Article

Does Fintech Development Enhance Corporate ESG Performance? Evidence from an Emerging Market

Deli Wang [1,2], Ke Peng [1], Kaiye Tang [1] and Yewei Wu [3,*]

1   School of Accounting, Guangdong University of Foreign Studies, 178 Waihuan East Road, Panyu District, Guangzhou 510006, China
2   Research Center for Guangdong-Hong Kong-Macao Greater Bay Area Accounting and Economic Development, Guangdong University of Foreign Studies, 178 Waihuan East Road, Panyu District, Guangzhou 510006, China
3   School of Economics and Management, Tongji University, 1239 Siping Road, Yangpu District, Shanghai 200092, China
*   Correspondence: 1810277@tongji.edu.cn

Abstract: The effectiveness of environmental, social, and governance (ESG) has been widely discussed and is often linked to corporate sustainability strategies. However, corporate ESG performance cannot be achieved without the support of financial development and the underlying mechanisms through which fintech development affects corporate ESG performance in emerging markets remain unexplored. Firms that are less financially constrained exhibit higher ESG performance in cities with better developed fintech. Moreover, the results remain robust after addressing the endogeneity between fintech development and ESG performance and using different city-level fintech indexes. Additionally, the results remain robust after addressing the endogeneity between fintech development and ESG performance and using different model specifications and variable measurement. Heterogeneity analysis suggests that the effect of fintech development on ESG performance is stronger for firms that are small, operate in technology industries, and have financial executives. These findings provide new insights into the role of fintech development in promoting sustainable social and economic development.

Keywords: fintech; financial constraints; ESG performance

1. Introduction

In the context of the current global advocacy of green and sustainable development, governments and social organisations have called on companies to improve their social responsibility and take the initiative to take into account the interests of other stakeholders. While maximising the interests of shareholders, companies are supposed to provide a favourable market environment for sustainable social development. Corporate ESG performance has gradually become an important indicator for investors to evaluate corporate value and sustainable development ability [1–6]. Indeed, since the establishment of the United Nations Alliance for Responsible Investment in 2006, the concept of ESG investing has been actively promoted globally by both companies and investors. According to the tracking statistics of the mainstream international rating agency, Ming Sheng (MSCI), in recent years, the leading ESG indices in emerging markets outperformed emerging market indices from 2015–2020, with lower volatility and higher Sharpe ratios, providing significant return enhancement. With China being the world's largest emerging market, the Securities Regulatory Commission for the first time explicitly required listed companies to disclose environmental, social, and corporate governance information in a timely manner since 2018. With sustainable development becoming a globally recognised trend, ESG performance as a comprehensive indicator reflecting the quality of corporate development has become an important reference indicator for investors [6,7]. How to improve corporate

ESG performance and thus promote sustainable development in society has become an important topic worthy of further discussion and research.

From the available studies, the prior literature on the economic consequences of corporate ESG performance focuses on the impact of corporate ESG performance on financing costs [8,9], firm value [10–12], firm performance [2,13], and efficiency of corporate investment [14]. However, there are financing constraints and insufficient incentives for firms to enhance their ESG performance with the goal of maximising shareholders' interests [4–6]. Most companies currently suffer from insufficient capacity and high costs in their ESG practices, and external financing constraints significantly reduce the intrinsic drive for ESG. Therefore, in the context of sustainable development, it is crucial to break the dilemma of corporate financing constraints and enhance the intrinsic motivation of corporate ESG investment.

The development of fintech has promoted the deep integration of digital technology with the real economy, providing effective support to alleviate corporate financing constraints and enhance corporate ESG practices [15,16]. Unlike traditional finance, fintech is based on digital technology to optimise the allocation of financial resources and improve the coverage and inclusiveness of finance for micro market players. Big data, blockchain, cloud computing, and other digital technologies can empower traditional financial activities and effectively solve the information asymmetry between the supply and demand of financial resources [17]. Fintech uses digital technologies to realize financial risk assessment and risk management in a holistic manner, expand the scope of financial resources allocation, reduce the exclusion of traditional financial allocation activities from micro market players and increase the inclusiveness of traditional financial activities [18,19]. Moreover, from the perspective of the process of financial allocation activities, FinTech can strengthen the market signals of financial resource allocation. Digital inclusive finance improves the support and screening of innovation-oriented firms for financing with the inclusiveness and accessibility of digital technologies, and reduces information asymmetry and transaction costs in the process of accessing financial resources for firms [20]. Therefore, the development of fintech can enhance the availability of loans and alleviate the financing constraints faced by corporate ESG investments [21–23]. In summary, fintech development can help enhance ESG practices and improve corporate ESG performance by alleviating financing constraints.

In view of this, this paper empirically examines the effect of fintech development on corporate ESG performance using a sample of Chinese listed companies in the world's largest emerging market, and ensures the credibility of its core findings through a series of robustness tests and endogeneity treatments. Further, this paper finds that the alleviation of corporate financing constraints is a channel through which fintech development has an effect on corporate ESG performance. The paper also examines the heterogeneity of fintech development on corporate ESG performance in terms of firm size, high-tech industry, and executive financial background. Overall, this paper reveals the impact and mechanism of fintech on corporate ESG performance, providing empirical evidence on the development of fintech and corporate ESG performance in emerging markets.

The main contributions of this paper are as follows. Firstly, this paper enriches the research on corporate ESG performance by including fintech development and corporate ESG performance in the same analytical framework and examining the contribution of fintech development to enhance corporate ESG performance from the perspective of building and enhancing corporate ESG performance. Previous studies have focused on the effects of corporate ESG performance on financing costs [8,9], firm value [10,11], firm performance [2], and firm investment economic consequences of efficiency [14], while existing research explores the important question of how to enhance corporate ESG performance. Therefore, this paper investigates the incentives for corporate ESG performance from the perspective of fintech development, further expanding the research related to corporate ESG performance and providing new perspectives for firms to enhance their ESG performance. Secondly, this paper reveals the non-economic effects created by fintech development and

broadens the study of the economic consequences of fintech. Previous studies on fintech have mainly focused on economic consequences such as technological innovation [17], bank risk-taking [18,19], and corporate finance [15,16], ignoring the impact of fintech on the sustainability of firms' capacity. Therefore, this paper investigates the impact of fintech development on corporate ESG performance, further enriching the research related to fintech from the perspective of non-economic effects. Thirdly, this paper opens the black box of causality between fintech development and corporate ESG performance to a certain extent, providing new empirical evidence of relevance for sustainable development.

2. Literature Review and Research Hypothesis

2.1. Corporate ESG Performance

ESG is an acronym for Environmental, Social and Governance. ESG performance of enterprises is a new evaluation system that focuses on the sustainable development of enterprises in three aspects: environment, social responsibility, and corporate governance. Research in the field of ESG in China started relatively late, but in recent years it has received extensive attention from the government and all sectors of society. The existing research results in the field of ESG are mostly focused on three aspects: ESG rating, ESG investment and the impact effect of corporate ESG. The research on ESG rating is mainly focused on the determination of ESG evaluation criteria and construction of rating models. The mainstream rating model is a comprehensive evaluation of a company's non-financial risks and sustainable development from the aspects of environment, society, and governance, which has a certain degree of operability and provides an assessment tool for corporate ESG performance, which is consistent with the concept of high-quality development. Many agencies are now involved in corporate ESG ratings, but corporate ESG ratings obtained by different agencies vary widely according to different scoring criteria, different industry adjustments and different data sources, i.e., ESG ratings given by different rating companies have a low level of correlation [1]. However, ESG rating results can have an important impact on investors' decisions, as Avramov et al. (2022) show that the higher the ESG rating of a company [2], the lower the return required by investors, but the widely varying ESG rating results from different rating agencies will offset some of the return requirements.

