Northumbria Research Link

Northumbria University
NEWCASTLE

University Library

Sovereign ESG and Corporate Investment: New Insights from the United Kingdom

Dongna Zhang

(dongnazhang6688@gmail.com)

Department of Accounting and Financial Management, Newcastle Business School, Northumbria University, Newcastle upon Tyne, UK

Zuoxiang Zhao*

(Corresponding Author)

(zhaozuoxiang@casisd.cn)

Institutes of Science and Development, Chinese Academy of Sciences, Beijing, China

Chi Keung Marco Lau

(marcolau@hsu.edu.hk)

Department of Economics and Finance, The Hang Seng University of Hong Kong, Hong Kong, China

Abstract

This paper examines the nexus between sovereign environmental, social and corporate governance (ESG) issues and corporate investment decisions from a sustainable perspective. By utilising firm-level balance sheets data, country-level governance and policy uncertainty data, we find country governance has a significant positive effect on firm investment. Moreover, this paper shows that climate and migration policy uncertainty has a statistically and economically significant dampening impact on corporate investment, indicating that environmental and social prospect plays a key role in promoting business investment in the United Kingdom. In addition, the empirical evidence on the moderation analysis of corporate leverage suggests that superior environmental, social, and governance performance can help businesses relieve the burden of debt overhang on firm investment. These results provide several important implications on climate change with the objectivesof the COP26 conference.

1 Introduction

A growing literature investigates how corporate environmental, social, governance (ESG) affects business performance (see, e.g., Francis et al., 2013; Broadstock et al., 2021). However, less attention has been received by the association between country-level ESG and firm investment (Nirino et al., 2021). The importance is more pronounced due to the economic and financial damage caused by the COVID-19 pandemic to enterprises worldwide (Elsayed et al., 2022).

Sovereign ESG performance provides a holistic picture of a country's economic prospect and business climate, which enable firms to make informed investment decisions aligned with the Sustainable Development Goals. Financial markets and intermediaries can benefit from superior ESG dimensions, promoting funds for business investment. Incorporating environmental and social factors with the traditionally fundamental factor governance in investigating corporate investment decisions is consistent with the UK Government Green Financing Framework (HM Treasury, 2021).

This paper seeks to address how sovereign ESG impacts corporate investment decisions in the UK from a sustainable perspective. In particular, sovereign ESG issues are proxied by climate policy uncertainty (Environment), migration policy uncertainty (Social) and institutional quality (Governance), respectively. We investigate the effects of sovereign ESG on corporate investment in the United Kingdom by using firm-level panel data for 680 non-financial firms from 2000 to 2018. The main research question we set out to answer in this study is how investment activities at frim-level are affected by the three dimensions of sovereign ESG individually. Through examining the moderating effects of corporate leverage, we also strive to reveal whether better sovereign ESG performance can play a role in mitigating the negative impacts of debt financing on investment.

The 26th United Nations Climate Change Conference of the Parties (COP26) w a s held in the UK to stimulate the fulfilment of the goals of the Paris Agreement. Systemic instability can arise from implementing climate change policies and green financing regulations during the transition to a net-zero economy (Carney, 2015; Walsh et al., 2020). Therefore, we argue that it is crucial to understand the association between climate policy uncertainty and business dynamics to achieve the COP26 goals in tackling climate change. Furthermore, migration-related policy uncertainty is an important signal of a country's social and political stability. Cross-border population movements can result in social consequences and significantly shock the domestic business environment. Accordingly, this study employs migration policy uncertainty as a proxy to investigate the role of sovereign social conditions in explaining corporate investment. In addition, good country governance and institutional infrastructure contribute to financial stability, facilitating better access to external financing and mitigating financial constraints for businesses. This issue indicates that a favourable institutional environment is beneficial in promoting investment. We select three country-level governance factors: control of corruption, government effectiveness, voice and accountability as indicators for sovereign governance.

To uncover the link between sovereign ESG and corporate investment, we adopt the panel data fixed-effects model to capture unobserved firm heterogeneity. We find that good country governance practice has a significant positive effect on firm investment. Moreover, we document that climate and migration policy uncertainty has a statistically and economically significant dampening impact on corporate investment, indicating that environmental and social stability plays

a key role in stimulating business investment in the UK. We also conduct moderation analysis by including the interaction terms of corporate leverage with sovereign ESG factors to unveil how debt financing is influenced by country-level governance, climate policy uncertainty, and migration policy uncertainty. The results imply that a sustainable environmental, social, and governance environment can help businesses relieve the burden of debt overhang on firm investment. This evidence is consistent with the theoretical grounding proposed by Myers and Majluf (1984) and Jensen (1986), pointing out that costly external financing can depress firm investment due to financial constraints and asymmetric information.

Extant literature lacks the impact of country-level ESG on firm investment from a sustainable perspective, which underscores the importance of a comprehensive empirical investigation to address the pressing need to create a sustainable and sound investment climate for UK businesses. Our findings provide fresh insights into the nexus between sovereign ESG and corporate investment in the UK in light of this situation. The empirical analysis is also robust by employing a battery of alternative econometric methodologies. More importantly, this study provides profound policy implications on climate change regarding fulfilling the goals set out in the COP26 conference.

The contribution of this paper is threefold. First, we confirm that firm-level investment is vulnerable to disruptions caused by climate and migration policy uncertainty, indicating that a stable environmental and social setting is imperative for boosting UK business investment. Second, this paper demonstrates that conducive country-level governance standards positively impact firm investment. Third, we analyse the moderating effects of sovereign ESG on the capital structure signalled by corporate leverage. To the best of our knowledge, we are the first to show that the negative effects of debt financing on corporate investment are moderated by sustainable sovereign ESG, which is usually associated with a stable financing environment. Despite the negative association between corporate leverage and firm investment, our results suggest that healthy prospects of sovereign ESG alleviate the detrimental impact of debt overhang on investment.

This study also provides several policy implications for boosting business investment and addressing climate change simultaneously. First, synergy can be created through a bottom-up approach involving governments and businesses working together to accelerate the delivery of the Paris Agreement and COP26 goals. Second, the Green Industrial Revolution (HM Government, 2020) outlines the transition to a net-zero economy. UK businesses should seize this opportunity to embrace green financing by issuing green corporate bonds to finance investment projects with positive net present value. Finally, policymakers must implement credible and forward-looking strategies decisively to foster corporate investment and support the transformation of businesses for decarbonisation.

The rest of the paper is organised as follows. Section 2 reviews the literature and addresses the research gap filled by this study. Section 3 develops the conceptual framework and tests hypotheses. Section 4 describes the empirical framework, including t h e data and methodology used in this study. Section 5 discusses the results. Section 6 offers concluding remarks and policy implications.

2 Literature Review

According to the neoclassical theory of corporate investment, the ratio of the market value of an

extra unit of the firm's capital to its replacement cost, i.e., marginal Q, serves as an adequate indicator to measure the firm's investment opportunities (Tobin, 1969). Thereby liquidity determined by internal cash flow plays a critical role in determining investment. Fazzari et al. (1988) further demonstrate that financial frictions can arise from costly external financing. Building on this theoretical underpinning, this study attempts to incorporate the broader literature on sovereign ESG to explain firm investment decisions in the UK.

