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Do Corporate Strategies in Fintech and Green Finance Enhance ESG Performance? The Moderating Role of Government Policies

Mandella Osei-Assibey Bonsu[1] | Samuel Clottey Attuquaye[2] | Katie Hyslop[1] | Ying Wang[3] | Li Kaodui[4,5]

[1]Liverpool Business School, Liverpool John Moores University, Liverpool, United Kingdom, UK | [2]School of Finance and Economics, Jiangsu University, Zhenjiang, China | [3]Faculty of Business and Law, Anglia Ruskin University, Cambridge, UK | [4]School of Economics and Finance, Division of State-Owed Enterprise Reform and Innovation, Institute of Industrial Economics, Jiangsu University, Zhenjiang, China | [5]College of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Correspondence: Mandella Osei-Assibey Bonsu (m.oseiassibeybonsu@ljmu.ac.uk)

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ABSTRACT

Despite the growing interest in ESG performance, limited research explores the mediating role of government policy in the relationship between Fintech, green finance and ESG outcomes. We address this gap by examining how Fintech and green finance influence ESG performance through government policies. We analysed panel data of banks in China and the United Kingdom from 2014 to 2024 using robust advanced regression estimates, such as Dynamic Common Correlated Effects, Common Correlated Effects Generalized Test and Bootstrap Quantile Regressions. Results show that both Fintech and green finance play a significant role in enhancing banks' ESG performance in the long run. Findings further reveal that Fintech significantly supports banks' green finance developments, with the effect being more significant at higher quantiles. Additionally, government policies positively moderate the Fintech and green finance impact on banks' ESG performance across all quantiles. Interestingly, our results also highlight country differences: The United Kingdom experiences a greater impact of Fintech on ESG performance, while green finance has a stronger impact on ESG performance in China. Additionally, the role of Fintech in supporting green finance has a higher influence on Chinese banks than in the United Kingdom. The study emphasizes the critical role of policy interventions and innovation-driven frameworks in coordinating Fintech and green finance initiatives with long-term ESG targets.

1 | Introduction

The rapid development of Fintech is transforming the global financial landscape through innovations such as big data analytics, artificial intelligence, blockchain and IoT (Hu et al. 2025; Wang, Mao, et al. 2023; Bonsu et al. 2025; Li, Ye, et al. 2025). These technologies support sustainable finance by streamlining operations, promoting financial inclusion and offering tools to improve ESG performance (Dicuonzo et al. 2024, Wang, Peng, et al. 2022). In particular, Fintech contributes to improved ESG outcomes by enabling efficient green financial products, reducing emissions through digital platforms and strengthening transparency and accountability (Wang, Lee, et al. 2022; Du et al. 2022; El Khoury et al. 2023; Li, Ye, et al. 2025; Guo and Yin 2024).

Parallel to the technology enhancement, green finance (GF) has emerged as a critical driver of sustainable development, providing capital to eco-friendly projects and promoting responsible resource use (Liang and Yang 2024; He et al. 2022). GF mechanisms, like green bonds and loans, facilitate energy conservation and innovation, promoting sustainability in both developed

and emerging economies (Wan et al. 2023; Han and Li 2022) and encouraging internal governance, transparency and operational efficiency, enhancing ESG performance (Lian et al. 2023). As global finance increasingly emphasizes sustainability, modern technologies and green financing are essential for driving long-term value, societal development and investment in environmental initiatives that improve ESG performance across economies (Chen and Xie 2022). Under this context, the banking sector plays a vital role in implementing both Fintech and GF strategies, especially capital allocation, sustainability, and risk management (Word Bank 2023).

Previous studies confirm that Fintech enhances green finance by improving access to sustainable financial products and enabling more accurate ESG tracking (Goodell et al. 2022, Le et al. 2021, Alharbi et al. 2023, Dicuonzo et al. 2024, Hu et al. 2025, Takeda and Ito 2021). However, most existing research focuses on the Fintech industry's impact on financial and operational performance, with limited studies examining its impact on ESG performance, especially across national banking contexts (Du et al. 2022; El Khoury et al. 2023; Wang, Lee, et al. 2022; Li et al. 2017; Liu et al. 2017; Kharrat et al. 2024; Wang et al. 2021). Recent studies on ESG in the banking sector reveal mixed effects of GF on environmental performance (Bitetto and Cerchiello 2023; El Khoury et al. 2023; Du et al. 2022; Wang, Lee, et al. 2022), presenting an interesting experiment to understand its impact on ESG performance across institutional environments such as China and the United Kingdom (Fan et al. 2024).

Furthermore, government policy, creating conditions that either support or hinder Fintech and GF, plays a critical role in ESG performance. Clear regulations, incentives, and disclosure obligations enhance positive effects on ESG performance, while regulatory confrontation hinders progress (Zhang et al. 2023; Zhang 2023b; Wang, Wang, et al. 2024). For instance, the United Kingdom leverages market mechanisms and ESG reporting guidelines (Financial Conduct Authority 2021), while China's state-led initiatives, including Green Finance Pilot Zones and digital currency projects, align Fintech with national sustainability goals (Paradise 2022; Zhang, Huang, et al. 2025). Yet, research on the moderating effects of government policy on Fintech and GF impact on ESG performance remains unexplored. Notably, Hu et al. (2025) call for empirical evidence of GP shaping Fintech-GF-ESG performance. The knowledge and practice gap present an important setting, leading us to address the following three key research questions in this study: (1) To what extent do corporate strategies in Fintech and GF contribute to ESG performance? (2) Does GF have positive effects on ESG performance? (3) Do government policies positively moderate these strategies on ESG performance?

This paper focuses on two distinct and influential economies: China, an emerging market with strong environmental directives, is rapidly digitizing due to its top-down governance model and state investments in digital and green infrastructure; and the United Kingdom, a mature financial hub, is committed to sustainable finance, ESG standards and innovation through market-based regulatory frameworks. To answer the key research questions, we employ secondary panel data from banking institutions in China and the United Kingdom, covering the period from 2014 to 2024, utilizing robust multiple regression estimates, including Dynamic Common Correlated Effects (DCCEs), Common Correlated Effects Generalized Test and Bootstrap Quantile Regressions. Drawing upon institutional theory (IT), stakeholders' theory (SHT) and the resource-based view (RBV), we show that Fintech significantly impacts banks' GF and ESG performance in the long run across all quantiles. Notably, Fintech significantly promotes GF at lower, middle, and higher quantiles, while increasing at higher quantiles. Additionally, we found that GF positively and significantly impacts banks' ESG performance in the long term, particularly enhancing performance at lower quantiles and increasing effects at higher quantiles. Interestingly, we suggest that GP positively moderates the relationship between Fintech, GF and ESG performance in both countries. Specifically, Fintech and GF contribute to a progressive increase in ESG performance across all quantiles, particularly when supported by government policy. The study emphasizes the importance of policy interventions and innovation-driven frameworks in coordinating Fintech and GF initiatives with long-term ESG goals.

Our paper contributes to the existing literature and practices. First, the study enhances the literature on Fintech's impact on ESG performance (Bitetto and Cerchiello 2023; El Khoury et al. 2023), a topic rarely explored, particularly in China and the UK banking sectors. Second, limited studies have examined the Fintech and GF nexus, despite research suggesting that Fintech development improves GF by promoting sustainable urbanization and stimulating economic growth (Yang et al. 2021; Dar et al. 2024; Liu 2025). Moreover, although studies show mixed effects of GF on environmental performance (Bakry et al. 2023; Zhao et al. 2024), limited literature exists on the impact of GF on banks' ESG performance, particularly in China and the United Kingdom (Fan et al. 2024). The paper highlights the strategic role of GF in enhancing ESG performance in banking contexts, emphasizing the role of Fintech innovations. Third, the extant literature lacks comprehensive research on how GP moderates Fintech and GF impact on ESG. Accordingly, we offer fresh insights on the potential of Fintech for GF development in enhancing ESG performance in Chinese and UK banks. Finally, by considering their distinct regulatory structures, technological advancements and sustainability strategies, we provide the first empirical evidence on the impact of Fintech and GF on ESG performance in Chinese and UK banks, highlighting cross-national insights into institutional contexts.

We summarize Fintech and GF developments in the UK and China in Section 2. Section 3 was utilized to create a theoretical framework, followed by the development of hypotheses. Sections 4 and 5 provide a comprehensive analysis of data and methods, discussing their robustness and presenting theoretical and policy implications before concluding the study in Section 6.

2 | Fintech and Green Finance Developments in the United Kingdom and China

Fintech and GF, vital for sustainable economic growth, are transforming financial services and addressing environmental issues (Awais et al. 2023; Hu et al. 2025; Omri and Omri 2025; Sun et al. 2025). The United Kingdom has established itself as a global Fintech hub (Bonsu 2024; Dasilas and Karanović 2023),

albeit with a diverse approach to innovation and regulation. The country's Fintech ecosystem includes digital banking, cross-border payments, robo-advisory services and Insurtech. The Financial Conduct Authority (FCA) fosters innovation and consumer protection through a regulatory sandbox, allowing Fintech firms to test new products without immediate compliance risk. The initiative has significantly sustained startups in experimenting with innovative ideas while minimizing consumer risks. The United Kingdom's GDPR approach, focusing on consumer data protection and strict privacy standards, emphasizes transparency and accountability in the Fintech sector (Buckley 2025; Farhad 2024).

In China, the rapid adoption of digital technologies and government support has accelerated its global leadership in Fintech, digital payments, mobile banking and blockchain (Guo et al. 2024). Platform like China's Alipay and WeChat Pay, powered by Ant Group and Tencent, have transformed the country's mobile payment systems, enabling transactions and providing financial services (Han 2021; Chorzempa 2023; Li, Ye, et al. 2025). Notably, the Chinese government has significantly contributed to Fintech advancements through regulatory initiatives and strategic plans like the Fintech Development Plan and the ongoing development of the Digital Yuan (Yong 2021). Despite these developments, the government regulates the Fintech sector to ensure consumer protection and financial stability, preventing misuse and ensuring security through peer-to-peer lending platforms, digital payments and blockchain technologies (Tsai 2018) (Allen et al. 2022). Moreover, the Bank of China has significantly contributed to the development and regulation of cryptocurrencies in the digital currency market (Xie 2019).