With regard to research on ESG investments, Renneboog et al. (2011) point out that socially responsible investment funds (SRI) do not have better financial performance [24], and some scholars point out that ESG investments do not lead to excess returns from the perspective that ESG can reduce systemic risk. Riedl and Smeets (2017) provide an explanation from the perspective of both the intrinsic social values of investors and the need to send social signals of philanthropy [25] active ownership perspective, noting that it is the integration of ESG issues into corporate ownership policies and practices by these investors that drives long-term ESG performance and improves the social image of the firm.

Research on the effects of ESG on corporate performance has focused on the effects of ESG performance on corporate financial performance and corporate value. Firstly, from the perspective of stakeholder theory proposed by Freeman (1984) [26], a large body of literature has argued that good ESG performance can help to gain the trust and support of stakeholders, which in turn can improve the financial performance and market value of the firm and alleviate financing constraints [27–29]. Second, some scholars argue that corporate ESG performance is negatively or not related to corporate performance and thus has a negative or no significant impact on corporate value [30–32]. Thirdly, it is also argued that there is a threshold effect of ESG performance on firm value [33]. As can be seen, most ESG research on the corporate perspective has focused on the economic impact generated by corporate ESG, with little literature examining the external drivers of corporate ESG performance.

2.2. Fintech Development

Fintech is a financial innovation driven by information technology such as cloud computing, big data, blockchain, and artificial intelligence, which creates new business models, technology applications, and product services that can have a significant impact on financial markets, financial institutions, and the way financial services are delivered.

Around the definition of FinTech, Chen et al. (2019) argue that any digital computing technology that can support or enhance the provision of financial services can be defined as FinTech [17] and, based on the data of patent applications related to financial services, FinTech is specifically classified into seven key technology categories: cybersecurity, mobile payment, data analytics, blockchain, P2P lending, smart investment, and Internet of Things categories. Fintech is a technological means of applying science and technology to the financial industry to improve the efficiency of the industry. Ma et al. (2017) consider fintech as a set of technologies that broadly affect the way financial payments [34], financing, lending, investment, financial services, and money work. Some scholars also emphasise that technology in FinTech usually refers to digital technologies that have a disruptive impact and are complex technologies used to deliver financial products and services to the market that are distinct from existing technologies [35]. Thakor (2020) states that FinTech is centred on the use of technology to provide new and improved financial services and that the areas covered include credit [36], deposit and financing services, payment, clearing and settlement services, investment management services, and insurance services.

The existing literature around the role of fintech has examined the impact of fintech on corporate behaviour in terms of the risk of stock price crashes, financing constraints, and the impact of inefficient investment. Buchak et al. (2018) argue that, in facilitating corporate finance with the help of modern digital technology [19], fintech significantly reduces information asymmetry between borrowers and lenders, greatly improves the ability to obtain information from borrowers, and further reduces the cost of lending to firms. Sun and Wang (2022) argue that digital finance has the potential to change the structure of financial intermediation by disrupting it through new business models empowered by smart algorithms [16], big data, cloud computing, and artificial intelligence, with lower costs and potentially better consumer experiences forming its powerful driving force. It also shows that fintech remains small, and while China is the largest fintech market, it remains small compared to financial intermediation as a whole. Meanwhile, Lu (2018) finds that, in the wake of the global financial crisis [15], banks have become risk-averse and SMEs, which account for 99.9% of the UK business market, receive just 17% of their total business loans from the banking sector, while the emergence of digital finance has channelled billions of pounds of finance to SMEs each year, offering great hope for solving the financing dilemma that they have long faced. Moreover, Gai et al. (2018) [37] argue that fintech can be used to denote a range of technologies used for financial services institutions and fintech departments in businesses or organisations with a wide range of operations, where these subjects primarily address the issue of improving service quality through the use of IT applications. Chuen and Teo (2015), Liu et al. (2020), and Zhang-Zhang et al. (2020) explored the latest phenomena in FinTech based on an ecosystem perspective and found that, unlike the earlier FinTech evolution [38–40], which was dominated by traditional financial institutions, there is a significant difference between the financial services and information technology sectors. Unlike the earlier evolution of fintech dominated by traditional financial institutions, 'cross-industry' fintech operating at the intersection of financial services and information technology has disrupted banks' existing business models while creating new ecosystem dynamics.

2.3. Fintech Development and Corporate ESG Performance

One traditional theory suggests that the goal of the firm is to maximise profits and shareholder value [41]. Modern corporate governance theory and stakeholder theory require companies to be responsible not only to shareholders, but also to creditors, employees, suppliers and customers, governments, communities, and the environment [26],

and to focus more on external corporate governance, pay attention to more stakeholders and maximise the overall interests of stakeholders. However, ESG practices have certain externalities and suffer from under-investment: on the one hand, the investment in environmental and social responsibility can waste corporate resources, increase additional expenses, and bring "negative effects" to the company, thus weakening its competitiveness and damaging the interests of shareholders. Moreover, a large number of companies are not sufficiently incentivised to improve their ESG performance due to resource constraints, poor technology, and information asymmetries with stakeholders, resulting in a lack of capacity and high costs [42,43].

Fintech development can improve corporate ESG performance by alleviating corporate financing constraints. First, information asymmetry between financial institutions and borrowers is one of the most prominent problems in credit markets [44,45]. Adverse selection due to pre-credit information asymmetry poses pre-credit risk [46], and moral hazard due to post-credit information asymmetry poses post-credit risk [47]. Moreover, Fintech offers new solutions to mitigate information asymmetry. To a certain extent, fintech can address information asymmetry in credit markets, connect financially excluded and disadvantaged groups to the information superhighway, and enhance the accessibility of financial services. The existing literature demonstrates the positive role of fintech in financial services. Zhang et al. (2022) find that fintech can mitigate pre-lending risks caused by pre-lending information asymmetry [48], and that this negative impact is more pronounced in banks with higher levels of management ownership. Second, fintech can effectively address the challenge of high financial transaction costs. The application of big data technology can reduce the cost of information search and information distortion, and financial institutions are willing to provide more financial services at the same price level [18,19]. Artificial intelligence can improve financial big data analysis capabilities by analysing data and building models to regulate the matching of supply and demand in finance, saving time and human resource costs in the credit business process. Relying on technologies such as the Internet and mobile communications helps financial institutions break their reliance on physical outlets such as ATMs and business halls to achieve innovation in financial services such as credit, finance, and payments, thereby improving the efficiency of financial services and reducing transaction costs [49–51]. In addition, Yao and Song (2021) found that fintech can reduce information costs for both sides of transactions and further increase the transparency of market information [52]. Therefore, fintech development can improve corporate loan accessibility, alleviate corporate financing constraints, and promote better and more efficient fulfilment of corporate social responsibility, thereby improving corporate ESG performance. Based on the above analysis, this paper proposes the following research hypotheses:

H1. *The development of fintech can contribute to the ESG performance of firms.*

2.4. Heterogeneity of Firms and Corporate ESG Performance

Capital is an important foundation for sustainable development, and the act of fulfilling ESG responsibilities requires a large amount of capital [4,5,53]. If the financing constraint is low, sufficient and low-cost capital will facilitate the conscious implementation of ESG concepts and proactive ESG responsibility, while improved ESG performance will accumulate more socially responsible and reputational capital for the company, which will help to gain more stakeholder support, thus eliciting positive feedback from the market and improving corporate performance. Conversely, severe financing constraints can weaken the incentive for companies to practise ESG responsibility.