Nowadays, the world has witnessed unprecedented climate changes in scope and scale. Shifts in technologies and regulations to reduce carbon emissions and address climate change can increase the cost for firms to engage in investment projects. The related uncertainty raises risks to business environments (Ye, 2022; Struckell et al., 2022; Wu & Liao, 2022). For example, extreme weather can affect the firm investment from the operational and logistical perspectives. Consequently, climate uncertainty has been put under the spotlight in a range of recent literature (Crecente et al., 2021; Puertas et al., 2022; Liang et al., 2022).

Barnett et al. (2020) propose a decision theory framework to analyse the impacts of climate change uncertainty on the economy and growth opportunities. They show that uncertainty associated with climate change, a trade-off arises for businesses as in wait until climate uncertainty is alleviated or act now by accounting for the consequences of climate change. Rubtsov et al. (2021) explore the optimal investment strategy under uncertainty by considering using the stock investment to hedge against climate change risk over different investment horizons. They find that stock investment and investor welfare are both decreased by high climate uncertainty. They also provide evidence on the importance of constructing financial instruments related to climate change to mitigate welfare loss and manage climate risk.

By adopting the approach of the quasi-natural experiment, Gu et al. (2021) evaluate how green investments decisions of businesses are affected by public concerns regarding environmental issues. Their findings indicate that heavily polluting firms put a stronger emphasis on investing in green corporate investment projects to address environmental responsibility and alleviate the adverseimpacts of pollution. Moreover, it is widely recognised that the intensity of innovation activity is an integral part in informing firm investment decisions (Aronica et al., 2022; Yuan et al., 2022; Su et al., 2022). Fernandez (2022) further document that in spite of the positive association between environmentally-friendly investment behaviour and innovation, both green investments and innovative practices are subject to finance constraints.

Migration is an inherently integrated component of a country's social ecosystem (United

Nations, 2015), and its role in promoting corporate investment has drawn a rapidly growing interest in recent years. The potential of migration in attenuating financial constraints and stimulating external financing for firms is substantial in that migration acts as an important source of funds that allows for easier access for businesses to obtain credit in the financial markets. OECD (2017) documents that the financial resources accumulated and brought by migration can be channelled into funds for business investments and financial development. Moreover, Woodruff and Zenteno (2007) analyse the relationship between migration networks and capital investment by employing the data of more than 6000 small enterprises' access to remittance flows in Mexico. They find that migration contributes to a higher level of investmentsof microenterprises by reducing capital costs and credit constraints.

Firms value flexibility during uncertain times; hence, irreversible investment usually involves capital investments that are highly sensitive to risk and financing cost (Pindyck, 1990). Nonetheless, very little research investigates the effects of policy uncertainty associated with migration on firm investment. Consequently, we utilise migration policy uncertainty as a proxy for the sovereign social matter in this study. Indeed, Gozgor et al. (2019) provide empirical evidence on the association between uncertainty and domestic credits for 139 economies. They demonstrate that increased uncertainty reduces the availability of domestic credits, which exacerbates firms financing conditions to access credit and can depress investment accordingly.

A large body of literature discusses ESG practice and its various impacts from the perspective of corporations (e.g., Avramov et al., 2021; Bofinger et al., 2022; Cui et al., 2022; Gillan et al., 2021; Serafeim & Yoon, 2022; Li et al., 2022;). Specifically, Nirino et al. (2021) examine the role of corporate controversies in explaining financial performance. They confirm a negative and significant association between controversies and performance. In addition, they find that firm-level ESG scores do not act as a moderator in alleviating the negative impacts of firm controversies on corporate performance whilst playing a key role in addressing the needs of stakeholders. Through the computational text analysis, Alkaraan et al. (2022) find that corporate transformation toward Industry 4.0 (CTTI4.0) disclosurepositively affects financial performance. In particular, their results suggest that corporate ESG practices tend to moderate the positive association between CTTI4.0 and firm performance by encouraging corporate information disclosure and facilitating superior financial performance. In addition, Tao et al. (2022) recognise that despite the significant growth in the lietrature discussing corporate and social responsibility to address climate change, further study that explores firm performance and ESG is needed in the integration of the economic and environmental agenda.

We also contribute to the existing literature by investigating the moderation role of leverage between sovereign ESG and corporate investment. The inherently risky nature of high leverage induces cash flow volatility and financial constraints, increasing the possibility of default and deterring firms from engaging in investment activity. Lang et al. (1996) document that leverage is negatively associated with firm growth for firms without sufficiently valuable investment opportunities that the financial market can identify. They further demonstrate that debt overhang can lead to liquidity constraints, forcing firms to pass up investment projects with positive net present value. Despite the dampening impact of debt financing on investment, firms can benefit from the tax advantages of debt arising from tax-deductible interest. Accordingly, there is a trade-off between the

tax shield of corporate debt and suboptimal investment strategy that involves risky debt (Myers, 1977; Jensen and Meckling, 1976). Moreover, Hennessy (2004) exhibits that a heavy debt burden distorts the level and compositionof investment by using a dynamic real options framework. It is found that debt overhang leadsto underinvestment despite firms' capacity in issuing additional secured debt. It is widely established that financial frictions can suppress firm investment (Shin and Stulz, 1998; Lamont, 1997). This evidence is because harnessing the internal cash flowis less costly than raising external finance via the issue of debt or equity.

3 Hypotheses Development

This study addresses several important research gaps by providing a systematic investigation on the role of sovereign ESG in explaining firm investment in the UK. Firstly, an extensive body of literature has studied the impact of economic policy uncertainty on firm investment (e.g., Kang et al., 2014; Wang et al., 2014; Gulen and Ion, 2014; Drobetz et al., 2018). Most studies suggest that an increase in economic policy uncertainty decreases corporate investment. However, with the COP26 climate summit successfully hosted by the UK that has brought together stakeholders to accelerate action towards the Paris Agreement and the UN Framework Convention on Climate Change, there is a heightened demand in understanding the association between climate uncertainty corporate investment. Secondly, geopolitical repositioning has caused social challenges and elevated social pressure, affecting businesses' investment decisions. Thirdly, most ESG analyses concentrate on the firm level (Nirino et al., 2021; Alkaraan et al., 2022; Barros et al., 2022; Mishra, 2022; Choi & Park, 2022; García & Herrero, 2022). Bhutta et al. (2022), Chahine et al. (2021), Dedehayir et al. (2018), Phan et al. (2021), among others, further elaborate on the environmental,social, governance issues at the corporate level. Nevertheless, the role of country-level governance and institutional quality cannot be ignored when examining firm investment dynamics as good governance, and institutional structures allow firms better access to external financing and curtail agency costs (Jensen and Meckling, 1976; Jensen, 1986; Myers, 1977).