Interestingly, the development strategies of their Fintech sectors have different implications for their ESG goals. In the United Kindom, GF has received significant momentum as part of the country's commitment to achieving net zero emissions by 2050. The UK government has implemented a comprehensive Green Finance Strategy since 2019, integrating ESG initiatives into financial decision-making through green bonds and sustainable investment funds (HM Government 2023). Yet, the country has implemented a regulatory framework encouraging firms to disclose climate-related financial risks, allowing investors to assess their exposure and align investments with sustainable practices. The green bond market's growth and commitment to transparency and accountability have made it a prominent player in sustainable finance.

China, the world's largest greenhouse gas emitter, has prioritized green finance as a key component of its transition to a low-carbon economy (Bonsu et al. 2025; Zhang et al. 2024). The Chinese government aims to achieve carbon neutrality by 2060 and reduce emissions by 2030, with green finance expected to play a crucial role in this transition (Guang-Wen and Siddik 2023). Green bonds, loans and other sustainable financial products are important for financing renewable energy projects, green infrastructure and emissions reduction initiatives (Liu 2025). Notably, China leads in green bond issuance globally, supporting a robust market to invest in environmentally sustainable projects (Liu 2025). China's Green Finance Committee and regulatory agencies are promoting green finance expansion through Green Credit Guidelines, despite challenges like transparency and monitoring in evaluating green bond projects' environmental sustainability. As a result, the government has enhanced reporting standards and transparency in green finance initiatives; however, there is room for improvement in ensuring sustainable project allocation.

Although both countries have made significant Fintech advancements, their regulatory approaches differ. Specifically, the Chinese government significantly influences the Fintech industry development, aligning with China's political and economic structure, driving significant technological and financial innovation through state-led initiatives. Meanwhile, the United Kingdom's market-driven regulatory system encourages competition and consumer choice, with the government acting as an enabler rather than a direct influencer of innovation. For instance, the Chinese government uses state-backed initiatives for sector growth, while the United Kingdom focuses on fostering innovation and market-driven solutions through government policies. The political and economic ideologies of the two nations significantly influence the role of Fintech and GF in enhancing ESG performance. As the global economy continues to develop, the experiences of China and the United Kingdom provide significant insights into how governmental policies and corporate strategies in Fintech and GF could facilitate ESG performance. Thus, our paper investigates the advancements in Fintech and GF in China and the United Kingdom, highlighting the role of government policies in enhancing ESG performance.

3 | Theoretical Framework and Hypothesis Development

We adopt IT, SHT and the RBV in this study. IT highlights the significant role of external factors like government policies, regulations and societal expectations in influencing corporate behaviour (Lee et al. 2024). IT suggests that the strategies of Fintech and GF companies are influenced by social expectations, government policies and regulations. Particularly, Fintech and GF must adapt to changing societal norms, legal frameworks, regulatory pressures, ESG performance standards and increased corporate transparency and responsibility (Bhattacharya and Sachdev 2024). IT explains why government policies and societal pressures drive companies to integrate ESG considerations into their Fintech and GF business models, ensuring compliance, legitimacy, and competitive advantages. For instance, evidence highlights the decisive role of regulatory frameworks and societal expectations in shaping corporate strategies. Firms shall prioritize Fintech and GF for financial returns while adhering to regulatory requirements for responsible operation. Thus, corporate strategies in Fintech and GF sectors must incorporate innovative technologies for transparency, accountability and sustainability to meet external pressures.

Second, SHT emphasizes the importance of addressing the needs and expectations of stakeholders who are increasingly concerned with ESG issues (Jones 1995). ESG performance has become a critical aspect for stakeholders, compelling companies to integrate ESG criteria into operations, products and services. Increasingly, stakeholders expect greater transparency, accountability and commitment to sustainability. This shift is vital in GF, where financial institutions must align strategies

with sustainable development goals to drive the transition to a greener economy. SHT highlights the importance of balancing the interests of diverse stakeholders by prioritizing financial products, investing in renewable energy and adopting sustainable business practices to promote environmental sustainability, social equity and robust governance (Saeed et al. 2024). By integrating ESG performance into corporate strategies, firms fulfil stakeholder expectations, including customers seeking socially responsible investment options, regulatory authorities implementing stricter ESG policies and investors prioritizing ESG performance when making investment decisions.

Finally, RBV asserts that acquiring unique, rare and inimitable resources is crucial for gaining a competitive advantage and enhancing a firm's performance (Barney 1991). RBV suggests that resources such as innovative technologies, financial capital and expertise in green finance are vital to achieving superior ESG performance. For instance, Fintech in financial institutions enhances transparency, governance, social responsibility and environmental sustainability, while GF enables companies to fund eco-friendly projects and advance ESG goals (Hu et al. 2025; Dicuonzo et al. 2024). Additionally, government policies, including subsidies and tax incentives for green investments, facilitate the efficient utilization of these resources by companies. The RBV suggests that companies can improve their financial performance and sustainability outcomes by utilizing their unique resources and aligning their strategies with ESG principles.

3.1 | Relationship Between Fintech and ESG Performance

Fintech innovations like big data, AI and blockchain are revolutionizing ESG performance in financial institutions, improving efficiency, precision and decision-making while aligning with sustainability objectives (Ding, Cui, and Li 2024; Ding, Li, and Zhao 2024). The relationship not only improves ESG performance but also fosters the green finance ecosystem by promoting sustainable practices in financial strategies (Jiao et al. 2024). RBV suggests that Fintech innovations enhance ESG performance by leveraging unique resources and capabilities for a competitive advantage (Barney 1991). In this context, Fintech and blockchain enhance ESG performance by enabling efficient analysis and transparency, providing firms with a competitive edge by meeting sustainability expectations.

Fintech and ESG are promoting sustainable development, fostering transparency and effective communication and aligning with stakeholder theory, promoting green economic recovery and balancing interests (Gao, Tan, and Duan 2024). Fintech enhances data management and ESG principles by responding to investor demand for ESG-centric financial products and advisory services, integrating ESG considerations into investment and decision-making processes (El Khoury et al. 2023). Fintech improves ESG information access, enabling stakeholders to comprehend a firm's environmental and social impact, optimizing resource allocation by directing capital to companies with strong ESG performance (Dicuonzo et al. 2024; Hu et al. 2025). Additionally, Fintech enhances transparency by facilitating communication and collaboration among stakeholders. In return, the improved transparency and traceability of ESG reporting ensure data immutability, which in turn fosters stakeholder trust and confidence in ESG claims (Galeone et al. 2024). For instance, Blockchain technology bolsters trust in the authenticity of ESG data, ensuring the integrity of information shared within the ecosystem (Kazachenok et al. 2023). This technological innovation aids companies in creating inclusive ESG strategies, ensuring stakeholder expectations are met and all parties' needs are met in ESG initiatives.

As Fintech strengthens the attractiveness of ESG investments through innovative financial products, it attracts a wider investor base, promotes sustainable finance involvement, democratizes access to ESG investing and encourages responsible business practices (Khalil and Belitski 2020). However, despite the increasing interest, limited studies have explored the impact of Fintech on corporate ESG performance, especially in the United Kingdom and China (Du et al. 2022; Hu et al. 2025). We seek to address this gap by investigating the influence of Fintech on ESG performance, leading to our H1:

H1. *Fintech innovations positively influence ESG performance in banking institutions.*

3.2 | Relationship Between Fintech and Green Finance

GF is gaining attention for its potential to reduce emissions and contribute to broader sustainability goals through investments in renewable energy and green technologies (Li and Umair 2023; Mishra et al. 2024; Čater et al. 2025). Green finance mechanisms like green bonds, loans and investment funds are crucial for channelling capital towards projects promoting environmental sustainability, accelerating the transition to a low-carbon economy (Xu and Lin 2024; Lyeonov et al. 2023). RBV suggests that Fintech innovations like AI-driven risk assessments, blockchain and data analytics offer financial institutions a competitive edge in identifying, evaluating and managing green finance opportunities. Research indicates that Fintech introduces novel funding mechanisms for green projects, like green bonds, which play a crucial role in financing environmentally friendly ventures (Mo et al. 2023; Ullah et al. 2023). Liu (2025) shows that Fintech can foster sustainable investments, GF and economic growth by promoting sustainable urbanization. According to IT, Fintech facilitates financial institutions in navigating green finance regulations, enabling them to swiftly adapt to sustainability-oriented investment demands and promoting investment diversification and transparency (Le et al. 2021; Goodell et al. 2022). Thus, we propose H2 as follows:

H2. *Fintech innovations positively and significantly promote green finance developments.*

3.3 | Relationship Between Green Finance and ESG Performance

ESG performance has become a crucial indicator of corporate sustainability (Liu et al. 2022; Ma et al. 2024). From the RBV, GF is a strategic approach that allows banks and clients to acquire and develop valuable, rare, inimitable and

nonsubstitutable ESG capabilities (Barney and Clark 2007). Investing in clean technologies, sustainable operations and ethical governance practices is vital for enhancing long-term performance and competitiveness (Wang, Li, and Wang 2023). Green credit or ESG-screened investments enable resource allocation that promotes innovation and risk mitigation in line with sustainability (Ma et al. 2024). Despite increasing policy focus and financial innovation, how green finance can improve ESG performance in financial institutions remains underexplored (Ma et al. 2024; Wang, Jiao, and Ma 2024). Most studies focus on ESG disclosures or firm-level practices, neglecting the mobilization of resources by financial institutions to support ESG integration (Tan et al. 2025; Baldini et al. 2018; Helfaya et al. 2023). Recently, evidence reveals mixed or context-specific effects on green finance and environmental performance, often lacking integration with strategic resource-based thinking (Fan et al. 2024). In this study, we propose GF as a strategic tool for enhancing ESG capabilities, aligning with the firm's internal resource development for sustained advantage, as highlighted in H3.