Firm-level heterogeneous characteristics may influence corporate ESG performance [54]. First, firm size is an important factor influencing ESG performance [55]. In general, larger firms have a greater ability to integrate resources and raise finance, and are therefore less likely to experience financing constraints [56]. Therefore, the effect of fintech on alleviating firms' financing constraints may not be significant in larger firms. Second, high-tech firms

have a leading and exemplary role in innovation and tend to have more mature technologies and innovations [5,57]. Fintech is a deep integration of technology and finance, which also leads to the fact that high-tech enterprises can take full advantage of the convenience of fintech with their own technological advantages, which will high-tech enterprises to take full advantage of the advantages brought by fintech to greater effect. Third, the financial background of executives is an important factor influencing the innovative activities of firms [58–60]. Executives with a financial background can help firms access bank credit resources through their financial expertise and social networks [60]. As a new technology, executives with a financial background can make full use of their professional advantages to fully grasp and exploit the convenience brought by fintech compared to firms without financial background executives. Based on the above analysis, this paper proposes the following research hypotheses:

H2. *There is heterogeneity of firm size on fintech development and firm ESG performance.*

H3. *There is heterogeneity of characteristics of high-tech companies on fintech development and firm ESG performance.*

H4. *There is heterogeneity of financial background of senior executives on fintech development and firm ESG performance.*

3. Data and Variables

3.1. Data

　　This paper uses the data of A-share listed companies in Shanghai and Shenzhen from 2010 to 2020 as the research sample. The financial data and corporate governance data of the companies in this paper are obtained from the CSMAR database, and the ESG performance data of the companies are obtained from the China Securities ESG Rating System of the WIND database. We screened the sample according to the following requirements: (1) excluding financial listed companies; (2) excluding samples with missing or abnormal key variables; and (3) excluding ST and ST* listed companies. A final total of 10,421 firm-annual valid observations were obtained. In order to eliminate the effect of extreme values, this paper also applies an upper and lower 1% Winsorize tailing treatment to the micro-continuous variables involved.

3.2. Variables

　　(1) Independent variable: FinTech. Following the previous literature [22], Fintech is measured using the China Digital Inclusive Finance Development Index jointly compiled by Peking University and Ant Financial Services. The FinTech index is a macro variable at the city level, while this paper intends to study its impact on the value of micro enterprises, so the municipality-level FinTech index is matched to listed companies by their office addresses. To address the problem of the data being too large in value compared to other indicators, the FinTech Index is divided by 100 in this paper.

　　(2) Dependent variable: ESG performance of enterprises. With the development and promotion of the concept of responsible investment, there are many ESG rating systems to measure the ESG performance of firms, which are different in the evaluation criteria, reference indicators, and coverage scope. Following previous research, we chose the ESG rating index of Hua Zheng from the WIND database to measure the ESG performance of firms. Compared with the ESG rating index of Hua Zheng, other ESG evaluation systems in China have the problem of narrow coverage and low update frequency to a certain extent. The ESG index system refers to the mainstream ESG evaluation framework of foreign countries, and combines the reality of China's capital market and characteristics of various listed firms. Finally, 26 key indicators were set, and the industry-weighted average method is adopted to conduct the ESG evaluation, which is updated at a quarterly frequency and includes all listed companies. The ESG rating of Hua Zheng is divided into nine grades, which are on a scale of C to AAA. The explanatory variable (ESG) is constructed by the

assignment method based on the above ratings. The nine grades C to AAA are assigned 1-9 successively, that is, when the rating is C, ESG = 1. When rated CC, ESG = 2; For a rating of CCC, ESG = 3, and so on. Firms with better sustainable performance rank higher. We also used other ESG rating systems as an alternative proxy for ESG performance in the robustness analysis.

(3) Control variables. Following the previous literature [4,5,53], we also have controls for a number of internal and external characteristic factors that have an impact on a firm's ESG, specifically, the following factors: firm size (Size), gearing (Lev), return on total assets (ROA), growth rate of a firm's operating income (Growth), and controls for the year of establishment (Age), and also controls for the percentage of shares held by the largest shareholder (First). In addition, annual and industry fixed effects are also controlled for. Specific metrics are defined in Table 1.

Table 1. Variable Definition.

Variable	Definitions
ESG	According to Hua Zheng ESG rating, the ESG index is divided into nine levels, the lowest level is recorded as 1, and the highest level is recorded as 9.
LnESG	Listed companies' ESG ratings on a logarithmic basis
Fintech	Peking University Digital Inclusive Finance Index/100
Size	The natural logarithm of total assets
Lev	The asset–liability ratio
ROA	The ratio of net profit to total assets
Growth	The growth rate of gross operating income
CF	The ratio of net cash flow from operating activities to total assets
Age	Natural logarithm of the number of years the company has been in existence
First	The percentage ownership of the largest shareholder
Boardsize	The natural logarithm of board size
Independ	The number of independent directors to board size ratio in percent

4. Empirical Results and Analysis

4.1. Empirical Model

To test the impact of fintech on corporate ESG performance, we constructed the following OLS regression model.

$$ESG_{i,t} = \beta_0 + \beta_1 Fintech_{i,c,t} + \beta_2 Controls_{i,t} + + \sum Year + \sum Ind + \varepsilon_{i,t} \qquad (1)$$

where i denotes firm, t denotes year, and c denotes city. The dependent variable denotes the fintech development index of firm i's location in year t, and the independent variable denotes firm i's ESG score in year t. These are the estimated coefficients of the core explanatory variables. The specific definitions are as described in the previous section, denoting a series of firm-level control variables, including firm size (Size), gearing (Lev), return on total assets (ROA), and shareholding of the largest shareholder (First). Based on the theoretical analysis in the previous section, this paper expects to be significantly positive, indicating that fintech development is conducive to enhancing corporate ESG performance.

4.2. Descriptive Statistics

Table 2 presents the results of the descriptive statistics for the key variables. The mean value of corporate ESG performance is 6.386, which is between A and BBB ratings, indicating that there is still room for further improvement in the ESG performance of Chinese companies, and the minimum value of 3 indicates that some companies have not yet paid attention to ESG, which will have a bearing on the sustainable and healthy

development of companies. The mean value of Fintech is 2.290 with a variance of 0.487, the minimum value is 0.852 and the maximum value is 3.2165, indicating that the degree of development of Fintech varies across regions in China, and that Fintech is still in the stage of further development in China. The descriptive statistics for the other variables are close to those of the existing literature.

Table 2. Summary Statistics for Key Variables.