Since sovereign ESG are significant for sustaining a favourable investment climate, we use climate policy uncertainty to proxy for sovereign environmental aspect and migration policy uncertainty as a proxy for sovereign social matter (Rubtsov et al., 2021). Policy uncertainty related to climate and migration issues can diminish incentives for new capital investmentand result in suboptimal investment choices. In particular, the credibility, usefulness and effectiveness of climate and migration policy directly affect market expectations and conditions, determining the expected returns of prospective investment prospects. Consequently, considering the aforementioned unfavourable impacts on investment decisions, we expect climate and migration policy uncertainty to harm firm investment. The hypotheses are proposed as follows:

Hypothesis 1. The environmental aspect is proxied by climate policy uncertainty. Climate policy uncertainty negatively affects firm investment, ceteris paribus.

Hypothesis 2. The social issue is proxied by migration policy uncertainty. Migration policy uncertainty negatively affects firm investment, ceteris paribus.

Exceptional sovereign governance decreases financial friction distortions and facilitates a business environment where firms benefit from lowered financing costs and financial constraints, encouraging

corporate investment. Specifically, firms can seize valuable investment opportunities by using either internal liquidity or better access to external finance. We incorporate three indicators relating to sovereign governance: control of corruption, government effectiveness and voice and accountability to proxy for sovereign governance quality. We expect superior country-level governance positively influences firm investment with the corresponding hypothesis as follows:

Hypothesis 3. Superior sovereign governance positively affects firm investment, ceteris paribus.

Good sovereign ESG allows the firms to engage in investment more proactively by providing a supportive financing environment. As such, investment incentives are stimulated by strengthened sovereign ESG. Thus, we expect good sovereign ESG to decrease firms' difficulty accessing external financing and lower the negative impact of corporate leverage on firm investment (e.g., Datta et al., 2019; Myers, 1977). Our final hypothesis is formalised as follows:

Hypothesis 4. Good sovereign ESG weakens the negative relationship between corporate leverage and firm investment, ceteris paribus.

Based on the above considerations, the conceptual framework proposed in this paper is summarised in Figure 1. The conceptual framework incorporates the rationale of this study and the hypotheses with regard to the nexus between sovereign ESG and corporate investment. To the best of our knowledge, there is no existing study investigates the dynamics among the climate as well as migration policy uncertainty and firm-level investment. Through examining the related hypotheses empirically, we attempt to advance the understanding of country-level determinants of firm investment in the UK. As depicted in Figure 1, we consider the sovereign ESG matter from three distinct perspectives: environmental , social and governance. Specifically, climate policy uncertainty is utilised to measure aggregate environmental perfromance and we expect that corporate investment is negatively associated with climate policy uncertainty (Hypothesis 1). We argue that the negative impact of climate policy uncertainty originates in the wait-and-see investment strategy that firms tend to adopt during uncertain times (Barnett et al., 2020). Furthermore, sovereign social aspect is evaluated through policy uncertainty related with migration policy. Hypothesis 2 expects that elevated migration policy uncertainty can impede investment activity at micro-level (OECD, 2017). To provide a comprehensive picture of how firm investment is impacted by sovereign governance, we select three country governance indicators—control of corruption, government effectiveness and voice and accountability-- to assess the sovereign governance performance. Building on the previous studies in this field, e.g., Alkaraan et al. (2022), Broadstock et al. (2021), we anticipate that a superior governance and institutional quality play a positive role in stimulating business investment (Hypothesis 3). In addition, Hypothesis 4 examines the moderating effects of sovereign ESG issues on the relationship betwee corporate leverage and firm investment. Since enhanced sovereign ESG can help to promote the external financing environment for businesses, thereby reducing the financial constraints associated with debt financing. Accordingly, it is expected that better sovereign ESG aspects contribute to the alleviation of negative impacts of financial leverage on corporate investment.
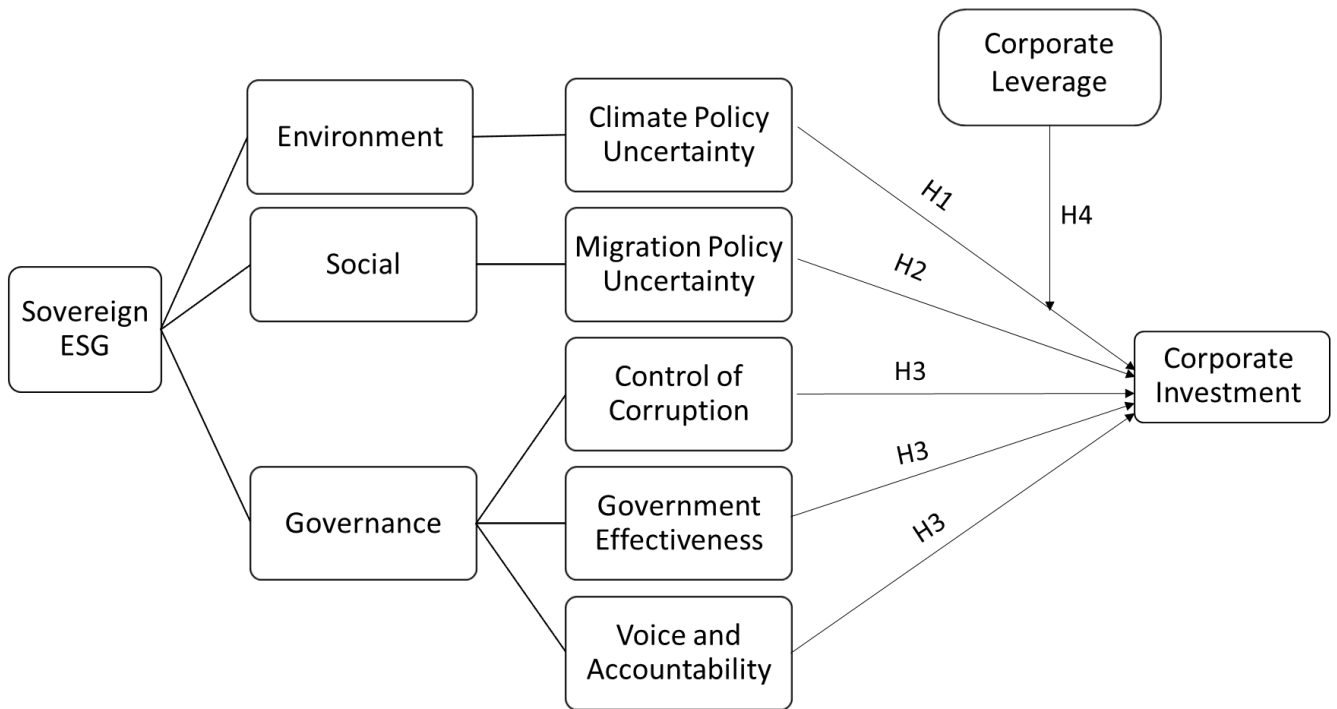
Figure 1: Conceptual Framework

4 Empirical Framework

4.1 Data

We collect the firm-level panel data from Thomson Reuters Datastream annually. The sample consists of 680 non-financial UK firms from 2000 to 2018. The variables are winsorised at the 1st and 99th percentiles to mitigate the effects of outliers. To address the issue of survivor bias, we select firms with no fewer than four consecutive years of data on any variable. The climate policy uncertainty index is constructed by Gavriilidis (2021) to reflect the policy uncertainty surrounding environmental issues such as climate change and the green economy based on major US media. Since the media searched to construct the index have global coverage. There is a close partnership between the US and the UK; we use the climate policy uncertainty index to investigate the impact of environmental-related policy risk on firm investment in the UK.

