed Assets in period t ; A_{t-1} refers to total assets at the end of year $t-1$, used to scale variables and control for firm size effects.

The calculation involves a three-step procedure: First, a cross-sectional regression (often referred to

as sub-model I in the *DA* calculation) is performed annually and by industry to obtain the estimated coefficients. Second, these estimated coefficients are then used to compute Non-Discretionary Accruals (*NDA*) (sub-model II). Finally, Discretionary Accruals (*DA*) are derived as the residual by subtracting *NDA* from Total Accruals (sub-model III).

Column (2) of table 9 presents the regression results for the moderating effect of information transparency on the relationship between economic policy uncertainty and corporate ESG performance. The results indicate that the interaction term between economic policy uncertainty and accrued earnings management (*EPU × DA*) is significantly negative. This suggests that the negative impact of economic policy uncertainty on corporate ESG performance is more pronounced in firms with lower information transparency (i.e., higher discretionary accruals).

Conversely, when firms exhibit higher information transparency (lower discretionary accruals), the detrimental effect of rising economic policy uncertainty on their ESG performance is mitigated, as they are likely more motivated to actively invest in environmental, social, and governance initiatives to manage potential risks.

Financial distress

ESG performance often demonstrates a positive relationship with a firm's financial health [51]. As uncertainty rises, firms tend to postpone investment, and managers build up cash reserves to mitigate unknown risks [52]. However, reduced investment inevitably hurts financial performance, making it harder for financially distressed firms to invest in ESG initiatives. At the same time, this investment inhibition also decreases a firm's willingness to seek external financing. Furthermore, rising economic policy uncertainty forces banks to adopt tighter credit policies [53] and complicates their credit assessments. This leaves financially distressed firms facing higher debt financing costs and stricter financing constraints [54]. When financially distressed firms are confronted with the combined pressures of economic policy uncertainty, high operating risks, and significant financing constraints, they find it more difficult to allocate resources toward corporate social responsibility, which directly undermines their ESG performance.

To examine the moderating effect of financial distress on the relationship between economic policy uncertainty and corporate ESG performance, we extended Model (1) by introducing a financial distress variable and constructing the following Model (7):

$$ESG_{it} = \alpha_0 + \alpha_1 EPU_t + \alpha_2 Zscore + \alpha_3 Zscore \times EPU_t + \alpha \sum Controls_{it} + \theta_i + \varepsilon_{it} \quad (7)$$

Here, *Zscore* is our proxy for corporate financial distress, measured using Altman's (1968) Z-score to gauge the likelihood of a firm entering financial distress. For ease of coefficient interpretation, we reverse-coded the Z-score by taking its inverse. With this adjustment, a higher Z-score indicates a higher

probability of financial distress. This approach maintains the original model's predictive validity while making the direction of the regression coefficient more intuitive.

Column (3) of table 10 presents the regression results for the moderating effect of financial distress. We find that the interaction term between economic policy uncertainty and our Z-score has a significant negative coefficient. This indicates that the negative impact of EPU on ESG performance is more pronounced for financially distressed firms. In other words, when a firm faces a higher degree of financial distress, it has a reduced incentive to prioritise ESG investments.

Table 9

HETEROGENEITY ANALYSIS			
Variable	(1)	(2)	(3)
	ESG	ESG	ESG
EPU×SOE	0.003*** (0.001)		
EPU×DA		-0.011** (0.006)	
DA		-0.020 (0.013)	
EPU×Zscore			-0.034*** (0.012)
Zscore			-0.097** (0.048)
EPU	-0.002*** (0.000)	-0.002*** (0.000)	-0.001*** (0.000)
SOE	0.009 (0.005)		
Controls	YES	YES	YES
_cons	0.552*** (0.045)	0.551*** (0.047)	0.534*** (0.045)
Quarter-Fixed Effects	Yes	Yes	Yes
Firm-Fixed Effects	Yes	Yes	Yes
N	2724	2716	2703
r2_a	0.565	0.563	0.562