Variable	N	Mean	SD	Min	P25	P50	P75	Max	Skew	Kurt
ESG	10,421	6.386	1.116	3.000	5.000	6.000	7.000	9.000	1.224	4.9086
lnESG	10,421	1.987	0.163	0.693	1.363	1.946	2.133	2.303	3.207	14.492
Fintech	10,421	2.290	0.487	0.852	1.765	2.326	2.843	3.216	2.600	10.888
Size	10,421	22.65	1.390	20.000	21.322	22.500	24.632	26.470	2.206	8.3113
Lev	10,421	0.515	0.199	0.084	0.356	0.526	0.743	0.930	0.985	1.9714
ROA	10,421	0.034	0.050	−0.149	0.008	0.029	0.112	0.189	1.518	6.7983
Growth	10,421	0.141	0.394	−0.520	0.020	0.079	1.512	2.605	0.284	2.4190
CF	10,421	0.047	0.069	−0.148	−0.018	0.047	0.163	0.243	0.857	3.6896
Age	10,421	13.570	6.049	1.000	8.000	14.000	23.000	29.000	−0.924	4.3429
First	10,421	0.392	0.154	0.362	0.371	0.385	0.521	0.890	−0.217	4.2328
Boardsize	10,421	2.211	0.199	1.099	1.754	2.197	2.562	2.996	0.603	3.1369
Independ	10,421	0.370	0.057	0.091	0.231	0.333	0.541	0.800	2.611	14.601

4.3. Baseline Regression Results

To further test the relationship between fintech and corporate ESG performance, we conducted a regression analysis using model (1). Table 3 reports the results of the baseline regressions in this paper. Columns (1) and (2) report Fintech regressions with ESG and lnESG, respectively. The results show that, controlling for year and industry fixed effects, the coefficient of Fintech on ESG is 0.352 and is statistically significant at the 1% level (*t*-value = 4.146), and the coefficient of Fintech on lnESG is 0.265 and is statistically significant at the 1% level (*t*-value = 3.759). This indicates that the degree of regional Fintech development will significantly improve corporate ESG performance. The results in Table 3 fully validate research hypothesis H1.

Table 3. Fintech development and corporate ESG performance.

	(1)	**(2)**
	ESG	**lnESG**
Fintech	0.352 ***	0.265 ***
	(4.146)	(3.759)
Size	0.240 ***	0.219 ***
	(4.978)	(4.377)
Lev	0.648 ***	0.485
	(3.798)	(1.434)
ROA	−7.927 ***	−13.073 ***
	(−4.922)	(−5.669)
Growth	0.160	0.387 *
	(1.374)	(1.902)
CF	2.125 **	5.389 ***
	(3.103)	(4.288)
Age	0.022 ***	0.028 *
	(3.868)	(2.152)

Table 3. *Cont*.

	(1)	**(2)**
	ESG	**lnESG**
First	0.008 **	0.017 **
	(2.993)	(2.748)
Boardsize	0.723 ***	1.160 ***
	(4.372)	(4.237)
Independ	−0.626	−0.717
	(−0.833)	(−1.712)
Constant	−6.520 ***	−7.787 ***
	(−6.035)	(−6.849)
Year	Yes	Yes
Industry	Yes	Yes
N	10,421	10,421
Adj_R^2	0.103	0.163

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.4. Endogeneity

While the core variable in our paper, fintech, is a city-level variable, there may also be potential endogeneity issues, such as reverse causality, in our dependent variable model using firm ESG performance as a baseline, with the regression. When regional firms perform better in ESG, fintech can make greater progress and improve rapidly. To address the potential reverse causality issue, and with reference to the existing literature [22], we re-estimated the impact of fintech development on corporate ESG performance using a difference-in-difference (DID) approach. We treated 4G services as an exogenous shock. In 2010, the Ministry of Industry and Information Technology (MIIT) and the Chinese Ministry of Information Technology (MIT) approved six cities as the first pilot zones for 4G communication technology. This was followed by two years of construction and, by 2012, people in these cities were enjoying 4G services. By the end of 2013, seven more cities were on the list of pilot zones. In 2014, all cities in mainland China were covered by 4G services, allowing for significantly faster data transmission over mobile networks. Therefore, the 4G shock could influence the development of Fintech. We defined the Var4G variable as a dummy variable: Var4G equals 1 if the 4G service is implemented in the pilot zones of the Ministry of Industry and Information Technology of China, and 0 otherwise.

Table 4 presents the difference-in-differences (DID) test result of the impact of d Fintech development and corporate ESG performance. The result shows that the coefficient of Var4G is significantly positive, which means the baseline result remains valid. This evidence suggests that Fintech development has a significant impact on corporate ESG performance.

Table 4. Endogeneity test.

	(1)	**(2)**
	ESG	**lnESG**
Var4G	0.049 ***	0.187 ***
	(4.251)	(5.152)
Size	0.200 *	0.127
	(1.891)	(1.072)
Lev	0.137 **	0.095
	(2.015)	(1.473)
ROA	0.494 ***	0.263 **
	(4.363)	(2.142)

Table 4. *Cont.*

	(1)	(2)
	ESG	**lnESG**
Growth	−0.150	−0.149
	(−0.443)	(−0.401)
CF	−0.021	0.029
	(−0.638)	(0.943)
Age	0.001	−0.014
	(0.131)	(−1.194)
First	−0.100	−0.020
	(−1.372)	(−0.234)
Boardsize	−0.092	−0.126
	(−0.344)	(−0.446)
Independ	−0.537 **	−0.752 ***
	(−2.407)	(−2.756)
Constant	−0.494	−0.098
	(−0.565)	(−0.116)
Year	Yes	Yes
Industry	Yes	Yes
N	10,421	10,421
Adj_R^2	0.182	0.195

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.5. Robustness Checks

4.5.1. Lagging Items to ESG Performance

To consider the lagged impact of fintech development on corporate ESG performance, the paper further validates the relationship between the degree of fintech development and corporate ESG performance in the lagged period. Table 5 reports the regression results. The results show that, controlling for year and industry fixed effects, the coefficient of the lagged one-period degree of fintech development Fintech on L1.ESG is 0. 679 and is statistically significant at the 1% level (*t*-value = 5.704), while its coefficient on L1.lnESG is 0.147 and is statistically significant at the 1% level (*t*-value = 3.352). The coefficient of Fintech on L2.ESG is 0. 243 and is significant at the 1% statistical level (*t*-value = 3.210), while its coefficient on L2.lnESG is 0.176 and is significant at the 1% statistical level (*t*-value = 3.253). This suggests that the degree of regional fintech development will significantly improve corporate ESG performance when the effect of time is taken into account. Fintech development has a continuous impact on enterprise ESG performance. Table 4 also suggests that the findings of the baseline regression in this paper are robust.

Table 5. Robustness check: Lagging term fintech development and ESG performance.

	(1)	(2)	(4)	(5)
	L1.ESG	**L1.lnESG**	**L2.ESG**	**L2.lnESG**
Fintech	0.679 ***	0.147 ***	0.243 ***	0.176 ***
	(5.704)	(3.352)	(3.210)	(3.253)
Size	0.325 ***	0.194 ***	0.146 ***	0.177 ***
	(7.264)	(3.327)	(2.604)	(4.124)
Lev	−0.169	−0.004	0.128	0.192
	(−0.571)	(−0.011)	(0.334)	(0.650)
ROA	−10.373 ***	−15.896 ***	−15.953 ***	−10.660 ***
	(−9.045)	(−10.618)	(−10.649)	(−9.271)
Growth	0.167	0.344 **	0.317 **	0.145
	(1.361)	(2.149)	(1.975)	(1.172)

Table 5. *Cont.*

	(1)	(2)	(4)	(5)
	L1.ESG	**L1.lnESG**	**L2.ESG**	**L2.lnESG**
CF	3.091 ***	6.072 ***	6.057 ***	2.913 ***
	(4.232)	(6.368)	(6.344)	(3.975)
Age	0.001	0.015	0.015	0.004
	(0.110)	(1.331)	(1.344)	(0.456)
First	0.004	0.014 ***	0.015 ***	0.006 *
	(1.408)	(3.266)	(3.501)	(1.907)
Boardsize	1.052 ***	1.233 ***	1.161 ***	0.870 ***
	(4.011)	(3.600)	(3.394)	(3.311)
Indboard	−0.256	−0.596	−0.661	−0.378
	(−0.289)	(−0.514)	(−0.570)	(−0.425)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	9221	9221	7231	7231
Adj_R2	0.277	0.411	0.080	0.439

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.5.2. Firm Fixed Effects

For robustness of the regression results, the control year and control industry were further regressed for fixed effects, in addition to all other control variables, and all regression coefficients were treated using heteroskedasticity robustness adjustment and cluster clustering at the firm and industry levels. Table 6 reports the regression results for firm fixed effects. The results show that the coefficients on Fintech development, Fintech and ESG and lnESG remain significantly positive. This indicates that the findings of the main regression in this paper are robust to controlling for firm fixed effects.