The migration policy uncertainty index for the UK is constructed by Baker et al. (2016). Both climate and migration policy uncertainty data is obtained from policyuncertainty.com. The country-level governance dataset is collected from the Sovereign ESG Data Portal of the World Bank Group. Specifically, we adopt three indicators to measure institutional quality. The first indicator is control of corruption, which measures the capacity to which public power can combat corruption. The second indicator is government effectiveness, which measures the quality and credibility of institutional settings. The third indicator is voice and accountability, which reflects the freedom and accountability in political, economic and social aspects.

4.2 Model Specification

The empirical multivariate analysis employs a fixed-effects model with firm cluster-robust standard errors to address heterogeneity concerns (Cameron and Trivedi, 2005). We further use the random- the effects GLS (generalised least squares) method and the random-effects MLE (maximum likelihood estimation) method to conduct robustness checks. Since it is not likely that sovereign ESG are driven by firm-level investment, the reverse causality problem is mitigated by the inherent nature of the empirical specification.

Building on the reduced-form of the neoclassical Q-theory investment model (Tobin, 1969; Hayashi, 1982; Fazzari et al., 1988; Dasgupta et al., 2019; Zhang, 2020), the baseline regression model is specified as:

$$Investment_{i,t} = \beta_1 SovereignESG_t + \beta_2 Q_{i,t} + \beta_3 CashFlow_{i,t} + \beta_4 Size_{i,t} + \gamma \Lambda_t^{'} + \alpha_i + \varepsilon_{i,t} \quad (1)$$

Where i refers to the firm number and t refers to the period. Investment is measured as capital expenditures scaled by the beginning-of-period total assets. Sovereign ESG indicators

enter the regression equation individually. The indicators are calculated as the natural logarithm of climatepolicy uncertainty (CPU), migration policy uncertainty (MPU), control of corruption (CC), government effectiveness (GE) and voice and accountability (VA), respectively. Tobin's Q is measured as the market value of equity plus book value of debt and preferred stock, scaled by total assets. Cash flow (CF) is the ratio of funds from operations to total assets. Since our variableof interest is sovereign ESG that captures aggregate effects on firm investment, time fixed-effectsare not included in the estimation specification. Alternatively, macroeconomic control variables (Λ_t) are incorporated to control the time-varying impacts of macroeconomic conditions on business investment. To be more specific, real GDP growth (RGF) is obtained from the OECD database to control the macroeconomic environment. Consumer Confidence Index (CCI), Business Confidence Index (BCI) and Composite Leading Indicator (CLI) are collected from the OECD database and converted in the form of the natural logarithm to capture expectations about the future business environment. α_i denotes fixed-effects that capture unobserved firm-specific heterogeneity. $\varepsilon_{i,t}$ isan idiosyncratic error term assumed to be independent and identically distributed.

To evaluate Hypothesis 4, moderation analysis is implemented based on the followingspecification:

$$Investment_{i,t} = \beta_1 SovereignESG_t + \beta_2 Q_{i,t} + \beta_3 CashFlow_{i,t} + \beta_4 Size_{i,t}$$
$$+ \beta_5 Leverage_{i,t} + \beta_6 SovereignESG_t * Leverage_{i,t} + \gamma\Lambda'_t + \alpha_i + \varepsilon_{i,t} \tag{2}$$

We add corporate leverage, measured as the ratio of total liabilities to total assets, to Equation (2). The interaction terms between sovereign ESG and leverage enter the regression individually, including climate policy uncertainty * leverage, migration policy uncertainty * leverage, control of corruption * leverage, government effectiveness * leverage, voice and accountability * leverage.

5 Empirical Results

5.1 Baseline Analysis

Table 1 shows the baseline regression results with robust standard errors clustered at the firm level reported in the parenthesis. It can be seen from all specifications spanning columns (1)- (5) that both Tobin's Q and cash flow have a statistically significant influence on firm investment. Tobin's Q measures opportunities whilst cash flow determines the ability of a firm to finance investment opportunities internally. Since our key research interest lies in the impacts of sovereign ESG on firm investment, we now turn to columns (1) and (2). We can see that thecoefficients about climate policy uncertainty and migration policy uncertainty are significantly different from zero at the 1% level with an economic magnitude of -0.0106 and -0.0086, respectively. The evidence corroborates Hypotheses 1 and 2 as elevated climate and migration policy uncertainty can decrease firm investment, highlighting the importance of creating a stable environment for climate and migration policy implementation.

Moreover, we use control of corruption, government effectiveness and voice and accountability to measure sovereign governance in columns (3)- (5). It is found that the three indicators of country-level governance have a consistent impact on investment as they are positively associated with UK firm investment at a 1% significance level. These results are consistent with Hypothesis 3 and indicate that greater quality of country governance enhances the institutional quality and facilitates better business financing conditions.

Table 1: Baseline regressions results

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0027***	0.0028***	0.0025***	0.0028***	0.0025***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
$Size_{i,t}$	0.0012	0.0047*	-0.001	0.0031	-0.001
	(0.0023)	(0.0024)	(0.0022)	(0.0023)	(0.0022)
$CF_{i,t}$	0.0296***	0.0258***	0.0317***	0.0281***	0.0303***
	(0.0071)	(0.0071)	(0.0072)	(0.0071)	(0.0072)
CPU_t	-0.0106***				
	(0.0017)				
MPU_t		-0.0086***			
		(0.0011)			
CC_t			0.0534***		
			(0.0105)		
GE_t				0.0975***	
				(0.0109)	
VA_t					0.0694***
					(0.0156)

Notes: This table presents fixed-effects panel regression results. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 2 adds a range of macroeconomic control variables to the baseline regression and demonstrates a coherent picture as with Table 1. The estimation coefficients of sovereign ESG presented in Table 2 are largely comparable with Table 1 in terms of the sign, magnitude and statistical significance. Specifically, columns (1) and (2) show that the economic magnitude of the coefficients of climate and migration policy uncertainty is slightly greater than that of Table 1. This evidence implies that the negative association between climate/migration policy uncertainty and investment is strengthened for non-financial firms by accounting for the general macroeconomic conditions. In addition, we also find similar results in columns (3)- (5) of Table 2 and Table 1. The statistically significant coefficient of control of corruption, government effectiveness and voice and accountability on firm investment confirms that the positive impact of sustainable country governance on UK investment at the firm-level persists after incorporating macroeconomic controls. To combat the adverse effects of climate change, the COP26 summit proposed the goal of achieving net zero emissions globally by 2050 and put forward plans to promote the implementation of the Paris Agreement. Our findings aligh with the outcomes of COP26 in the sense that constructive

climate policy is a key element of the journey towards net zero as well as sustainable growth in business investment, which both require policymakers to nurture sound sovereign ESG in reconciling the needs of enterprises and the planet.