H3. *Green finance positively leads to improved ESG performance of banks.*

3.4 | Moderating Role of Government Policies

Fintech solutions, including blockchain-based supply chain transparency, AI-driven ESG analytics and digital platforms for stakeholder engagement, can significantly improve environmental tracking, social accountability and governance oversight (Ali and Abbas 2025; Ojukwu et al. 2024). Research suggests that policies promoting ecological civilization and environmental pollution liability insurance promote green technology innovation, wider ESG practices adoption, transparency and accountability in the ecosystem (Bai et al. 2023; Ma and Ma 2024). Fintech and GF, influenced by the regulatory and institutional environment, significantly impact ESG performance (Du et al. 2022). Based on IT, government interventions serve as both coercive and normative pressures, influencing organizational behaviour and promoting compliance with emerging sustainability norms and practices (Huq and Stevenson 2020). Government policies could influence the implementation of digital financial tools and sustainability-driven financial instruments by creating conducive conditions (Ullah et al. 2024). Supportive regulatory frameworks, like subsidies, tax incentives, mandatory ESG disclosures and carbon pricing, improve Fintech and green finance's effectiveness in delivering ESG outcomes and reducing systemic barriers. As the benefits of technological integration and sustainability are often achieved through government policies that support these priorities, the following hypothesis is proposed:

H4. *Government policies moderate the relationship between Fintech and ESG performance.*

Similarly, GF initiatives are more effective when policy frameworks are robust and align financial incentives with environmental and social goals (Zhang, Gao, et al. 2025). Policy instruments, including green bond standards, environmental risk assessments in lending and public investment in clean technologies, create institutional conditions that drive green financial flows toward high-impact ESG projects (Sahu et al. 2024; Ojukwu et al. 2024; Mertzanis et al. 2025). Without such support, GF efforts may be limited in scale or fail to achieve transformative ESG outcomes. Thus, the interaction between green finance and ESG performance is contingent on the policy landscape that governs financial markets and sustainability regulations. This leads to the development of the second moderating hypothesis:

H5. *Government policies moderate the relationship between GF and ESG performance.*

4 | Data and Method

Understanding sustainability dynamics in markets requires considering Fintech, green finance, government roles and ESG performance. Our theoretical frameworks highlight the importance of ESG performance through Fintech and GF strategies in the banking landscape. To examine the hypotheses, we estimated panel data from 2014–2024 in China and the United Kingdom. The selection of Chinese and UK-listed banks as research samples is based on two key reasons. First, China and the United Kingdom have distinct regulatory environments influencing Fintech, GF and ESG performance, with China promoting digital banking and sustainable projects and the UK fostering innovation. Second, the United Kingdom and China are both prioritizing ESG, with the United Kingdom focusing on corporate governance and social responsibility, and China on green finance for its low-carbon transition. This contrast offers a unique comparative analysis of how Fintech and government policies influence ESG outcomes in the banking sector.

Our paper utilized various data from credible sources. ESG performance data were sourced from Refinitiv ESG and MSCI, which offer standardized metrics for UK- and China-listed banks. The data on Fintech were sourced from each country's central bank publications, complemented with banks' annual reports. Green Finance data were sourced from the Climate Bonds Initiative, Bloomberg data and bank reports. Finally, government policy was sourced from the FCA and the China Banking and Insurance Regulatory Commission (CBIRC). We exclude banks lacking ESG data or missing annual reports from their websites, leading our sample to comprise 60 UK and Chinese banks. The key variables provide various dimensions into corporate strategies and governmental issues affecting ESG performance, offering a framework for enhancing ESG performance and suggesting effective strategies for both emerging and developed countries.

4.1 | Variable Description

4.1.1 | ESG Performance-Dependent Variable

ESG is a comprehensive framework that assesses a firm's sustainability and social impact, integrating environmental stewardship, social responsibility and robust corporate governance (Hu et al. 2025). Firms can improve their social responsibility, brand image and market competitiveness by focusing on ESG

factors while mitigating potential risks and achieving long-term sustainable growth (Edmans 2023). ESG serves as a holistic assessment of a firm's overall performance and its contribution to a sustainable society (Mandas et al. 2023). In our study, we used ESG performance scores or indices as a proxy for banks' ESG performance.

4.1.2 | Independent Variable

4.1.2.1 | Fintech. Fintech is a revolutionary approach that utilizes technologies like big data, AI, blockchain and digital platforms to improve the efficiency and delivery of financial services (Boot et al. 2021). These technologies enhance financial inclusion, operational efficiency, service delivery innovation, risk management and stability in the financial sector (Berg et al. 2022). In our study, we measure Fintech innovations at the bank level using a text-mining approach based on keyword identification in annual reports. Following the methodology of Dicuonzo et al. (2024), we constructed a Fintech index based on the frequency of Fintech-related terms in each bank's annual report. These keywords include Technology, Digital Banking, Network, Internet Banking, Online Services, Fintech, AI, Blockchain, E-payment and Mobile Banking. The bank-level Fintech index measures the level of Fintech adoption in each institution. We constructed the Fintech index by following five steps: (1) downloading the PDF versions of annual reports for each bank in the sample; (2) converting these reports into text format; Chinese-language reports were translated into English; (3) cleaning the text to retain only relevant keywords; (4) recording the keyword frequencies in Excel spreadsheets; and (5) calculating the Fintech index for each bank as the sum of the frequencies of all selected keywords.

4.1.2.2 | Green Finance. Green finance is a financial strategy that promotes sustainable activities, such as green bonds, sustainable lending and investments in renewable energy, to combat global environmental issues (Lee et al. 2023; Hu et al. 2025). GF assists banks in managing environmental risks, transitioning to a low-carbon economy, and ensuring compliance with environmental disclosure regulations (Chin et al. 2024). Our paper uses the total volume of green bonds, green loans and sustainable investment products, along with green finance disclosures, as proxies for GF at the bank level. The indicators are combined to create a comprehensive green finance index for each bank.

4.1.3 | Government Policy-Moderating Variable

Government policy plays a vital role in shaping banking institutions' sustainability practices by introducing supportive regulations, incentives and guidelines that promote green and responsible finance (Wang, Peng, et al. 2022; Li, Chen, et al. 2025). In this research, we operationalized government policy (GP) through an index that captures the existence of (1) green subsidies, (2) tax incentives for sustainable activities and (3) mandatory ESG disclosure regulations (Aklin et al. 2021). Each policy component is represented as a binary variable (1 = exists, 0 = does not exist) for each bank and country-year observation. We constructed GP by aggregating these three components into a composite score ranging from 0 to 3. This index acts as a moderating variable to evaluate the impact of GP on the relationship between Fintech adoption, GF and ESG performance.

4.1.4 | Control Variables

We investigate the impact of Fintech and GF on ESG performance through GP, incorporating various control variables to ensure robustness of the findings. First, bank size significantly influences ESG performance, with larger firms having more resources and capabilities, while smaller businesses may face resource limitations, making prioritizing ESG management more challenging (Bolibok 2024). Second, bank age can significantly influence its strategic engagement with ESG practices in the long term (Fuente et al. 2022). Thus, age was measured using the natural logarithm of the firm's existence years. Profitability is controlled using *ROA* (the ratio of net profit to total assets) and ROE (the ratio of net equity to total assets), as more profitable banks are better positioned to allocate resources towards ESG-related investments and disclosures. Table 1 summarizes the variable description.

4.2 | Model Specification and Long-Term Relationship Estimator

We evaluate the impact of Fintech and GF on the ESG performance of Chinese and UK banks through government policy. First, the model's explanatory variables (FINTECH, GF and GP) are defined for country i at time t, with ESG performance of the bank as the dependent variable. The general function of our model was then stated as follows:

$$f\left(FINTECH_{it}, GF_{it}, GP_{it}\right) \tag{1}$$

The theoretical framework is represented by Equation (1), showing the functional relationship between the dependent variable $ESG_{P_{it}}$ for a particular bank in country i at time t, and the explanatory variables (FINTECH, GF and GP) in country i at time t, modelled as a function (f). The functional form demonstrates the necessity of these components, illustrating the relationships between these parameters for ESG performance. The panel regression model can be derived as follows from the general function (f) labelled as Equation (1).

$$\begin{aligned} ESG_{P_{it}} = \alpha_1 + \beta_1 FINTECH_{it} + \beta_2 GF_{it} + \beta_3 GP_{it} + \beta_4 BS_{it} \\ + \beta_5 BA_{it} + \beta_6 ROA_{it} + \beta_7 ROE_{it} + \varepsilon_{it} \end{aligned} \tag{2}$$

The ESG_p in Equation (2) denotes ESG performance as the dependent variable, with other variables as independent and control variables. *FINTECH*, *GF* and *GP* denotes Fintech (financial technology), green finance and government policies. *BS, BA, ROA* and *ROE* denote bank size, bank age, return on assets and return on equity, respectively. α_1 signifies the intercept term. $\beta_2, \beta_3, \beta_4$, and β_5 show the coefficients for each explanatory variable's impact on ESG performance. ε_{it} represents the random error term, which takes into consideration the effects of all unknown factors that could have an impact on ESG performance. The control variables are also important since they affect ESG performance programmes.

TABLE 1 | Variable description.