Table 6. Robustness check: Firm fixed effects.

	(3)	(4)
	ESG	**lnESG**
Fintech	0.004 **	0.005 *
	(2.600)	(1.943)
Size	0.170 ***	0.170 ***
	(4.211)	(3.442)
Lev	0.855 ***	0.647 *
	(4.260)	(1.926)
ROA	−7.991 ***	−13.078 ***
	(−4.878)	(−5.659)
Growth	0.120	0.344
	(0.998)	(1.611)
CF	2.124 ***	5.422 ***
	(3.180)	(4.366)
Age	0.022 ***	0.028*
	(4.823)	(2.172)
First	0.009 ***	0.019 **
	(3.680)	(2.997)
Boardsize	0.622 ***	1.080 ***
	(4.260)	(4.212)
Independ	−0.726	−0.804*
	(−0.966)	(−1.913)

Table 6. *Cont.*

	(3)	(4)
	ESG	**lnESG**
Constant	−5.893 ***	−7.360 ***
	(−5.762)	(−7.070)
Year	Yes	Yes
Firm	Yes	Yes
N	10,421	10,421
Adj_R^2	0.100	0.162

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.5.3. Alternative Measures for the Key Variables

Following previous studies [61], we changed an alternative proxy for ESG performance using ESG ratings data provided by the China Alliance of Social Value Investment (CASVI). However, the ESG ratings provided by CASVI went online in 2016 and only covered the components of CSI 300. Thus, we lost some samples relative to the baseline regression test. Regression results using alternative proxy for ESG performance are presented in Table 7. As we can see, the coefficient of Fintech still remains significantly positive at the 1% level, which further supports our prediction.

Table 7. Robustness check: alternative proxy for ESG performance.

	(1)	(2)
	ESG	**lnESG**
Fintech	0.213 **	0.327 **
	(2.350)	(2.028)
Size	0.285 **	0.368 **
	(2.411)	(2.350)
Lev	2.936 *	3.888 **
	(1.810)	(2.482)
ROA	−20.876 ***	−14.377 ***
	(−3.449)	(−3.413)
Growth	1.800 **	1.564
	(2.693)	(1.749)
CF	0.315	6.417
	(0.128)	(1.663)
Age	0.011	0.041
	(0.288)	(0.789)
First	0.001	−0.006
	(0.153)	(−0.430)
Boardsize	−3.732 **	−3.338 **
	(−3.066)	(−2.662)
Indboard	−0.165	−4.188
	(−0.040)	(−1.109)
Constant	0.914	−2.766
	(0.191)	(−1.381)
Year	Yes	Yes
Industry	Yes	Yes
N	10,421	10,421
Adj_R^2	0.155	0.255

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

We further examine the effect of Fintech development on ESG performance using an alternative measure of Fintech development. Following the existing literature [62], we further used Fintech firms in a city as our alternative Fintech development measure. As

Table 8 shows, the results are in line with those of the baseline model. This means that our findings are robust to a variety of different control variables. This evidence further suggests that Fintech development has a significant impact on corporate ESG performance.

Table 8. Robustness check: alternative proxy for fintech development.

	(1)	(2)
	ESG	**lnESG**
Fintech	0.178 ***	0.028 ***
	(3.704)	(3.454)
Size	0.061	0.229
	(0.327)	(1.536)
Lev	0.226 **	−0.018
	(2.386)	(−0.214)
ROA	0.360 **	0.125
	(2.435)	(0.654)
Growth	−0.182	−0.316
	(−0.450)	(−0.567)
CF	0.010 **	0.003 **
	(2.205)	(2.066)
Age	0.006	0.008
	(0.207)	(0.781)
First	0.082	−0.005
	(0.755)	(−0.075)
Boardsize	0.400 **	0.670 **
	(2.152)	(2.334)
Indboard	−0.209	−0.351
	(−0.765)	(−0.844)
Constant	1.238 ***	−1.331 ***
	(3.094)	(−4.736)
Year	Yes	Yes
Industry	Yes	Yes
N	10,421	10,421
Adj_R^2	0.171	0.145

The *t*-statistics are presented in the parenthesis and superscripts *** and ** denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.6. Potential Mechanism Analysis

This paper further examines the mechanism of fintech's impact on corporate ESG performance based on the main hypothesis. The previous analysis suggests that corporate ESG investment is plagued by a lack of resources and financing constraints, and that fintech is an effective mechanism to alleviate corporate financing constraints. It can be hypothesised that fintech can contribute to the ESG performance of firms by increasing their access to loans and reducing their financing constraints. To test this hypothesis, this paper uses two indicators commonly used in the literature to measure corporate financing constraints as follows: (1) The SA index constructed by Hadlock and Pierce (2010) is used to measure corporate financing constraints [56]; the larger the SA index, the stronger the corporate financing constraints. (2) refers to the existing literature and uses the KZ index as an additional measure of financing constraints. The larger the KZ index, the stronger the financing constraint.

Table 9 reports the regression results for Fintech development on firms' financing constraints. The above results show that the regression coefficients of Fintech development (Fintech) are significant at the 5% statistical level regardless of whether the SA index or KZ index is used as the dependent variable, which implies that Fintech development significantly alleviates corporate financing constraints. The above findings suggest that Fintech development enhances corporate ESG performance mainly by alleviating the financing constraints faced by companies in the ESG investment process.

Table 9. Potential mechanism analysis: financing constraints.

	(1)	(2)
	SA	*KZ*
Fintech	−0.036 **	−0.021 **
	(−2.506)	(−2.573)
Size	−0.007 ***	−0.007 ***
	(−12.893)	(−12.578)
Lev	0.000	−0.001
	(0.022)	(−0.235)
ROA	0.015	0.014
	(1.243)	(1.211)
Growth	−0.001 **	−0.001
	(−2.030)	(−1.588)
CF	0.046 ***	0.046 ***
	(5.586)	(5.561)
Age	0.000 ***	0.000 ***
	(3.885)	(3.914)
First	0.010 ***	0.023 ***
	(3.275)	(2.988)
Boardsize	0.002	0.002
	(0.505)	(0.640)
Indboard	0.009	0.010
	(0.960)	(1.025)
Constant	0.181 ***	0.179 ***
	(13.393)	(13.298)
Year	Yes	Yes
Industry	Yes	Yes
N	10,421	10,421
Adj_R^2	0.327	0.327

The *t*-statistics are presented in the parenthesis and superscripts *** and ** denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.7. Heterogeneity Tests

4.7.1. Firm Size

Firm size is an important factor influencing ESG performance [55]. In general, larger firms tend to have a resource advantage and also face lower financing constraints [56]. Therefore, the effect of fintech on alleviating firms' financing constraints may not be evident among larger firms. It is reasonable to hypothesize that the boosting effect of fintech on firms' ESG performance is mainly found in relatively small firms. To test this hypothesis, we grouped the sample according to the mean of firm size and examined the effect of fintech on firm ESG performance separately.