Table 2: Panel regressions results with macroeconomic controls

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0027***	0.0028***	0.0026***	0.0028***	0.0025***
	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0007)
$Size_{i,t}$	0.0014	0.0052**	0.0001	0.0032	-0.0011
	(0.0024)	(0.0024)	(0.0023)	(0.0024)	(0.0022)
$CF_{i,t}$	0.0296***	0.0261***	0.0311***	0.0281***	0.0304***
	(0.0072)	(0.0071)	(0.0072)	(0.0071)	(0.0072)
RGF_t	-0.0006	-0.0001	-0.0011*	0.000	-0.0004
	(0.0006)	(0.0005)	(0.0006)	(0.0006)	(0.0006)
BCI_t	-0.1213	0.0165	-0.072	-0.1169	-0.0532
	(0.901)	(0.0893)	(0.0909)	(0.0894)	(0.0915)
CCI_t	0.0841	0.3299***	-0.3624***	0.0284	0.0774
	(0.0807)	(0.0829)	(0.1125)	(0.0818)	(0.0816)
CLI_t	0.031	-0.1708**	0.2869***	0.006	0.016
	(0.0851)	(0.0071)	(0.0973)	(0.0838)	(0.0851)
CPU_t	-0.011***				
	(0.0018)				
MPU_t		-0.0096***			
		(0.0011)			
CC_t			0.1058***		
			(0.0174)		
GE_t				0.097***	
				(0.0113)	
VA_t					0.0665***
					(0.017)

Notes: This table presents fixed-effects panel regression results. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

5.2 Moderation Analysis

According to Myers (1977), debt overhang resulting from high levels of debt financing can cause financial vulnerability and eliminate the possibility for firms to fund investment projects with external capital. We are interested in whether the relationship between leverage and firm investment is moderated by sovereign ESG. Therefore, we include the term leverage in Table 3 and the interactions between sovereign ESG and leverage in Table 4.

It can be seen from Table 3 that leverage has a consistently negative impact on firm investment from all model specifications. This finding suggests that increased interest and principal payments associated with debt commitment can exacerbate financing conditions and reduce investment, aligning

with Borensztein and Ye (2018) and Kalemli-Ozcanet al. (2018).

Table 3: The impact of sovereign ESG and corporate leverage on firm investment

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0027***	0.0028***	0.0026***	0.0028***	0.0025***
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
$Size_{i,t}$	0.0012	0.0051**	0.000	0.0031	-0.0012
	(0.0024)	(0.0025)	(0.0023)	(0.0024)	(0.0022)
$CF_{i,t}$	0.0288***	0.0255***	0.0302***	0.0274***	0.0291***
	(0.0074)	(0.0073)	(0.0074)	(0.0073)	(0.0074)
$Leverage_{i,t}$	-0.0037	-0.0029	-0.004	-0.0031	-0.0058
	(0.0059)	(0.0059)	(0.006)	(0.006)	(0.0059)
CPU_t	-0.0109***				
	(0.0018)				
MPU_t		-0.0096***			
		(0.0011)			
CC_t			0.1047***		
			(0.0176)		
GE_t				0.0965***	
				(0.0114)	
VA_t					0.0665***
					(0.0169)
Observations	9367	9367	9367	9367	9367
Firms	680	680	680	680	680
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes

Notes: This table presents fixed-effects panel regression results. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

As shown in column (1) of Table 4, the association between climate policy uncertainty and firm investment remains significantly negative at the 1% level. The coefficient about the interaction between climate policy uncertainty and investment is positive, implying that the increase of climate policy uncertainty will increase the negative impact of leverage on investment. Furthermore, column (2) shows a statistically significant positive interaction between migration policy uncertainty and investment. This evidence suggests that heightened migration policy uncertainty can worsen the burden of debt financing on firm investment. As shown by the coefficient of interaction terms in columns (3)- (5), each control of corruption, government effectiveness and voice and accountability have a negative moderating effect on the relationshipbetween leverage and investment. The results exhibit that better country governance alleviates the depressing effect of corporate leverage on firm investment, indicating that it is vital for policymakers to enhance the sovereign governance conditions to encourage business investment. Finally, it is observed that the empirical evidence from Table 4 corroborates Hypothesis 4.

Table 4: Moderation effects of sovereign ESG with corporate leverage on firm investment

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0027***	0.0028***	0.0026***	0.0028***	0.0025***
	(0.0007)	(0.0007)	(0.0006)	(0.0007)	(0.0007)
$Size_{i,t}$	0.0013	0.0052**	0.000	0.0032	-0.0012
	(0.0024)	(0.0024)	(0.0023)	(0.0024)	(0.0022)
$CF_{i,t}$	0.0287***	0.026***	0.0301***	0.0275***	0.0291***
	(0.0074)	(0.0073)	(0.0074)	(0.0073)	(0.0074)
$Leverage_{i,t}$	-0.0322	-0.0307*	0.007	0.0169	0.0101
	(0.0216)	(0.0173)	(0.0219)	(0.0173)	(0.0169)
CPU_t	-0.0142***				
	(0.0034)				
$CPU_t * Leverage_{i,t}$	0.0065				
	(0.0048)				
MPU_t		-0.0121***			
		(0.0021)			
$MPU_t * Leverage_{i,t}$		0.0049*			
		(0.003)			
CC_t			0.1143***		
			(0.0271)		
$CC_t * Leverage_{i,t}$			-0.0186		
			(0.0347)		
GE_t				0.1169***	
				(0.0209)	
$GE_t * Leverage_{i,t}$				-0.0407	
				(0.0325)	
VA_t					0.0941***
					(0.0365)
$VA_t * Leverage_{i,t}$					-0.0539
					(0.0513)
Observations	9367	9367	9367	9367	9367
Firms	680	680	680	680	680
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes

Notes: This table presents fixed-effects panel regression results. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

5.3 Robustness Checks

Robustness checks are implemented in this section by taking three steps. First, we examine whether the baseline findings hold for alternative estimators. Second, we test whether the main results are robust to cross-sectional dependence by adopting panel regression models with Driscoll and Kraay (1998) standard

errors. Third, to address potential multicollinearity problem, we construct an institutional quality index by extracting the first principal component of the three country governance variables and revisit the impact of sovereign governance on firm investment accordingly.

Tables 5 and 6 present econometric methodological comparisons and confirm the robustnessof our estimation results. It is worth noting that using random-effects GLS and MLE does not materially alter the economic magnitude and statistical significance of coefficients on sovereign ESG variables. The evidence reported in Tables 5 and 6 further confirm that sovereign ESG is an important determinant in UK firm investment. More specifically, as shown in columns (1)- (2) of Tables 5 and 6, the estimation coefficients pertaining to climate and migration policy uncertainty remain negative and statistically significant at the 1% level. In addition, column (3)- (5) demonstrate that coefficients of sovereign governance indicators on firm investment are positive at 1% significance level.