Variables	Description	Sources
Fintech	Using a text-mining approach to calculate the Fintech index for each bank using the sum of the frequencies of selected keywords from annual reports	Central Banks Publications of each country, Banks' annual reports
Green finance	Green Finance Index (or volume of green loans, bonds, or green financing as a % of total assets)	Climate bonds Initiative, Bloomberg, bank reports
ESG performance	ESG performance score or index	Refinitiv ESG, MSCI and Bloomberg ESG
Government policies	Index by aggregating the three components below into a composite score ranging from 0 to 3 based on the existence of supportive government policies (1 = green subsidies, 2 = tax incentives for sustainable activities and 3 = mandatory ESG disclosure regulations)	Financial Conduct Authority (FCA), China Banking and Insurance Regulatory Commission (CBIRC)
Control variables		
Bank age	Number of years of bank existence	Banks official websites
Bank size	Natural logarithms of total assets (USD)	Bank's annual reports
ROA	The ratio of net profit to total assets	Bank's annual reports
ROE	The ratio of net equity to total assets	Bank's annual reports

To test long-run relationship, we used the DCCE model, a derivative of the Common Correlated Effect (CCE) technique, to examine the long-term relationships between the variables (Chudik and Pesaran 2015; Yeboah et al. 2024). This estimation technique enhances panel model estimation by controlling error term situations among data entities, improving precision (Yeboah et al. 2024). Notably, traditional panel estimators, like fixed or random effects models, often fail in macropanel settings due to unobserved common factors and heterogeneous responses. The DCCE estimator, a variant of the CCE, incorporates cross-sectional averages to account for unobserved common shocks, heterogeneous slope coefficients, and potential nonstationarity. This makes DCCE ideal for panels with strong cross-sectional dependence (CSD), dynamic relationships and structural heterogeneity across units due to its adaptability. The DCCE equation can be expressed in the general form as follows:

$$y_{it} = \alpha_i + \sum_{j=1}^{n} \beta_{ij} x_{ijt} + \delta_i y_{it-1} + \sigma_i \bar{y}_{(t-1)} + \sum_{j=1}^{n} \gamma_{ij} \bar{x}_{(jt-1)} + \rho_i \bar{y}_t + \sum_{j=1}^{n} \tau_{ij} \bar{x}_{jt} + \epsilon_{it}$$

In this case, where n denotes the number of our independent variables ($n = 4$). The cross-sectional averages ($\bar{y}_t$) and $\bar{x}_{jt}$ are given as follows:

$$\bar{y}_t = \frac{1}{M} \sum_{i=1}^{M} y_{it}$$

and

$$\bar{x}_{jt} = \frac{1}{M} \sum_{t=1}^{M} x_{it}$$

To account for the dynamic character of the model, the lag of the dependent variable for unit i is represented by y_{it-1}. $\bar{y}_t$ and $\bar{x}_{jt}$ represent the cross-sectional averages of the dependent and independent variables at time t, respectively. The random error term is represented by ϵ_{it}, while the coefficients of the cross-sectional averages are represented by σ_i, γ_{ij}, ρ_i and τ_{ij}. The study incorporates cross-sectional averages and lagged dependent variables y_(i,t-1) to account for unobserved heterogeneity that fluctuates over time between nations. Common shocks that affect both independent and dependent variables can reduce the likelihood of endogeneity.

4.3 | Econometric Estimators

We performed three econometric estimations, such as CSD tests, unit root tests, and cointegration tests. First, CSD tests were conducted to identify significant associations within the panel datasets to prevent biased parameter estimates. The CSD test is a crucial diagnostic tool for panel data estimations, ensuring the reliability of statistical results, estimation techniques and model specifications (Degirmenci and Yavuz 2024). The CSD test is estimated mathematically as below:

$$\mathrm{CD_{BP}} = \sum_{i=1}^{N-1} \sum_{j=(i+1)}^{N} \hat{\rho}_{ij}^2, \quad \mathrm{CD_{LM}} = \sqrt{\frac{1}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=(i+1)}^{N} T\hat{\rho}_{ij}^2 - 1 \right)$$

and

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=(i+1)}^{N} \hat{\rho}_{ij} \right)$$

The CSD estimator tests the null hypothesis of no CSD ($H_0: Cov\left(U_{it}, U_{ij}\right) = 0$) against the alternative hypothesis of CSD ($H_1: Cov\left(U_{it}, U_{ij}\right) \neq 0$). Additionally, we performed Pesaran and Yamagata's slope homogeneity test (Pesaran 2007) as follows: $\hat{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{\delta} - k}{\sqrt{2k}}\right)$ and

$$\hat{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{\delta} - E\left(\tilde{Q}_{it}\right)}{\sqrt{Var\left(\tilde{Q}_{it}\right)}}\right)$$

where $\tilde{\delta}$ is defined as

$$\left(\tilde{Q}_{it}\right) = k, var\left(\tilde{Q}_{it}\right) = \frac{2k(T-k-1)}{T+1}$$

The null hypothesis is rejected, indicating uniform slope coefficients across test statistics, as shown in Tables 2 and 3 of the CSD test and slope homogeneity rest results. Specifically, bank size (CD = 70.72, $p = 0.000$), ROE (CD = 67.21, $p = 0.000$), and ESG performance (CD = 61.84, $p = 0.000$) exhibit particularly high levels of dependence, reflecting potential spillover effects and interconnectedness among firms across countries or regions. Additionally, we found that variables with lower CD values, like government policy and bank age, show significant cross-sectional linkages. The study emphasizes the need for second-generation panel data estimation techniques that consider dependencies for more reliable econometric inferences.

Second, we utilized the CIPS approach, an enhanced version of the panel unit test, to identify potential trends and intercepts in panel data analysis (Pesaran 2007). Unit root tests are essential for assessing modelling validity, correcting erroneous findings and enhancing economic forecasts by addressing CSD issues (Xu et al. 2023). The CIPS test statistics are expressed as follows:

$$CIPS = N^{-1}\sum_{i=1}^{N} CADF_i$$

where *CADF* denotes the cross-sectional augmented Dickey–Fuller estimator. Table 4 presents the CIPS unit root test results. The variables are nonstationary with intercept only but become stationary when trend is included, as indicated by significant test statistics at the 1% level. This confirms that all variables are integrated of order one, I(1).

Finally, we used Westerlund (2007) cointegration method, a robust error correction approach with fewer constraints, to ensure long-term variable balance and accommodate structural breaks, while being sensitive to lag length. The equation is expressed as follows:

$$\Delta Q_{it} = \delta_i \varphi_i \left(Q_{i(t-1)} + v_i x_{i(t-1)}\right) + \sum_{j=1}^{n} \varphi_{ij}\left(\Delta Q_{(t-j)} + \sum_{j=1}^{n} \varphi \rho_{ij} \Delta x_{i(t-j)} + \mathrm{v_{it}}\right.$$

Table 5 shows panel cointegration test results for both models, confirming a long-run relationship among variables with

TABLE 2 | CSD test results.

Variables	CD-test	*p*
ESG_{it}	61.84	0.000 ***
$Fintech_{it}$	21.50	0.000 ***
GF_{it}	15.46	0.000 ***
GP_{it}	9.20	0.000 ***
$Bank\_size_{it}$	70.72	0.000 ***
$Bank\_age_{it}$	6.57	0.000 ***
$lnROA_{it}$	44.59	0.000 ***
$lnROE_{it}$	67.21	0.000 ***

***denotes 1% significance level.

TABLE 3 | Slope homogeneity test results.

$ESG_{it} = f\left(Fnech_{it}, GF_{it}, GP_{it}, Bsize_{it}, Bage_{it}, ROA_{it}, ROE_{it}\right)$		
	Test statistics	***p***
Delta_tilde	12.669	0.000 ***
Delta_tilder_adjusted	16.026	0.000 ***
$GF_{it} = f\left(Fintech_{it}, GP_{it}, Bsize_{it}, Bage_{it}, ROA_{it}, ROE_{it}\right)$		
Delta_tilde	7.501	0.000 ***
Delta_tilder_adjusted	9.488	0.000 ***

***denotes 1% significance level.

TABLE 4 | CIPS unit root test.

Variable	Intercept	Trend
ESG_{it}	2.005	−3.124 ***
$Fintech_{it}$	3.583	−6.983 ***
GF_{it}	3.520	−4.345 ***
GP_{it}	2.415	−6.481 ***
$Bank\_size_{it}$	5.434	−7.264 ***
Ban_age_{it}	2.794	−5.758 ***
ROA_{it}	3.293	−5.278 ***
ROE_{it}	2.079	−3.453 ***

***denotes 1% significance level.

TABLE 5 | Panel cointegration test.

Model 1	Gt (*p*)	Ga (*p*)	Pt (*p*)	Pa (*p*)
	−3.928	−7.979	−14.239	−6.491
	(0.000)	(0.000)	(0.000)	(0.220)
Model 2	−3.841	−6.141	−11.754	−5.540
	(0.000)	(0.050)	(0.000)	(0.140)

statistically significant Gt, Ga, and Pt at the 1% level. This justifies the application of the DCCEs estimator for long-run analysis.

4.4 | Sample Statistics

Table 6 displays the general description of the variables in the form of mean, median, standard deviation, skewness, kurtosis and probability values of all the variables. Bank age recorded the highest mean, followed by BS, ESG, ROA, ROE and Fintech, with the lowest mean recorded by government policy. From the results, the government policy recording the smallest average value among the variables is an obvious indication of the minimal attention given to supportive government interventions for Fintech-driven sustainability practices in both China and the United Kingdom. This suggests that despite both countries' growing focus on digital innovation and sustainable development, policy frameworks and governmental incentives directly targeting the integration of Fintech into ESG performance remain underdeveloped or insufficiently implemented. All the variables demonstrate normal skewness with values less than 3. According to the results, the kurtosis values affirm the normal distribution of the data indicated by the *p*-values.

Table 7 presents the correlation matrix, offering insights into the relationships among ESG performance, Fintech innovation, GF, GP and control variables. The correlation between ESG and Fintech is weak, suggesting limited direct association, while the correlation between ESG and green finance is slightly stronger, suggesting modest association with better ESG outcomes. The moderate positive correlation between Fintech and GP (0.509) indicates that policy support significantly contributes to the development of Fintech. Interestingly, the negative correlation between GF and GP indicates a potential policy mismatch, with a preference for digital finance over environmental initiatives. The study found a strong correlation between ESG performance and bank size ($r = 0.821$) and bank age (0.820), suggesting that larger and established banks tend to exhibit higher ESG engagement. Fintech has a strong positive correlation with profitability indicators like ROA (0.773) and ROE (0.728), indicating its potential contribution to financial performance. In contrast, the weak correlation between ESG activities and ROA (0.065) and ROE (0.098) indicates that ESG activities may not be immediately linked to profitability.