CONCLUSION AND DISCUSSION

This study provides systematic empirical evidence on how economic policy uncertainty (EPU) impacts the ESG performance of listed textile companies in China, using a dataset spanning from 2009 to 2024. Our baseline regression results show that an increase in EPU significantly undermines a firm's ESG performance. This finding remains robust across a variety of checks, including using alternative variable measures, instrumental variable methods, and dynamic panel models. Our mechanism analysis further reveals two key transmission channels: financing constraints and risk aversion. First, EPU exacerbates a credit crunch by raising loan thresholds and financing costs, which limit a firm's capacity

to undertake ESG investments. Second, EPU prompts firms to increase precautionary cash holdings, diverting discretionary funds that could have been used for long-term ESG projects. Our heterogeneity analysis shows that this negative effect is more pronounced for financially distressed firms, those with low information transparency, and state-owned enterprises. Furthermore, the decline in ESG performance due to EPU can lead to a decrease in a firm's financing capabilities and total factor productivity, creating a feedback loop that hinders the green transition of the textile industry.

This research makes several important contributions to the existing literature. First, we expand the scope of ESG antecedent studies by shifting the focus from internal firm characteristics to the broader macro policy environment. We establish a theoretical framework that explains how EPU influences a firm's ESG decisions and provide empirical evidence for the dual channels of financing constraints and risk management. Second, by focusing on the textile industry, a classic example of a "high-pollution, high-energy-consumption, high-water-consumption" sector, our study addresses the practical challenges of traditional manufacturing under China's "dual carbon" goal, enriching the literature that has previously focused on high-tech and service industries. Third, our methodological contribution lies in simultaneously identifying and verifying these dual mechanisms, which deepens our understanding of how macroeconomic uncertainty shapes corporate sustainability. Our findings expand the analytical framework of the policy-firm-environment interaction and align with recent calls to incorporate macro-level factors into micro-sustainability analysis.

Our findings offer several important policy implications for various stakeholders. For government policymakers, maintaining a stable and predictable policy environment is crucial for promoting corporate ESG investment, especially in capital-intensive industries with long payback periods, like the textile sector. ESG-related regulations should prioritise policy continuity and avoid frequent or sudden changes that could undermine a firm's long-term sustainability commitments. Financial institutions, in turn, should enhance green credit mechanisms and reduce financing frictions during periods of high EPU to ensure a steady flow of ESG-oriented capital. For corporate managers, it is essential to improve infor-

mation transparency and build robust risk management systems to buffer the adverse effects of EPU on sustainable investments. Additionally, differentiated support measures are needed to address the heterogeneity of policy effects. For instance, targeted green financing policies could be implemented for financially constrained firms, stricter ESG disclosure requirements could be established for firms with low information transparency, and a balanced performance evaluation system that considers both market demands and policy guidance could be created for state-owned enterprises.

Despite our comprehensive empirical analysis, a few limitations remain. First, while we control for a variety of firm- and macro-level variables, our estimates may still be subject to omitted variable bias from factors such as industry-specific environmental regulations or global demand shocks. Second, our study primarily relies on the SNSI/Huazheng ESG rating system, and its scoring criteria may differ from other domestic or international ESG evaluation systems. Third, because our sample is limited to Chinese textile firms, the direct generalizability of our findings to other industries or countries is limited. Finally, although we performed robustness checks using alternative EPU indices, potential biases stemming from media sources may still exist.

Based on these limitations, we propose several avenues for future research. First, scholars could conduct cross-country comparative studies to test whether the mechanisms identified in our study are also valid in different institutional environments and financial systems. Second, future research could introduce diverse ESG data sources (such as Refinitiv, MSCI, or firm-level survey data) to improve measurement validity and enable multi-dimensional cross-validation. Third, the research scope could be extended to other high-impact industries (like steel or chemical manufacturing) to compare the EPU-ESG relationship across different sectors. Finally, future studies could combine scenario analysis with policy simulation to predict how changes in the policy environment might reshape firms' ESG strategies in the context of a climate transition.

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