Table 5: Panel regression results estimated by random-effects GLS

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0026***	0.0026***	0.0025***	0.0027***	0.0025***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0007)
$Size_{i,t}$	0.0014	0.0028***	0.0008	0.0021**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.0022)
$CF_{i,t}$	0.0283***	0.0259***	0.0294***	0.0273***	0.0303***
	(0.0065)	(0.0064)	(0.0065)	(0.0064)	(0.0072)
$Leverage_{i,t}$	-0.0049	-0.0059	-0.0047	-0.0052	-0.0049
	(0.005)	(0.005)	(0.0051)	(0.005)	(0.0072)
CPU_t	-0.0105***				
	(0.0016)				
MPU_t		-0.0085***			
		(0.001)			
CC_t			0.1037***		
			(0.016)		
GE_t				0.0975***	
				(0.0109)	
VA_t					0.0898***
					(0.01)
Observations	9367	9367	9367	9367	9367
Firms	680	680	680	680	680
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes

Notes: This table presents panel regression results using the GLS (generalised least squares) random-effects estimator. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%,5% and 10% level, respectively.

Table 6: Panel regression results estimated by random-effects MLE

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0026***	0.0026***	0.0025***	0.0027***	0.0025***
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)
$Size_{i,t}$	0.0014	0.0028***	0.0008	0.0021**	0.0005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$CF_{i,t}$	0.0283***	0.0259***	0.0293***	0.0273***	0.0285***
	(0.0065)	(0.0064)	(0.0065)	(0.0064)	(0.0065)
$Leverage_{i,t}$	-0.0049	-0.0059	-0.0048	-0.0053	-0.0055
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
CPU_t	-0.0105***				
	(0.0016)				
MPU_t		-0.0085***			
		(0.001)			
CC_t			0.1036***		
			(0.016)		
GE_t				0.0897***	
				(0.01)	
VA_t					0.0682***
					(0.0167)
Observations	9367	9367	9367	9367	9367
Firms	680	680	680	680	680
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes

Notes: This table presents panel regression results using the MLE (maximum likelihood) random-effects estimator. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

To take into account the concern of cross-sectional dependence, we employ the methodology introduced by Driscoll and Kraay (1998) to correct the standard errors across the cross-sectional units and examine whether our main findings are robust to cross-sectional dependence[1]. As we can see in column (1) of Table 7, the economic and statistical sginificance of climate policy uncertainty remain consistent with the baseline results reported in the previous section. Column (2) of Table 7 shows that migration policy uncertainty have a significantly negative impact on firm investment at 1% significance level, which is in line with our main findings as well. Furthermore, it is shown that the country governance variable has a statistically positive effect on corporate investment across column (3)- (5) of Table 7. Overall, we find that our conclusions with regard to the relationship between sovereign ESG and firm investment remain unchanged after correcting for the error terms and are robust to cross-sectional dependence.

Table 7: Panel regressions account for cross-sectional dependency

---

[1] After undertaking the cross-sectional dependency test, the errors between the cross-sectional units are found to be cross-sectional dependent.

	(1)	(2)	(3)	(4)	(5)
$Q_{i,t}$	0.0027***	0.0028***	0.0026***	0.0028***	0.0025***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
$Size_{i,t}$	0.0012	0.0051*	-0.0004	0.0031	-0.0012
	(0.0026)	(0.0028)	(0.0025)	(0.0025)	(0.0034)
$CF_{i,t}$	0.0288***	0.0255***	0.0274***	0.0273***	0.0291***
	(0.0061)	(0.0055)	(0.0064)	(0.0064)	(0.006)
$Leverage_{i,t}$	-0.0037	-0.0029	-0.004	-0.0031	-0.0058
	(0.0059)	(0.0054)	(0.0054)	(0.0055)	(0.0063)
CPU_t	-0.0109***				
	(0.0028)				
MPU_t		-0.0096***			
		(0.0013)			
CC_t			0.1047***		
			(0.029)		
GE_t				0.0965***	
				(0.0166)	
VA_t					0.0665*
					(0.0398)
Observations	9367	9367	9367	9367	9367
Firms	680	680	680	680	680
Macroeconomic controls	Yes	Yes	Yes	Yes	Yes

Notes: This table presents the estimation results from fixed-effects panel regression model with Driscoll and Kraay (1998) standard errors, which are robust to cross-sectinal dependence, heteroscedasticity and autocorrelation. Driscoll and Kraay (1998) standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Next, we consider whether the key findings hold for alternative measure of sovereign governance to mitigate potential multicollinearity problem. To do so, we construct an institutional quality index (IQI) by extracting the first principal component of the three country governance indicators. In column (1) of Table 8, fixed-effects estimator returns a economic magnitude of 0.0094 on institutional quality index, which is statistically significant at 1% level. The estimation results from GLS and MLE estimator as shown in column (2) and (3) of Table 8 respectively also confirm that there exists a positive association between institutional quality and corporate investment at 1% significance level. On the whole, Table 8 suggests that the statistically significant positive impact of sovereign governance on firm investment is robust to multicollinearity and alternative measure of instituational quality.

Table 8: The impact of institutional quality index on firm investment

	(1)	(2)	(3)
$Q_{i,t}$	0.0026***	0.0026***	0.0026***
	(0.0006)	(0.0006)	(0.0006)
$Size_{i,t}$	0.0001	0.0009	0.0009
	(0.0023)	(0.001)	(0.001)
$CF_{i,t}$	0.0302***	0.0294***	0.0293***
	(0.0074)	(0.0065)	(0.0065)
$Leverage_{i,t}$	-0.0039	-0.0047	-0.0047
	(0.006)	(0.0051)	(0.005)
IQI_t	0.0094***	0.0093***	0.0093***
	(0.0016)	(0.0014)	(0.0014)
Observations	9367	9367	9367
Firms	680	680	680
Macroeconomic controls	Yes	Yes	Yes
Estimation method	FE	GLS	MLE

Notes: This table presents panel regression results to investigate the impact of institutional quality index on firm investment by using the fixed-effects (FE), generalized least squares random-effects (GLS) and maximum likelihood random-effects (MLE) estimator in column (1), (2) and (3), respectively. Robust standard errors are in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

6 Policy Implications

In this section, we discuss the policy implications associated with our findings and elaborate on how they are related with the COP26 summit. As one of the key outcomes delivered by COP26, the Glasgow Climate Pact is considered to be a milestone in strengthening the implementation of the Paris Agreement mechanisms. On the one hand, we find that uncertain environmental and social prospects measured by climate and migration policy uncertainty can discourage firm investment significantly, which highlights the need to establish forward-looking guidance to signify the intention of regulators during the transition to climate-resilient economy and a net zero future. On the other hand, this study shows that effective governance arrangements and public integrity is imperative in creating a supportive environment for business investment, indicating the necessity of transparent and coherent governance framework. Drawing on the results from moderation analysis, we argue that it is crucial to reconcile the interests of businesses with the net zero agenda by providing financing incentives for advances in environmental technology and innovation.