5 | Empirical Results and Discussion

Our results, following the DCCE long-run estimator by (Chudik and Pesaran 2015; Yeboah et al. 2024), support our Hypothesis 1. As evidenced in Table 8, Fintech has a positive and significant effect on the ESG performance of banks for both countries at the 1% significance level. It suggests that adopting Fintech can improve banks' environmental, social and governance practices by enhancing transparency, operational efficiency and access to sustainable financial services. This is consistent with recent and previous conclusions (Hu et al. 2025; Sassi 2024; Dicuonzo et al. 2024; Albert et al. 2025), indicating that Fintech acts as a catalyst for sustainable banking by facilitating green innovation, responsible investment and improved stakeholder engagement.

TABLE 6 | Descriptive statistics.

Full sample					UK sample				China sample			
Variables	Mean	Std. dev.	Minimum	Maximum	Mean	Std. dev.	Minimum	Maximum	Mean	Std. dev.	Minimum	Maximum
ESG_{it}	23.006	1.828	18.585	29.156	23.2004	1.9881	19.9776	29.1558	22.828	1.6504	18.585	26.327
$Fintech_{it}$	6.949	0.7457	208.122	7370.653	1368.072	1025.584	226.983	5289.276	1437.964	1516.473	208.123	7370.653
GF_{it}	4.649	0.3970	39.0967	480.125	114.107	55.595	51.1618	480.1259	126.793	72.342	39.097	420.186
GP_{it}	3.479	0.4509	3.3352	228.994	35.864	16.382	8.4942	87.2898	45.083	40.6544	3.335	228.994
B_size_{it}	23.528	1.7493	19.669	28.5323	23.528	1.7492	20.465	28.5323	23.245	1.762	19.669	27.127
B_age_{it}	25.072	1.7777	21.31	29.75	25.072	1.7777	22.46	29.75	24.709	1.4709	21.31	27.66
ROA_{it}	8.4708	1.0727	445.264	53068.36	8.4709	1.0727	6.3552	10.5524	8.226	1.2069	6.0986	10.879
ROE_{it}	8.0826	1.2319	157.061	57562.53	8.0826	1.2319	5.3939	10.6159	7.8559	1.3188	5.0566	10.961
Obs	1104				528				576			

TABLE 7 | Correlation results.

	ESG_{it}	$Fintech_{it}$	GF_{it}	GP_{it}	B_size_{it}	B_age_{it}	ROA_{it}	ROE_{it}
ESG_{it}	1.000							
$Fintech_{it}$	0.116***	1.000						
GF_{it}	0.135***	−0.012**	1.000					
GP_{it}	−0.064***	0.509**	−0.154***	1.000				
$Bank\_size_{it}$	0.821***	0.329***	0.087**	0.117***	1.000			
$Bank\_age_{it}$	0.820**	0.174**	0.151**	−0.108***	0.814***	1.000		
ROA_{it}	0.065**	0.773***	−0.298***	0.506***	0.288***	0.176**	1.000	
ROE_{it}	0.098**	0.728***	−0.275***	0.503***	0.346**	0.188***	0.747	1.000

***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

TABLE 8 | DCCE test results.

	Dependent variables					
	Full panel		Panel A (Banks in the United Kingdom)		Panel B (Banks in China)	
Independent variables	ESG_{it}	GF_{it}	ESG_{it}	GF_{it}	ESG_{it}	GF_{it}
$Fintech_{it}$	1.171 (5.34)***	0.901 (12.08)***	0.776 (4.27)***	0.681 (5.57)***	0.311 (4.71)***	0.982 (5.40)***
GF_{it}	1.071 (4.93)***	—	0.530 (5.75)***	—	0.914 (3.51)***	—
Moderators						
Fintech*GP_{it}	0.074 (4.44)***		0.135 (3.19)***		0.254 (4.93)***	
GF*GP_{it}	0.032 (3.56)***		0.035 (3.84)***		0.208 (4.50)***	
Control variables						
$Bank\_size_{it}$	0.026 (3.56)***	0.071 (3.10)**	0.232 (4.35)***	0.072 (4.94)***	0.089 (3.92)***	0.164 (3.55)**
$Bank\_age_{it}$	0.020 (3.75)**	−0.027 (−0.75)	0.538 (4.16)***	0.049 (3.26)**	0.036 (3.75)**	0.057 (3.44)**
ROA_{it}	0.096 (3.42)***	0.097 (5.86)***	0.659 (5.25)**	0.053 (6.38)***	0.153 (5.09)***	0.054 (8.24)***
ROE_{it}	0.063 (3.95)***	0.098 (3.16)***	1.065 (5.18)***	0.047 (5.65)***	0.881 (4.28)***	0.029 (3.92)***
R^2	0.56	0.53	0.52	0.50	0.54	0.55
Obs	1104		528		576	

Note: GF, ROA and ROE denote green finance, return on assets and return on equity.
***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

However, the effect of Fintech on ESG performance is larger in the United Kingdom compared to China, highlighting that institutional maturity, regulatory support and digital infrastructure in the United Kingdom provide a more conducive environment for Fintech to drive sustainable outcomes. Based on IT, we highlight the significant role of both formal and informal institutional frameworks in influencing organizational behaviour. For instance, the United Kingdom's robust regulatory systems, stringent ESG standards and increased stakeholder awareness are driving banks to incorporate sustainability into their Fintech strategies. While China's Fintech adoption is advanced, institutional factors such as evolving ESG regulations and less mature sustainability frameworks may limit its full impact (Liu 2025).

H2 was supported, evidencing that Fintech has a positive and significant effect on GF, indicating that Fintech enhances green financial practices by optimizing resource allocation, reducing information asymmetry and promoting the development of environmentally focused financial instruments. Imperatively, the results support the previous literature (Liu 2025; Hu et al. 2025, Ullah et al. 2023; Bonsu et al. 2025), highlighting the significance of Fintech in enhancing green finance by facilitating

capital flow into sustainable projects, improving transparency, streamlining data management and optimizing investment decision-making.

Notably, the effect is larger in China compared to the United Kingdom. This is evident as China's rapid Fintech expansion and government-led green finance initiatives foster a favourable environment for Fintech's significant impact on green finance development. This contrasts with the United Kingdom's market-driven approach, where the Fintech-green finance linkage might be tempered by established financial markets and existing green investment frameworks. Therefore, our research supports the RBV, indicating that firms can achieve a competitive advantage by effectively leveraging valuable, rare, inimitable and nonsubstitutable resources (Barney 1991). In this context, Fintech capabilities are a strategic resource that enables financial institutions, particularly in China, to develop and implement unique green finance solutions. Fintech integration in financial services enhances firms' ability to identify, evaluate and finance sustainable investment opportunities, enhancing green competitiveness in rapidly evolving financial ecosystems.

H3 was validated, showing a positive and significant effect of GF on banks ESG performance suggesting that GF initiatives improve banks' ESG performance by promoting sustainable investments, transparency in financial products and responsible business practices. While previous studies (Sun et al. 2025; Hu et al. 2025; Kwilinski et al. 2025; Gao, Zhou, and Wan 2024) support our findings, studies did not focus on the banking sector, highlighting the unique role of GF in aligning banking activities with sustainable development goals. Thus, we argue that GF improves ESG metrics and assists banks in meeting the growing sustainability demands from stakeholders like investors, regulators and customers. For instance, China's major banks, including ICBC, have significantly improved their ESG scores by issuing green bonds and financing renewable energy projects. Likewise, UK banks such as the HSBC and Barclays have incorporated green finance into their portfolios, issuing green bonds and financing eco-friendly projects, thereby improving their ESG ratings. However, the effect is more significant in China than in the United Kingdom, attributed to the Chinese government's robust policy initiatives, GF subsidies and swift adoption of sustainable financial practices. Chinese regulatory emphasis on green development and sustainable growth pressures banks to adopt green finance (Ma et al. 2024), resulting in enhanced ESG performance. However, the United Kingdom's mature financial system may not clearly associate enhancements in ESG performance with green finance initiatives due to their institutionalized characteristics.

For moderating effects, we anticipated a positive moderating effect of GP on Fintech's impact on ESG performance (H4) and GF effect on ESG performance (H5). H4 is validated as GP has a positive and significant moderating effect on Fintech and ESG performance relationships for both countries. The study indicates that government policies promoting Fintech adoption, particularly those promoting sustainable financial practices, significantly improve ESG performance in banks in both countries. Therefore, we provide empirical evidence that government support through regulatory frameworks, GF incentives and subsidies can expedite the integration of Fintech into sustainable finance practices.

The positive effects may be because China's government has implemented policies, including the Green Bond Endorsed Project Catalogue and Digital Financial Inclusion Strategy (Yue and Nedopil 2025) to foster Fintech development and its direct influence on ESG outcomes. Meanwhile, the UK government's green finance initiatives and commitment to net zero emissions by 2050 partially support Fintech's role in driving ESG performance. Notably, the moderating effect is larger in China than in the United Kingdom, which can be attributed to China's more aggressive government policies and subsidies aimed at promoting Fintech adoption and GF, alongside its top-down approach to environmental regulation. In contrast, the United Kingdom's mature regulatory and financial systems, supportive policy environment and established ESG infrastructure help mitigate the additional impact of policy moderation on Fintech and ESG outcomes.