Table 10 reports the results of the regressions grouped according to the mean of firm size. The results show that the regression coefficients for Fintech are 0.027 and 0.024 for the relatively small sample of firms, and are statistically significant at the 1% level. In contrast, the regression coefficients for Fintech are not significant in the larger sample of firms. This suggests that Fintech mainly alleviates the financing constraints faced by small-scale firms in the ESG investment process, and therefore, Fintech development mainly contributes to the ESG performance of small-scale firms.

Table 10. Heterogeneity analysis: firm size.

	(1)	(2)	(3)	(4)
	Small Companies		Large Companies	
	ESG	lnESG	ESG	lnESG
Fintech	0.027 ***	0.024 ***	0.029	0.028
	(8.053)	(4.184)	(0.931)	(0.652)

Table 10. *Cont*.

	(1)	(2)	(3)	(4)
	Small Companies		**Large Companies**	
	ESG	lnESG	ESG	lnESG
Size	0.278 ***	0.235 ***	0.297 ***	0.218 ***
	(5.279)	(4.886)	(5.740)	(4.530)
Lev	1.012 ***	1.111 ***	0.990 ***	1.099 ***
	(4.336)	(4.651)	(4.165)	(4.625)
ROA	−6.060 ***	−5.933 ***	−6.233 ***	−6.114 ***
	(−4.503)	(−4.326)	(−4.526)	(−4.437)
Growth	−0.001	−0.001	−0.003	−0.002
	(−0.185)	(−0.115)	(−0.465)	(−0.346)
CF	0.765 *	0.711	0.800 *	0.687
	(1.851)	(1.771)	(1.918)	(1.697)
Age	0.012 **	0.019 ***	0.019 ***	0.019 ***
	(2.410)	(3.758)	(3.738)	(4.290)
First	0.003	0.006 **	0.007 **	0.007 **
	(1.547)	(2.613)	(2.956)	(3.042)
Boardsize	0.556 **	0.583 **	0.550 **	0.559 **
	(3.020)	(3.028)	(3.050)	(2.965)
Indboard	−0.946	−0.960	−0.870	−0.916
	(−1.509)	(−1.490)	(−1.352)	(−1.400)
Constant	−7.536 ***	−6.989 ***	−8.291 ***	−6.651 ***
	(−5.285)	(−5.185)	(−5.747)	(−4.855)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	6293	6293	4128	4128
Adj_R^2	0.109	0.108	0.108	0.107

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.7.2. Characteristics of High-Tech Companies

High-tech companies have a leading and exemplary role in innovation and often have more mature technologies and innovations. Fintech is a deep integration of technology and finance, which also leads to high-tech enterprises being able to leverage their technological strengths to take full advantage of the convenience of fintech. Therefore, this paper speculates that the boosting effect of fintech development on corporate ESG performance may be more present in the sample of high-tech enterprises.

Table 11 reports the grouping tests according to high-tech firms. The results show that the regression coefficients for financial technology (Fintech) are 0.018 and 0.045 in the sample of high-tech enterprises and are statistically significant at the 10% and 1% levels respectively. In the non-high-tech sample, the regression coefficients for Fintech were not significant. This suggests that Fintech mainly contributes to the ESG performance of high-tech firms.

Table 11. Heterogeneity analysis: Characteristics of high-tech companies.

	(1)	(2)	(3)	(4)
	High-Tech Companies		**Non-High-Tech Companies**	
	ESG	lnESG	ESG	lnESG
Fintech	0.018 *	0.045 ***	0.012	0.012
	(1.943)	(3.416)	(0.888)	(0.547)
Size	0.274 ***	0.247 ***	0.344 ***	0.239 ***
	(4.961)	(4.855)	(6.666)	(4.534)

Table 11. *Cont*.

	(1)	(2)	(3)	(4)
	High-Tech Companies		**Non-High-Tech Companies**	
	ESG	**lnESG**	**ESG**	**lnESG**
Lev	0.761 **	0.806 **	0.651 *	0.818 **
	(2.225)	(2.265)	(1.828)	(2.327)
ROA	−9.690 ***	−9.787 ***	−9.938 ***	−9.720 ***
	(−5.061)	(−4.998)	(−5.189)	(−5.023)
Growth	−0.008	−0.009	−0.009	−0.008
	(−1.234)	(−1.514)	(−1.634)	(−1.377)
CF	3.893 ***	3.858 ***	3.998 ***	3.847 ***
	(3.355)	(3.318)	(3.436)	(3.307)
Age	0.024 **	0.032 **	0.025 *	0.029 **
	(2.288)	(2.642)	(2.115)	(2.744)
First	0.015 **	0.019 ***	0.016 **	0.018 **
	(2.832)	(3.219)	(2.651)	(3.006)
Boardsize	0.708 **	0.709 **	0.687 **	0.712 **
	(2.797)	(2.864)	(2.791)	(2.830)
Indboard	−1.224 **	−1.171 **	−1.140 **	−1.202 **
	(−2.546)	(−2.361)	(−2.431)	(−2.447)
Constant	−8.280 ***	−8.124 ***	−9.820 ***	−7.821 ***
	(−5.983)	(−6.346)	(−6.844)	(−6.066)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	5579	5579	4842	4842
Adj_R²	0.170	0.170	0.172	0.170

The *t*-statistics are presented in the parenthesis and superscripts ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.7.3. Financial Background of Senior Executives

The financial background of executives is an important factor influencing firms' innovative activities [58,60]. Executives with a financial background can help firms access bank credit resources through their financial expertise and social networks. As a new technology, executives with a financial background can take full advantage of their expertise to fully grasp and exploit the convenience brought by fintech as opposed to firms without financial background executives. Therefore, this paper speculates that the boosting effect of fintech development on corporate ESG performance may be more present in the sample of companies with executives with financial backgrounds.

Table 12 reports tests for grouping by whether or not a firm's executives have a financial background. The results show that the regression coefficients for Fintech are 0.096 and 0.014 for the sample with executives from financial backgrounds, and are significant at the 10% and 1% statistical levels, respectively. The regression coefficients for Fintech were not significant in the sample without executives from financial backgrounds. The results in Table 10 suggest that Fintech primarily contributes to the ESG performance of high-tech firms.

Table 12. Heterogeneity analysis: Financial background of senior executives.

	(1)	(2)	(3)	(4)
	Senior Executives with Financial Background		**Senior Executives without Financial Background**	
	ESG	**LnESG**	**ESG**	**lnESG**
Fintech	0.096 ***	0.014 ***	0.132	0.0191
	(2.826)	(3.010)	(1.291)	(1.323)
Size	0.281 ***	0.274 ***	0.032 ***	0.033 ***
	(13.872)	(13.424)	(13.141)	(12.731)