In a time marked by escalated climate change and uncertainty, COP26 has delivered a clear message that collective commitments are pivotal in tackling global warming and building a sustainable future. This suggests that the adoption of cooperative approaches across the sovereign ESG dimensions can play an important role in stimulating investment without compromising the environmental integrity, which calls for effective and consistent support for directing businesses to

the pathway of green growth in investment. In particular, it is critical that the central bank and government are transparent about the potential risks and opportunities entailed with the net zero agenda in the communication and coordination with the industry. Since the adaption to the impacts of climate change can be costly for enterprises, regulators need to initiate transformational efforts in ensuring businesses can thrive while being resilient to climate change. In response to the COP26 agreement in fighting against the accelerating risk associated with climate change, comprehensive and robust collaboration between businesses and government is essential. More importantly, policymakers need to make sure that a decisive and transparent sovereign ESG strategy are introduced to support the sustainability and green transition of businesses.

7 Conclusion

This study analyses the nexus between sovereign environmental, social and governance issues and corporate investment decisions from a sustainable perspective. By utilising firm-level balance sheets data, country-level governance, and policy uncertainty data, we find that country governance has a significant positive effect on firm investment. In addition, we provide empirical evidence on the moderating role of sovereign ESG, which indicates that good environmental, social, and governance mechanisms help businesses relieve the burden of debt overhang on firm investment. Moreover, this paper shows that climate and migration policy uncertainty both have a statistically and economically significant dampening impact on corporate investment, indicating that environmental and social stability plays a key role in promoting the business investment of the UK.

   We offer important policy implications from the findings of this paper. First, environmental and social changes can lead to uncertain market conditions. In the face of trade-offs about financial risk and the net-zero transition, forward-looking guidance regarding the direction of future policy planning on climate and social change should be provided in a timely manner. Second, the decision-making process of investment is driven by the cost of capital, whereas firms' capital structure is determined by the cost of debt and equity financing, indicating that policymakers should foster an organic sovereign ESG dimension through targeted policies. Lastly, regulators should incorporate the business response to climate and social change and institutional quality as part of the sustained initiatives to promote business investment in the UK. Consistency and transparency of government scheme details should also be ensured for more efficient policy design.

References

Alkaraan, F., Albitar, K., Hussainey, K., Venkatesh, V. G. (2022). Corporate transformation toward Industry 4.0 and financial performance: The influence of environmental, social, and governance (ESG). Technological Forecasting and Social Change, 175, 121423.

Aronica, M., Fazio, G., & Piacentino, D. (2022). A micro-founded approach to regional innovation in Italy. Technological Forecasting and Social Change, 176, 121494.

Avramov, D., Cheng, S., Lioui, A., & Tarelli, A. (2021). Sustainable investing with ESG rating uncertainty. Journal of Financial Economics.

Baker, S. R., Bloom, N., Davis, S. J. (2016). Measuring economic policy uncertainty, The Quarterly Journal of Economics 131 (4), 15931636.

Barnett, M., Brock, W., Hansen, L. P. (2020). Pricing uncertainty induced by climate change. The Review of Financial Studies, 33(3), 1024-1066.

Barros, V., Matos, P. V., Sarmento, J. M., & Vieira, P. R. (2022). M&A activity as a driver for better ESG performance. Technological Forecasting and Social Change, 175, 121338.

Bhutta, U. S., Tariq, A., Farrukh, M., Raza, A., Iqbal, M. K. (2022). Green bonds for sustainable development: Review of literature on development and impact of green bonds. Technological Forecasting and Social Change, 175, 121378.

Bofinger, Y., Heyden, K. J., & Rock, B. (2022). Corporate social responsibility and market efficiency: Evidence from ESG and misvaluation measures. Journal of Banking & Finance, 134, 106322.

Borensztein, E., Ye, L. S. (2018). Corporate debt overhang and investment: Firm-level evidence, World Bank Policy Research Working Paper, No. 8553.

Broadstock, D. C., Chan, K., Cheng, L. T., Wang, X. (2021). The role of ESG performance during times of financial crisis: Evidence from COVID-19 in China. Finance Research Letters, 38, 101716.

Cameron, A. C., Trivedi, P. K. (2005). Microeconometrics: Methods and Applications, Cambridge: Cambridge University Press.

Carney, M. (2015). Breaking the tragedy of the horizon climate change and financial stability, The speech was given at Lloyds of London 29, 220230.

Chahine, S., Daher, M., Saade, S. (2021). Doing good in periods of high uncertainty: Economic policy uncertainty, corporate social responsibility, and analyst forecast error, Journal of Financial Stability 56, 100919.

Choi, H. Y., & Park, J. (2022). Do data-driven CSR initiatives improve CSR performance? The

importance of big data analytics capability. Technological Forecasting and Social Change, 182, 121802.

Crecente, F., Sarabia, M., & del Val, M. T. (2021). Climate change policy and entrepreneurial opportunities. Technological Forecasting and Social Change, 163, 120446.

Cui, X., Wang, P., Sensoy, A., Nguyen, D. K., & Pan, Y. (2022). Green Credit Policy and Corporate Productivity: Evidence from a quasi-natural experiment in China. Technological Forecasting and Social Change, 177, 121516.

Dasgupta, S., Li, E. X., Yan, D. (2019). Inventory behavior and financial constraints: Theory and evidence. The Review of Financial Studies, 32(3), 1188-1233.

Datta, S., Doan, T., Iskandar-Datta, M. (2019). Policy uncertainty and the maturity structure of corporate debt, Journal of Financial Stability 44, 100694.

Dedehayir, O., Mkinen, S. J., Ortt, J. R. (2018). Roles during innovation ecosystem genesis: A literature review. Technological Forecasting and Social Change 136, 1829.

Driscoll, J. C., & Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. Review of economics and statistics, 80(4), 549-560.

Drobetz, W., El Ghoul, S., Guedhami, O., Janzen, M. (2018). Policy uncertainty, investment, and the cost of capital, Journal of Financial Stability 39, 2845.

Elsayed, A. H., Gozgor, G., & Lau, C. K. M. (2022). Risk transmissions between bitcoin and traditional financial assets during the COVID-19 era: The role of global uncertainties. International Review of Financial Analysis, 81, 102069.

Fazzari, S., Hubbard, R. G., Petersen, B. (1988). Investment, financing decisions, and tax policy, The American Economic Review 78 (2), 200205.

Fernandez, V. (2022). Environmental management: Implications for business performance, innovation, and financing. Technological Forecasting and Social Change, 121797.

Francis, B., Hasan, I., Song, L., Waisman, M. (2013). Corporate governance and investment- cash flow sensitivity: Evidence from emerging markets, Emerging Markets Review 15, 5771.

García, C. J., & Herrero, B. (2022). Corporate entrepreneurship and governance: Mergers and acquisitions in Europe. Technological Forecasting and Social Change, 182, 121845.

Gavriilidis, K. (2021). Measuring climate policy uncertainty, Available at SSRN 3847388.