Similarly, H5 is supported, showing a positive and significant moderating effect of GP on GF and ESG performance relationships for both countries, suggesting that government policies supporting green finance, including green bond issuance, renewable energy financing and ESG reporting standards, are crucial for enhancing ESG performance in the banking sector. For instance, China's green finance policies, including mandatory green bond issuance (Sun and Chen 2022; Zhang 2023a) significantly influence banks' sustainability integration, thereby significantly impacting ESG performance. Likewise, the United Kingdom's Green Finance Institute and financial market regulations support green finance product development, with the impact moderated by the country's established ecosystem. Notably, the effect is larger in China than in the United Kingdom, considering China's government's proactive approach of implementing incentives and regulations, promoting green finance adoption to achieve environmental objectives. Evidently, institutional pressures in China are stronger, pushing banks to adopt green finance practices as part of national development goals. However, the United Kingdom's financial markets have already integrated numerous practices, making additional government interventions less impactful. Our findings are connected to IT, which highlights the influence of government policies and regulations on organizational behaviour. The stronger effect in China highlights how the institutional environment, through proactive government intervention, drives Fintech and green finance to meet sustainability goals. Likewise, the stakeholder theory explains outcomes by demonstrating how government policies align with stakeholders like investors, regulators and customers who demand sustainable practices. Consequently, government interventions establish a framework to assist banking institutions in meeting stakeholder expectations and enhancing ESG performance. Particularly, our moderation results provide a comprehensive understanding of how GP moderates Fintech and GF impact on ESG, thereby expanding the existing literature.

For control variables, BS, BA, ROA and ROE exhibit significant effects on both ESG and GF performance across both the United Kingdom and China. Larger banks tend to perform better in ESG and GF, likely due to their greater resources, financial capacity and economies of scale, which enable them to engage in sustainable and green finance activities. This is particularly evident in both countries, where larger banks show a significant positive impact on ESG and GF performance. Similarly, older

banks, especially in the United Kingdom, tend to have more experience in adopting ESG practices, which could be due to their long-established presence and alignment with regulatory frameworks, though their effect on GF is less pronounced. In contrast, Chinese banks also show positive effects of age on both ESG and GF, suggesting that long-established banks in China are well positioned to integrate sustainability into their operations.

Additionally, both ROA and ROE exhibit positive and significant effects on ESG performance and GF in all panels. More profitable banks are better equipped to invest in green projects and implement sustainable practices, as they have greater financial resources. Notably, the effect of ROA on both ESG and GF is stronger in the United Kingdom, indicating that higher profitability in UK banks significantly contributes to their engagement in these areas. Meanwhile, in China, the positive relationship between ROE and ESG is more pronounced, reflecting the country's focus on long-term sustainability in its financial system, even though the effect of ROE on GF is somewhat weaker. Overall, these control variables highlight the importance of bank size, age and profitability in driving sustainable finance initiatives and improving ESG performance across both countries.

5.1 | Robustness Estimators and Analysis

We further utilized the Common Correlated Effects Generalized Test (CCEG) approach (Yeboah et al. 2024), which effectively reduces bias in panel data models with CSD, addresses unobserved heterogeneity and addresses common shocks. This method provides precise estimates and a robust research framework, making it suitable for evaluating nations with similar economic characteristics. The CCEG estimator is mathematically expressed as follows:

$$y_{it} = \alpha_i + \beta' x_{it} + \sigma' \overline{X}_t + \tau'_{\mu t} + \epsilon_{it}$$

where y_{it} is the dependent variable for country i at time t, α_i denotes the individual fixed effect for country i, β' is a vector of coefficients for the variables, x_{it} It is a vector of the explanatory variables for country i at time t. $\overline{X}_t$ signifies the cross-sectional average of the variables, σ' denotes coefficients for the cross-sectional averages, μ_t represents the unobserved common factors, τ denotes coefficients for unobserved common factors, and ϵ_{it} denotes the error term. This method ensures a robust causal relationship by addressing unnoticed confounders that could potentially undermine causal associations with genuine underlying effects. Therefore, our model is computed below:

$$ESG_{P_{it}} = \alpha_1 + \beta_2 FINTECH_{it} + \beta_3 GF_{it} + \beta_4 GP_{it} + \sigma_1 FINTECH_t + \sigma_2 GF_t + \sigma_3 GP_t + \tau'_{\mu t} + \varepsilon_{it}$$

Table 9 presents CCEGT estimator results confirming the robustness of previous findings using the DCCE estimator. Particularly, Fintech significantly impacts ESG performance and GF across the full panel, UK, and China subsamples, confirming H1, H2. This indicates that Fintech adoption in the banking sector consistently improves sustainability outcomes by fostering digital innovation, financial inclusion and enhanced resource allocation. Similarly, GF enhances bank ESG performance by allocating capital to environmentally friendly and socially responsible projects, strengthening H3, supported by DCCE estimates and consistent magnitude of effects. Moreover, the study confirms the moderating role of GP, indicating that regulatory and policy support can significantly enhance the impact of Fintech and green finance on ESG outcomes, supporting H4, H5. The robustness of moderating effects across estimation techniques underscores the crucial role of institutional frameworks in shaping sustainable finance impacts. Overall, the CCEGT estimator confirms the DCCE's reliability, emphasizing Fintech, GF and GP's role in enhancing ESG performance in the banking sector.

The novel CCEG was confirmed using the Bootstrap Quantile Regression (BSQR) test, despite its robust and reliable results (Westerlund 2008). The BSQR test is an efficient nonparametric model stability and reliability test for panel datasets, ensuring reliable data output despite varying results (Yeboah et al. 2024). The method effectively addresses missing elements bias and offers a comprehensive view of ESG performance, detecting various effects that regressors often overlook. Table 10 confirms DCCE and CCEGT estimators' findings, highlighting Fintech, GF, and GP's vital roles in driving ESG performance across different bank sustainability engagement levels.

The results validate the hypothesized relationships and reveal heterogeneity in the magnitude and intensity of these effects across the ESG performance distribution. Specifically, Fintech exhibits a consistently positive and statistically significant influence on ESG performance across all quantiles (Q25, Q50, Q75 and Q90), reaffirming its transformational potential in embedding sustainability into banking operations. Interestingly, the magnitude of this effect is most pronounced at the median (Q50) and remains strong at both the lower and higher quantiles. This suggests that Fintech allows banks to integrate sustainability into financial intermediation, enhancing transparency and enabling banks to harness digital innovation across the ESG spectrum. Additionally, Fintech's growing impact on GF is a significant catalyst for promoting environmentally responsible investment practices and financial inclusion across all quantiles. The direct impact of GF on ESG performance is statistically significant across all quantiles, with its effect intensifying at the higher ends of the distribution. This implies that banks with established ESG frameworks are better equipped to utilize green finance initiatives for achieving significant sustainability outcomes. Notably, GF enhances ESG advancement within institutions that have already internalized sustainability principles, making it more effective in supporting sustainability efforts.

The moderating effects are positive and significant across all quantiles, providing robust evidence of the moderating role of government policy. The study confirms that regulatory support and favourable institutional environments significantly enhance the positive impact of Fintech and green finance on ESG performance. Particularly, the moderation is effective in upper quantiles, indicating that strong governance mechanisms and supportive public policy frameworks are critical for banks leading in sustainability efforts. Overall, the quantile regression analysis confirms the consistency and robustness of DCCE

TABLE 9 | CCEGT results.

	Dependent variables					
	Full panel		Panel A (Banks in the United Kingdom)		Panel B (Banks in China)	
Independent variables	ESG_{it}	GF_{it}	ESG_{it}	GF_{it}	ESG_{it}	GF_{it}
$Fintech_{it}$	1.348 (4.18)***	0.991 (9.31)***	0.588 (4.56)***	0.921 (12.8)***	0.486 (5.74)***	0.136 (6.57)***
GF_{it}	1.265 (3.63)***		0.613 (5.62)***		0.281 (4.26)***	
Moderators						
Fintech*$lnGP_{it}$	0.282 (3.44)***		0.131 (3.29)***		0.012 (3.82)***	
GF*$lnGP_{it}$	0.063 (3.38)***		0.095 (5.51)***		0.169 (3.67)***	
Control variables						
$Bank\_size_{it}$	0.154 (3.66)***	0.079 (3.75)**	0.064 (3.15)**	0.046 (3.99)**	0.012 (4.04)***	0.013 (3.51)***
$Bank\_age_{it}$	0.021 (2.15)***	−0.034 (−1.33)	0.078 (4.12)***	0.036 (4.31)**	0.037 (3.68)***	0.060 (4.55)***
ROA_{it}	1.092 (5.12)***	0.965 (9.20)***	0.966 (5.31)***	0.962 (15.32)***	1.428 (5.11)***	0.583 (5.53)***
ROE_{it}	0.693 (4.95)***	0.203 (3.40)***	0.905 (5.42)***	0.815 (9.41)***	1.104(5.44)***	0.236 (3.14)***
R^2	0.58	0.55	0.53	0.52	0.56	0.54
Obs	1104		528		576	

Note: GF, ROA and ROE denote green finance, return on assets and return on equity.
***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

and CCEGT findings, while also revealing that the benefits of Fintech, GF and GP are not uniform.

For individual country effects (as shown in Tables 11 and 12), the results show that Fintech has a consistently positive and statistically significant influence on ESG performance in both countries. Specifically, the effect remains stable across all quantiles in the United Kingdom (ranging from 0.485 to 0.537), indicating a mature and uniformly integrated Fintech environment within ESG strategies and performance. However, Chinese banks exhibit a wider variation in Fintech's impact (0.131 to 0.580), reflecting a less uniform adoption of Fintech across institutions and possibly highlighting differences in digital maturity and regulatory alignment. Moreover, GF contributes significantly to ESG performance in both countries, though the strength of the relationship differs. UK banks demonstrate a strong and consistent positive association between GF and ESG performance across all quantiles, suggesting a well-established linkage between financial innovation and sustainability. Meanwhile, Chinese banks show a weak but significant impact of GF initiatives, indicating their early implementation and effectiveness in driving ESG transformation. Fintech is deemed an indispensable enabler of GF in both countries. We reveal China's significant influence on Fintech, promoting green financial products, while UK banks exhibit strong Fintech-GF linkages due to institutional and regulatory frameworks.