Table 12. *Cont.*

	(1)	(2)	(3)	(4)
	Senior Executives with Financial Background		**Senior Executives without Financial Background**	
	ESG	**LnESG**	**ESG**	**lnESG**
Lev	−0.815 ***	−0.818 ***	−0.123 ***	−0.121 ***
	(−7.731)	(−7.375)	(−7.932)	(−7.916)
ROA	1.477 ***	1.443 ***	0.226 ***	0.226 ***
	(5.832)	(5.171)	(6.001)	(5.819)
Growth	−0.325	−0.330	−0.068 *	−0.093 *
	(−1.410)	(−1.341)	(−1.737)	(−1.737)
CF	0.043 ***	0.045 ***	0.052 ***	0.054 ***
	(3.163)	(3.30)	(2.60)	(2.73)
Age	−0.084 ***	−0.098 ***	−0.010 ***	−0.0102 ***
	(−3.363)	(−3.740)	(−2.830)	(−2.871)
First	0.027	0.354	0.023	0.041
	(0.333)	(0.152)	(0.224)	(0.442)
Boardsize	0.035	−0.012	0.008	0.0002
	(0.209)	(−0.043)	(0.416)	(0.203)
Indboard	0.193	0.165	0.167	0.013
	(0.737)	(0.725)	(0.842)	(0.813)
Constant	−0.217	0.042	1.153 ***	1.136 ***
	(−0.025)	(0.048)	(17.332)	(17.415)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	6179	6179	4242	4242
Adj_R²	0.184	0.186	0.164	0.166

The *t*-statistics are presented in the parenthesis and superscripts *** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

5. Conclusions and Discussions

5.1. Conclusions and Discussions

With sustainable development becoming a globally recognised development trend, specific ways and paths to promote sustainable development are important directions worthy of in-depth exploration and research. In this context, this paper explores the impact of fintech on corporate ESG performance and its mechanism of action, using a sample of listed companies in the world's largest emerging markets. The paper confirms the significant positive effect of fintech development on corporate ESG performance and ensures the credibility of the core findings through a series of robustness tests and endogeneity treatments. In terms of mechanism testing, this paper also shows that fintech development improves ESG performance mainly by alleviating corporate financing constraints. The paper also examines the heterogeneity of fintech development on firms' ESG performance in terms of firm size, high-tech industry, and executive financial background. Overall, this paper reveals the impact and mechanism of fintech on corporate ESG performance, providing empirical evidence on the development of fintech and corporate ESG performance in emerging markets.

This paper further extends the existing research on corporate ESG performance by exploring the factors influencing corporate ESG performance from the novel perspective of fintech. Previous studies have focused on the economic consequences of corporate ESG performance on financing costs [8,9], firm value [10,11], firm performance [2], and firm investment efficiency [14], but little literature has explored the important issue of the factors influencing corporate ESG performance. Therefore, this paper examines the incentives of corporate ESG performance from the perspective of fintech development, which further expands the research related to corporate ESG performance and is a useful addition to the research on the influencing factors of corporate ESG performance.

This paper examines the development of fintech development to enhance corporate ESG performance, which fully illustrates the non-economic effects created by fintech development, while enriching the research on the economic consequences of fintech. Previous studies on fintech have focused on economic consequences such as technological innovation [17], bank risk-taking [18,19], and corporate finance [15,16], ignoring the impact of fintech on corporate sustainability. Therefore, this paper further complements the research on fintech from the perspective of non-economic effects.

5.2. Practical Contributions

The findings of this paper have implications for business managers and policy makers. First, FinTech is a joint venture between finance and technology, and results have shown that digital finance can effectively alleviate the financing constraints faced by enterprises and is effective in stimulating ESG investments. Traditional financial institutions should be more proactive in adopting digital technology, increasing the development of fintech-related businesses, improving lending procedures and protocols, and helping companies to innovate in related businesses. The government and relevant financial institutions should pay attention to the development of digital finance, accelerate the pace of digital finance construction, and further promote the innovation and integration of finance and technology, so that digital technology can make the best use of its superiority in financial services.

Second, enterprises should strengthen the top-level design of ESG construction, reinforce the awareness of fulfilling ESG responsibilities, and make ESG performance enhancement an important strategy to achieve long-term corporate value and sustainable development. Previous studies document that state-owned enterprises (SOE), compared to non-SOEs, behave differently in corporate policies and decision making such as dividend payment [63], tax aggressiveness [64,65], working capital management [66,67], financial reporting [68], and auditing [69]. In particular, enterprises in polluting industries, non-state-owned enterprises and enterprises in less market-oriented regions should pay more attention to ESG construction and take the initiative to strengthen ESG information disclosure in order to gain the trust and support of stakeholders such as governments and investors, obtain key resources, maintain good relationships, and promote sustainable corporate development.

Third, government should improve the ESG information disclosure system and guide enterprises to make substantive disclosure of ESG information to improve information transparency, alleviate financing constraints, reduce corporate risks, promote the active implementation of green innovation strategies by enterprises, and enhance the sustainability of corporate surpluses. At the same time, it should encourage the development of ESG rating agencies and third-party certification systems. ESG ratings and third-party audits are important forces in the regulation of ESG information disclosure, and they are mutually reinforcing with government regulation, which is conducive to prompting enterprises to comply with information disclosure requirements, improving their own ESG performance and guiding them to develop in a benign manner to enhance their sustainable value.

Author Contributions: Conceptualization, D.W.; Formal analysis, resources, data curation, Y.W.; Writing—original draft preparation, K.P.; Writing—review and editing, K.T. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement: Not applicable.

Data Availability Statement: We obtained the data from the China Stock Market & Accounting Research (CSMAR) Database (https://www.gtarsc.com/, accessed on 16 November 2022) and Wind database (https://www.wind.com.cn/, accessed on 16 November 2022).