Gillan, S. L., Koch, A., & Starks, L. T. (2021). Firms and social responsibility: A review of ESG and CSR research in corporate finance. Journal of Corporate Finance, 66, 101889.

Gozgor, G., Demir, E., Belas, J., Yesilyurt, S. (2019). Does economic uncertainty affect domestic credits? An empirical investigation. Journal of International Financial Markets, Institutions and Money, 63, 101147.

Gu, Y., Ho, K. C., Yan, C., Gozgor, G. (2021). Public environmental concern, CEO turnover, and green investment: Evidence from a quasi-natural experiment in China. Energy Economics, 100, 105379.

Gulen, H., Ion, M. (2016). Policy uncertainty and corporate investment. The Review of Financial Studies, 29(3), 523-564.

Hayashi, F. (1982). Tobin's marginal q and average q: A neoclassical interpretation, Econometrica, 50 (1), 213224.

Hennessy, C. A. (2004). Tobin's Q, debt overhang, and investment. The Journal of Finance, 59(4), 1717-1742.

HM Government. (2020). The ten-point plan for a green industrial revolution. HM Treasury (2021), UK Government Green Financing Framework. HM Treasury: London.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers, The American Economic Review 76 (2), 323329.

Jensen, M. C., Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305-360.

Kalemli-Ozcan, Laeven, L., Moreno, D. (2018). Debt overhang, rollover risk, and corporate investment: Evidence from the European crisis. National Bureau of Economic Research Working Paper, No. 24555.

Kang, W., Lee, K., Ratti, R. A. (2014). Economic policy uncertainty and firm-level investment. Journal of Macroeconomics, 39, 42-53.

Lamont, O. (1997). Cash flow and investment: Evidence from internal capital markets. The Journal of Finance, 52(1), 83-109.

Lang, L., Ofek, E., Stulz, R. (1996). Leverage, investment, and firm growth. Journal of Financial Economics, 40(1), 3-29.

Li, G., Xue, Q., & Qin, J. (2022). Environmental information disclosure and green technology innovation: Empirical evidence from China. Technological Forecasting and Social Change, 176, 121453.

Liang, C., Umar, M., Ma, F., & Huynh, T. L. (2022). Climate policy uncertainty and world renewable energy index volatility forecasting. Technological Forecasting and Social Change, 182, 121810.

Mishra, C. S. (2022). Does institutional ownership discourage investment in corporate R&D?. Technological Forecasting and Social Change, 182, 121837.

Myers, S. C. (1977). Determinants of corporate borrowing, Journal of Financial Economics 5 (2), 147175.

Myers, S. C., Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics 13 (2), 187221.

Nirino, N., Santoro, G., Miglietta, N., Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. Technological Forecasting and Social Change, 162, 120341.

OECD. (2017). Strengthening the links between migration, investment, financial services and development, in Interrelations between Public Policies, Migration and Development, OECD Publishing, Paris.

Phan, D. H. B., Tran, V. T., Ming, T. C., Nguyen, D. T. (2021). Oil price uncertainty, CSR and institutional quality: A cross-country evidence, Energy Economics, 100, 105339.

Pindyck, Robert S. (1991). Irreversibility, uncertainty, and investment, Journal of Economic Literature, Vol. XXIX, 1110-1148.

Puertas, R., Carracedo, P., Garcia, M., & Vega, V. (2022). Analysis of the determinants of market capitalisation: Innovation, climate change policies and business context. Technological Forecasting and Social Change, 179, 121644.

Rubtsov, A., Xu, W., Šević, A., & Šević, Ž. (2021). Price of climate risk hedging under uncertainty. Technological Forecasting and Social Change, 165, 120430.

Serafeim, G., & Yoon, A. (2022). Which Corporate ESG News does the Market React to?. Financial Analysts Journal, 78(1), 59-78.

Shin, H. H., Stulz, R. M. (1998). Are internal capital markets efficient? The Quarterly Journal of Economics, 113(2), 531-552.

Struckell, E., Ojha, D., Patel, P. C., & Dhir, A. (2022). Strategic choice in times of stagnant growth and uncertainty: An institutional theory and organizational change perspective. Technological Forecasting and Social Change, 182, 121839.

Su, K., Wu, J., & Lu, Y. (2022). With trust we innovate: Evidence from corporate R&D expenditure. Technological Forecasting and Social Change, 182, 121834.

Tao, H., Zhuang, S., Xue, R., Cao, W., Tian, J., & Shan, Y. (2022). Environmental Finance: An Interdisciplinary Review. Technological Forecasting and Social Change, 179, 121639.

Tobin, J. (1969). A general equilibrium approach to monetary theory. Journal of Money, Credit and Banking, 1(1), 15-29.

United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable

Development. United Nations: New York, NY, USA.

Walsh, P. P., Murphy, E., Horan, D. (2020). The role of science, technology and innovation in the UN 2030 agenda. Technological Forecasting and Social Change, 154, 119957.

Wang, Y., Chen, C. R., Huang, Y. S. (2014). Economic policy uncertainty and corporate investment: Evidence from China. Pacific-Basin Finance Journal, 26, 227-243.

Woodruff, C., Zenteno, R. (2007). Migration networks and microenterprises in Mexico. Journal of Development Economics, 82(2), 509-528.

Wu, X., & Liao, H. (2022). A Dempster-Shafer-theory-based entry screening mechanism for small and medium-sized enterprises under uncertainty. Technological Forecasting and Social Change, 180, 121719.

Ye, L. (2022). The effect of climate news risk on uncertainties. Technological Forecasting and Social Change, 178, 12158.

Yuan, D., Shang, D., Ma, Y., & Li, D. (2022). The Spillover Effects of Peer Annual Report Tone for Firm Innovation Investment: Evidence from China. Technological Forecasting and Social Change, 177, 121518.

Zhang, D. (2020). Intangibles and the UK under-investment puzzle: Evidence from firm-level panel data. Economics Letters, 194, 109389.

Dongna Zhang is an Assistant Professor at Northumbria University. Dr Zhang holds a PhD in Economics from the University of York, UK. Her research interests include financial economics, energy economics, the interactions between finance and macroeconomic activity, and firm behaviour. Her research findings shed light on the UK under-investment puzzle and provide policy implications on industrial strategy.

Zhao Zuoxiang is an assistant researcher at the Institutes of Science and Development, Chinese Academy of Sciences. He was a postdoctoral fellow at the National School of Development, Peking University, and received a PhD in economics from the University of Exeter. Main research fields: innovation policy, development economics, technological economics and operations research.

Chi Keung Marco Lau is an Associate Professor at the Hang Seng University of Hong Kong. Most of his recent research has been in Digital Finance, Financial Economics, International Finance, and Energy Economics. He published over 120 papers in SSCI/SCI peer review journals, with a current h-index=33. His publications have appeared in ABS4* and ABS3* journal. He also served as the Founding Associate Editor of Eurasian Business Review (ABS/SSCI listed), and the current Associate Editor of Asian Economics Letters. According to RePEc (Research Papers in Economics) I sit in the top 7% of economist in Europe.

Acknowledgments