GP moderates the relationship between Fintech, GF and ESG performance. Notably, GP in the United Kingdom significantly improves the effectiveness of Fintech and GF, particularly among mid-to-high ESG performers. In contrast, the robust moderating effects of GP in China suggest that government intervention is more fundamental in reinforcing sustainable finance initiatives. The study highlights the significance of policy frameworks in accelerating ESG integration, particularly in emerging or transitional markets. Our results discover that UK and Chinese banks are exploiting Fintech and GF to enhance ESG performance, with UK banks demonstrating a more stable and consistent approach. We highlight the influence of institutional context, regulatory intensity and market maturity on the contribution of digital and green innovations to sustainable banking practices.

5.2 | Addressing Simultaneity Bias

To address simultaneity bias in the relationship between Fintech development, GF and ESG performance, the system Generalized Method of Methods estimator was employed (Blundell and Bond 1998; Roodman 2009). This approach mitigates dynamic panel data challenges, including endogenous regressors and unobserved heterogeneity, by applying first differences to eliminate fixed effects and utilizing lagged levels and differences of endogenous variables as instruments, thereby reducing endogeneity from simultaneity and reverse causality (Agyemang et al. 2018; Arellano and Bond 1991). Table 13 presents the model validity results, assessed using the Sargan test and the Arellano–Bond test for serial correlation in differenced residuals.

Our results suggest a statistically significant positive impact of Fintech on GF and ESG. Additionally, GF shows a positive influence on ESG performance, indicating a reinforcing relationship between sustainable financial practices and

TABLE 10 | Full panel tests with bootstrap quantile regression.

	Full panel (Banks in the United Kingdom and China)							
	Dependent variables							
	ESG_{it}				GF_{it}			
Independent variables	**Q = 0.25 coefficient *p***	**Q = 0.50 coefficient *p***	**Q = 0.75 coefficient *p***	**Q = 0.90 coefficient*p***	**Q = 0.25 coefficient *p***	**Q = 0.50 coefficient *p***	**Q = 0.75 coefficient *p***	**Q = 0.90 coefficient *p***
$Fintech_{it}$	0.191 (2.75) ***	0.337 (6.35) ***	0.194 (2.88) ***	0.236 (2.26) ***	0.822 (45.70) ***	0.863(37.26) ***	0.885(36.17) ***	0.966(21.45) ***
GF_{it}	0.212 (2.39)**	0.397 (7.78) ***	0.267 (4.23) ***	0.338 (4.00) ***	—	—	—	—
Moderators								
Fintech*GP_{it}	0.234 (2.73) ***	0.130(2.175) ***	0.287 (2.97) ***	0.167(1.74) ***	—	—	—	—
GF*GP_{it}	0.213 (3.10) ***	0.294 (1.76) ***	0.396 (2.06) ***	0.787 (2.19) ***	—	—	—	—
Control variables								
$Bank\_size_{it}$	0.019 (0.23)	0.017 (0.03)	−0.043 (−0.45)	−0.096 (−0.52)	−0.1659 (−4.09) ***	−0.144(−3.55) ***	−0.033 (−0.73)	−0.425(−0.43)
$Bank\_age_{it}$	1.081 (12.09) ***	1.083 (16.55) ***	1.119 (11.80) ***	1.162 (6.28) ***	−0.028 (−0.69)	−0.024(−0.37)	−0.209(−3.66) ***	−0.032(0.37)
ROA_{it}	−0.963 (−9.56) ***	−0.837 (−9.20) ***	−1.073 (−9.90) ***	−1.138 (−5.42) ***	−0.514 (−11.80) ***	−0.593(−7.76) ***	−0.491 (7.12) ***	−0.731(−8.41) ***
ROE_{it}	1.080 (12.00) ***	1.055 (14.76) ***	1.168 (13.56) ***	1.246 (6.63) ***	−0.1162(−2.65) ***	−0.053(−0.81)	−0.181(−2.89) ***	−0.036(−0.40)
Constant	−4.692 (−5.81) ***	−5.703 (14.99) ***	−4.951 (−9.06) ***	−5.155 (−5.52) ***	4.6091(20.67) ***	5.064(1.42) ***	6.061 (20.17) ***	5.154(12.41) ***
Obs	1104	1104	1104	1104	1104	1104	1104	1104

***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

TABLE 11 | Robustness for the United Kingdom using bootstrap quantile regression.

	Panel A (Banks in the United Kingdom)							
	dependent variables							
	ESG_{it}				GF_{it}			
Independent Variables	**Q = 0.25 coefficient *p***	**Q = 0.50 coefficient *p***	**Q = 0.75 coefficient *p***	**Q = 0.90 coefficient *p***	**Q = 0.25 coefficient *p***	**Q = 0.50 coefficient *p***	**Q = 0.75 coefficient *p***	**Q = 0.90 coefficient *p***
$Fintech_{it}$	0.485 (5.62)***	0.503 (6.69)***	0.4896 (4.74)***	0.537 (3.84)***	0.859 (41.54)***	0.897 (48.84)***	0.854 (43.79)***	0.827 (23.30)***
GF_{it}	0.622 (8.18)***	0.602 (9.12)***	0.5304 (5.28)***	0.546 (4.94)***	—	—	—	—
Moderator								
Fintech*$lnGP_{it}$	0.143 (2.26)***	0.011 (2.24)***	0.019 (2.24)***	0.295 (1.90)**	—	—	—	—
GF*$lnGP_{it}$	0.148 (2.37)***	0.012 (1.10)***	0.007 (2.10)***	0.283 (1.96)**	—	—	—	—
Control variables								
B_size_{it}	0.057 (0.57)	0.061 (0.62)	0.213 (1.85)*	0.292 (1.76)**	−0.067 (−1.70)**	−0.118 (−2.78)***	−0.257 (−1.93)**	−0.207 (−1.53)
B_age_{it}	1.011 (9.74)***	1.021 (10.48)***	0.854 (7.44)***	0.770 (4.57)***	−0.091 (−1.75)**	−0.091 (−1.49)	0.019 (0.12)	0.035 (0.24)
ROA_{it}	−0.775 (−6.91)***	−0.776 (−5.35)***	−0.734 (−4.85)***	−0.667 (−3.41)***	−0.336 (−6.16)***	−0.408 (5.85)***	−0.552 (−3.76)***	−0.466 (−2.36)**
ROE_{it}	1.091 (11.93)***	1.100 (9.92)***	1.028 (7.94)***	1.001 (6.60)***	−0.265 (−5.03)***	0.233 (−3.72)***	−0.086 (−0.63)	−0.138 (−0.84)
Constant	−5.864 (−9.48)***	−5.966 (12.98)***	−4.340 (−6.46)**	−3.964 (−4.19)***	3.495 (12.61)***	3.802 (13.00)***	3.213 (3.92)***	2.649 (4.66)***
Obs	528	528	528	528	528	528	528	528

Note: GF, ROA and ROE denote green finance, return on assets and return on equity.
***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

TABLE 12 | Robustness for china using bootstrap quantile regression.

	Panel B (Banks in China)							
	Dependent variables							
	$lnESG_{it}$				$LnGF_{it}$			
Independent Variables	**Q = 0.25 coefficient *p***	**Q = 0.50 coefficient *p***	**Q = 0.75 coefficient *p***	**Q = 0.90 coefficient *p***	**Q = 0.25 coefficient *p***	**Q = 0.50 coefficient *p***	**Q = 0.75 coefficient *p***	**Q = 0.90 coefficient *p***
$Fintech_{it}$	0.5803 (6.47) ***	0.4698 (5.33)***	0.1313 (3.26)***	0.5116 (3.85)***	0.8195 (25.28)***	0.8101 (38.69)***	0.9684 (43.33)***	1.0509 (38.85)***
GF_{it}	0.1767 (4.64) ***	0.1411 (3.28) ***	0.0346 (3.42)***	0.2511 (2.46)**	—	—	—	—
Mediator								
Fintech*GP_{it}	0.1450 (3.28) ***	0.0213 (2.14)***	0.4374 (3.75)***	0.2954 (1.90)**	—	—	—	—
GF*GP_{it}	0.2208 (1.96)*	0.0207 (1.10)***	0.2471 (2.98)***	0.2834 (1.96)**	—	—	—	—
Control variables								
B_size_{it}	0.0465 (3.42)***	0.0736 (3.64)***	0.2358 (2.74)**	0.0880 (1.87)**	0.1725 (2.51)**	0.0280 (1.74) **	0.0392 (3.21)***	0.067 (1.67)**
B_age_{it}	0.114 (8.68)***	1.1271 (9.31)***	1.3137 (10.12)***	1.1941 (12.69)***	0.1079 (3.48)***	0.1153 (1.72) **	0.0759 (2.65)**	0.061 (1.92)**
ROA_{it}	1.1139 (7.43)***	1.1212 (6.19)***	1.4649 (8.11)***	1.6265 (7.89)***	0.7915 (8.53)***	0.5860 (6.60) ***	0.7195 (8.49)***	0.893 (11.15)***
ROE_{it}	1.034 (9.16)***	1.1317 (9.23)***	1.2981 (9.15)***	1.1659 (7.78)***	0.1433 (1.88)*	0.0681 (1.86)**	0.036 (2.46)***	0.0684 (1.90)**
Constant	2.368 (2.11)**	3.644 (3.04)***	4.3993 (6.58)**	3.2746 (5.50)***	5.4318 (12.23)***	6.5092 (23.36)***	6.562 (20.79) ***	6.225 (20.9)***
Obs	576	576	576	576	576	576	576	576

Note: GF, ROA and ROE denote green finance, return on assets and return on equity.
***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

TABLE 13 | System GMM results.

	Full panel		UK panel		China panel	
	ESG_{it}	GF_{it}	ESG_{it}	GF_{it}	ESG_{it}	GF_{it}
	Coefficient/*t*-statistics/*p*	Coefficient/t-statistics/*p*	Coefficient/*t*-statistics/*p*	Coefficient/*t*-statistics/*p*	Coefficient/*t*-statistics/*p*	Coefficient/*t*-statistics/*p*
Lag(1)	0.371 (2.267)**	0.819 (5.02) ***	0.605 (2.88) ***	0.758 (4.48) ***	0.365 (2.89)**	0.531 (2.26)**
$FinTech_{it}$	1.803 (4.50) ***	0.158 (3.20) ***	1.258 (3.79) ***	0.175 (2.30)**	0.202 (2.11)**	0.430 (2.87)**
GF_{it}	0.634 (5.70)**		0.989 (2.63)**		0.283 (2.13)**	
$Bank\_size_{it}$	0.671 (3.21) ***	0.901 (1.98)**	0.021 (2.25)**	0.931 (0.45)	3.82 (0.18)**	0.081 (1.16)**
$Bank\_age_{it}$	0.601 (2.26)**	0.551 (2.80)**	0.142 (3.23) ***	2.751 (2.81)**	2.231 (2.59)**	0.331 (1.25)**
ROA_{it}	0.017 (2.34)**	0.103 (1.08)**	0.292 (2.97)**	0.104 (2.22)**	0.326 (2.20)**	0.364 (1.77)**
ROE_{it}	0.819 (3.95) ***	0.019 (2.49)**	0.525 (3.38) ***	0.041 (1.85)*	0.786 (3.55) ***	0.017 (1.86)*
Instruments	31	30	31	30	31	30
AR (1) test	−3.720 (0.000) ***	−3.21 (0.001) ***	−2.30 (0.003)**	−2.65 (0.008)**	−2.03 (0.004)**	−2.86 (0.004) ***
AR (2) test	0.440 (0.657)	0.62 (0.533)	−0.41 (0.916)	0.61 (0.539)	−0.81 (0.417)	0.46 (0.644)
Sargan test	3.22 (0.200)	1.829 (0.268)	1.358 (0.717)	6.64 (0.272)	6.125 (0.450)	5.721 (0.499)
Obs	1104	1104	528	528	576	576

***denotes 1% significance level.
**denotes 2% significance level.
*denotes 5% significance level.

ESG outcomes. Notably, the estimated coefficients indicate a strong and significant impact of Fintech on both ESG and GF in the United Kingdom, highlighting an integrated green finance ecosystem. In China, Fintech and GF also positively influence ESG performance, with significant relationships, though the coefficient magnitudes are lower. These findings suggest that the Fintech-GF-ESG relationships are developing, though they are less significant than those observed in the United Kingdom, likely due to variations in institutional maturity and policy environments. Observably, the diagnostic tests validate the reliability of GMM estimations, indicated by the significant first-order serial correlation in differenced residuals via the Arellano–Bond AR(1) test, while the non-significant AR(2) test confirms the absence of second-order serial correlation, fulfilling a critical assumption of the GMM framework. Finally, the Sargan test yields *p*-values greater than 0.05 across all model specifications, confirming the validity of the instruments used and reinforcing the reliability of the estimation results.

6 | Conclusions and Implications

We examine the impact of Fintech and GF strategies on ESG performance in China and the United Kingdom through government policies from 2014 to 2024, using robust multiple regression estimates (*DCCE, CCEG and BSQR*). In the long run estimations, our results indicate a significant and positive effect of Fintech on banks' ESG performance. The CCEG and BSGR analyses confirmed a positive correlation between Fintech and ESG performance across all quantiles (0.25, 0.50, 0.75 and 0.90). The study substantiates Fintech as a vital strategy for banks in China and the United Kingdom to enhance long-term ESG performance. Additionally, Fintech evidences a positive and significant impact on banks' GF in the long run. The study confirms the role of Fintech in promoting sustainable banking practices through CCEG and BSQR estimation methods. Notably, Fintech significantly promotes GF at lower, middle and higher quantiles while increasing at higher quantiles. Moreover, we discovered positive and significant effects of GF on banks' ESG performance in the long run. This result was confirmed by the CCEG and BSQR estimation methods, indicating that GF contributes meaningfully to enhancing the ESG performance of banks. However, the BSQR checks show that GF significantly enhances ESG performance at the lower quantile (0.25), while increasing ESG performance at higher quantiles (0.50, 0.75 and 0.90).

Our moderating results suggest that: GP positively and significantly moderates (1) Fintech and ESG performance relationships for both countries (2) GF and ESG performance relationships for both countries. As evidenced, our results from both the CCEG and BSQR tests reveal consistent findings, validating the moderation effects. Specifically, the BSQR results confirm that Fintech and GF through GP contribute to a progressive increase in ESG performance across all quantiles. The study highlights that policy-driven Fintech adoption and GF initiatives are essential in enhancing sustainable performance in the banking sector. The study suggests that implementing diverse government policies can enhance ESG performance in banks in China and the United Kingdom through the implementation of Fintech and GF strategies. Government policy interventions, including regulatory support, financial incentives and innovation-driven frameworks, are crucial for aligning Fintech and green finance initiatives with ESG goals. Our findings contribute to the understanding of the relationship between Fintech, GF and ESG performance through government policy, offering useful insights for both theory and practice.

6.1 | Theoretical Implications

Despite extensive research on their relationship, few studies have examined the influence of Fintech on ESG performance, especially in China and the United Kingdom. The paper confirms that Fintech innovations can significantly enhance the ESG performance of banks in both countries. Second, research indicates that Fintech development can significantly enhance GF to promote sustainable urbanization and stimulate economic growth, although there is a lack of direct research on this relationship. This paper highlights the prominence of Fintech innovations, highlighting the banking sector's role in financial services and its support for Fintech. Moreover, studies show mixed or context-specific effects on green finance and environmental performance, often lacking integration with strategic resource-based thinking (Fan et al. 2024). We provide evidence of how GF enhances ESG performance in banking contexts, emphasizing its strategic role as a resource provider and enabler for sustained advantage.

Third, while studies have examined the effects of Fintech and GF on ESG performance, no research has examined the moderating effects of government policy. Research shows that Fintech and GF significantly impact ESG performance, influenced by the regulatory and institutional environment of financial and corporate actors. Notably, research calls for empirical scholarship on the moderating effects of GP on Fintech and GF impact on firm ESG performance. The study shows that the impact of Fintech and GF on ESG performance is moderated by GP, providing fresh insights on Fintech's potential for GF development to enhance ESG performance in Chinese and UK banks.

Fourth, we explore the role of GP on Fintech and GF impact on banks' ESG performance, validating institutional, stakeholder and resource-based theories in banking literature. The study reveals that GP, Fintech, and GF can significantly enhance ESG performance in Chinese and UK banks, influenced by institutional pressures, stakeholder expectations and internal resource capabilities. Finally, we examine the banking landscapes in the United Kingdom and China, highlighting their distinct regulatory structures, technological advancements and sustainability strategies, providing valuable insights for both developed and emerging economies. Notably, we provide first empirical evidence on the impact of Fintech and GF on Chinese and UK banks' ESG performance moderated by GP, highlighting the cross-national insights deepening our understanding of how institutional contexts influence the effectiveness of sustainable financial strategies.

6.2 | Practical and Policy Implications

Our findings hold significant implications for policymakers and banks. First, we demonstrate that Fintech improves sustainable banking by enhancing transparency, operational efficiency and stakeholder engagement. Therefore, policymakers should enhance regulatory frameworks to integrate Fintech into sustainable finance practices, promoting ESG-compliant standards, green incentives and regulatory sandboxes for innovation and sustainability alignment. Primarily, in China, government policy moderates the impact of Fintech and GF on ESG performance, suggesting that proactive interventions like subsidies, mandatory disclosures and centralized ESG frameworks can enhance sustainable finance outcomes. In contrast, the United Kingdom's mature institutional framework may benefit from flexible, market-based policies that promote bottom-up innovation and public–private collaboration.

For banks, the study highlights the strategic importance of Fintech and GF in enhancing ESG performance. Therefore, banks should incorporate Fintech innovations into their ESG strategies, utilizing these technologies for real-time ESG monitoring, green product innovation and improved sustainability reporting. Particularly, Chinese banks can leverage robust policy momentum and state-backed digital infrastructures to expand green finance offerings, while UK banks can differentiate through advanced market mechanisms and stakeholder pressure. Moreover, the banking sector should incorporate sustainability into its governance, training and strategic planning to establish an institutionalized ESG knowledge and culture. Our study highlights the importance of both formal and informal institutional environments in promoting sustainable banking outcomes, advocating for coordinated policy and industry action in Fintech and green finance.

6.3 | Limitations and Future Direction

Our study recognizes some valuable limitations. First, our analysis focused exclusively on UK and Chinese banks, without considering other nonbanking financial institutions. Further research should include data from additional financial institutions to fully validate the robustness of the reported results. Second, our Fintech indicator used a keyword identification index, but other metrics could provide a comprehensive assessment of bank-level Fintech development. For instance, we recommend that authors enhance our text-mining approach with quantitative indicators like digital transaction volumes, Fintech R&D spending or adoption rates. This would provide a more comprehensive measure of Fintech intensity and quality.

Moreover, due to data limitations, we were unable to explore the impact of Fintech on green finance and ESG performance, including other important mediating or moderating factors such as a bank's innovation capability. We call for further investigation into additional mediating or moderating variables necessary to fully understand this mechanism. Finally, we are calling for further studies to examine the impact of specific Fintech on various ESG performance dimensions. The analysis will offer accurate guidance on how technologies like artificial intelligence, blockchain and big data analytics can tackle specific sustainability issues.

Author Contributions

Mandella Osei-Assibey Bonsu: conceptualization (lead), writing – original draft (lead), formal analysis (lead), writing – review and editing. **Samuel Clottey Attuquaye:** methodology (supporting), software (lead); writing – review and editing (equal). **Katie Hyslop:** writing – review and editing (equal); supervision (lead). **Ying Wang:** conceptualization (supporting); methodology (supporting); writing – original draft (supporting); writing – review and editing (equal). **Li Kaodui:** review and editing (equal); supervision (lead).

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