References

1. Chatterji, A.K.; Durand, R.; Levine, D.I.; Touboul, S. Do ratings of firms converge? Implications for managers, investors and strategy researchers. *Strateg. Manag. J.* **2016**, *37*, 1597–1614. [CrossRef]
2. Broadstock, D.C.; Chan, K.; Cheng, L.T.; Wang, X. The role of ESG performance during times of financial crisis: Evidence from COVID-19 in China. *Financ. Res. Lett.* **2021**, *38*, 101716. [CrossRef] [PubMed]
3. Avramov, D.; Cheng, S.; Lioui, A.; Tarelli, A. Sustainable investing with ESG rating uncertainty. *J. Financ. Econ.* **2022**, *145*, 642–664. [CrossRef]
4. Tan, Y.; Zhu, Z. The effect of ESG rating events on corporate green innovation in China: The mediating role of financial constraints and managers' environmental awareness. *Technol. Soc.* **2022**, *68*, 101906. [CrossRef]
5. Tang, H. The effect of ESG performance on corporate innovation in China: The mediating role of financial constraints and agency cost. *Sustainability* **2022**, *14*, 3769. [CrossRef]
6. Zhai, Y.; Cai, Z.; Lin, H.; Yuan, M.; Mao, Y.; Yu, M. Does better environmental, social, and governance induce better corporate green innovation: The mediating role of financing constraints. *Corp. Soc. Resp. Env. Manag.* **2022**, *29*, 1513–1526. [CrossRef]
7. Luke, T.W. Investment and rapid climate change as biopolitics: Foucault and governance of the self and others through ESG. *Sustainability* **2022**, *14*, 14974. [CrossRef]
8. Goss, A.; Roberts, G.S. The impact of corporate social responsibility on the cost of bank loans. *J. Bank. Financ.* **2011**, *35*, 1794–1810. [CrossRef]
9. Eliwa, Y.; Aboud, A.; Saleh, A. ESG practices and the cost of debt: Evidence from EU countries. *Critic. Perspect. Account.* **2021**, *79*, 102097. [CrossRef]
10. Ghoul, S.E.; Guedhami, O.; Kim, Y. Country-level institutions, firm value, and the role of corporate social responsibility initiatives. *J. Int. Bus. Stud.* **2017**, *48*, 360–385. [CrossRef]
11. Fatemi, A.; Glaum, M.; Kaiser, S. ESG performance and firm value: The moderating role of disclosure. *Glob. Financ. J.* **2018**, *38*, 45–64. [CrossRef]
12. Wu, S.; Li, X.; Du, X.; Li, Z. The impact of ESG performance on firm value: The moderating role of ownership structure. *Sustainability* **2022**, *14*, 14507. [CrossRef]
13. Chang, Y.J.; Lee, B.H. The impact of ESG activities on firm value: Multi-level analysis of industrial characteristics. *Sustainability* **2022**, *14*, 14444. [CrossRef]
14. Benlemlih, M.; Bitar, M. Corporate social responsibility and investment efficiency. *J. Bus. Ethics* **2018**, *148*, 647–671.
15. Lu, L. Promoting SME finance in the context of the fintech revolution: A case study of the UK's practice and regulation. *Bank. Financ. Law. Rev.* **2018**, *33*, 317–343.
16. Sun, Y.; Li, S.; Wang, R. Fintech: From budding to explosion-an overview of the current state of research. *Rev. Manag. Sci.* **2022**, 1–41. [CrossRef]
17. Chen, M.A.; Wu, Q.; Yang, B. How valuable is FinTech innovation? *Rev. Financ. Stud.* **2019**, *32*, 2062–2106. [CrossRef]
18. Gomber, P.; Koch, J.A.; Siering, M. Digital finance and fintech: Current research and future research directions. *J. Bus. Econ.* **2017**, *87*, 537–580. [CrossRef]
19. Buchak, G.; Matvos, G.; Piskorski, T.; Seru, A. Fintech, regulatory arbitrage, and the rise of shadow banks. *J. Financ. Econ.* **2018**, *130*, 453–483. [CrossRef]
20. Wang, Q.; Yang, J.; Chiu, Y.H.; Lin, T.Y. The impact of digital finance on financial efficiency. *Manag. Decis. Econ.* **2020**, *41*, 1225–1236. [CrossRef]
21. Demir, A.; Pesqué-Cela, V.; Altunbas, Y.; Murinde, V. Fintech, financial inclusion and income inequality: A quantile regression approach. *Eur. J. Financ.* **2022**, *28*, 86–107. [CrossRef]
22. Ding, N.; Gu, L.; Peng, Y. Fintech, financial constraints and innovation: Evidence from China. *J. Corp. Financ.* **2022**, *73*, 102194. [CrossRef]
23. Wu, Y.; Huang, S. The effects of digital finance and financial constraint on financial performance: Firm-level evidence from China's new energy enterprises. *Energ. Econ.* **2022**, *112*, 106158. [CrossRef]
24. Renneboog, L.; Ter Horst, J.; Zhang, C. Is ethical money financially smart? Nonfinancial attributes and money flows of socially responsible investment funds. *J. Financ. Intermed.* **2011**, *20*, 562–588. [CrossRef]
25. Riedl, A.; Smeets, P. Why do investors hold socially responsible mutual funds? *J. Financ.* **2017**, *72*, 2505–2550. [CrossRef]
26. Freeman, R.E. *Strategic Management: A Stakeholder Approach*; Pitman: Boston, MA, USA, 1984.
27. Edmans, A. Does the stock market fully value intangibles? Employee Satisfaction and equity prices. *J. Financ. Econ.* **2011**, *101*, 621–640. [CrossRef]
28. Deng, X.; Kang, J.K.; Low, B.S. Corporate social responsibility and stakeholder value maximization: Evidence from mergers. *J. Financ. Econ.* **2013**, *110*, 87–109. [CrossRef]

29. Flammer, C. Does corporate social responsibility lead to superior financial performance? A regression discontinuity approach. *Manag. Sci.* **2015**, *61*, 2549–2568. [CrossRef]

30. Atan, R.; Alam, M.M.; Said, J.; Zamri, M. The impacts of environmental, social, and governance factors on firm performance: Panel study of Malaysian companies. *Manag. Environ. Qualit. Int. J.* **2018**, *29*, 182–194. [CrossRef]

31. Duque-Grisales, E.; Aguilera-Caracuel, J. Environmental, social and governance (ESG) scores and financial performance of multilatinas: Moderating effects of geographic international. *J. Bus. Ethics* **2021**, *168*, 315–334. [CrossRef]

32. Garcia, A.S.; Orsato, R.J. Testing the institutional difference hypothesis: A study about environmental, social, governance, and financial performance. *Bus. Strat. Env.* **2020**, *29*, 3261–3272. [CrossRef]

33. Nollet, J.; Filis, G.; Mitrokostas, E. Corporate social responsibility and financial performance: A non-linear and disaggregated approach. *Econ. Model.* **2016**, *52*, 400–407. [CrossRef]

34. Ma, Y.; Liu, D. Introduction to the special issue on crowdfunding and fintech. *Financ. Innov.* **2017**, *3*, 1–4. [CrossRef]

35. Knewtson, H.S.; Rosenbaum, Z.A. Toward understanding fintech and its industry. *Manag. Financ.* **2020**, *46*, 1043–1060. [CrossRef]

36. Thakor, A.V. Fintech and banking: What do we know? *J. Financ. Intermed.* **2020**, *41*, 100833. [CrossRef]

37. Gai, K.; Qiu, M.; Sun, X. A survey on fintech. *J. Netw. Comput. Appl.* **2018**, *103*, 262–273. [CrossRef]

38. Lee, D.K.C.; Teo, E.G. Emergence of fintech and the LASIC principles. *J. Financ. Perspect.* **2015**, *3*, 24–37. [CrossRef]

39. Liu, J.; Li, X.; Wang, S. What have we learnt from 10 years of fintech research? A scientometric analysis. *Technol. Forecast. Soc.* **2020**, *155*, 120022. [CrossRef]

40. Zhang-Zhang, Y.; Rohlfer, S.; Rajasekera, J. An eco-systematic view of cross-sector fintech: The case of Alibaba and Tencent. *Sustainability* **2020**, *12*, 8907. [CrossRef]

41. Friedman, M. A theoretical framework for monetary analysis. *J. Polit. Econ.* **1970**, *78*, 193–238. [CrossRef]

42. Saha, A.K.; Al-Shaer, H.; Dixon, R.; Demirag, I. Determinants of carbon emission disclosures and UN sustainable development goals: The case of UK higher education institutions. *Aust. Account. Rev.* **2021**, *31*, 79–107. [CrossRef]

43. Nguyen, V.H.; Agbola, F.W.; Choi, B. Does Corporate Social Responsibility Enhance Financial Performance? Evidence from Australia. *Aust. Account. Rev.* **2022**, *32*, 5–18. [CrossRef]

44. Sufi, A. Information asymmetry and financing arrangements: Evidence from syndicated loans. *J. Financ.* **2007**, *62*, 629–668. [CrossRef]

45. Yu, H.; Zhao, Y.; Liu, Z.; Liu, W.; Zhang, S.; Wang, F.; Shi, L. Research on the financing income of supply chains based on an e-commerce platform. *Technol. Forecast. Soc.* **2021**, *169*, 120820. [CrossRef]

46. Niinimäki, J.P. Collateral in credit rationing in markets with asymmetric information. *Q. Rev. Econ. Financ.* **2018**, *68*, 97–102. [CrossRef]

47. Favara, G.; Ivanov, I.; Rezende, M. GSIB surcharges and bank lending: Evidence from US corporate loan data. *J. Financ. Econ.* **2021**, *142*, 1426–1443. [CrossRef]

48. Zhang, A.; Wang, S.; Liu, B.; Liu, P. How fintech impacts pre- and post-loan risk in Chinese commercial banks. *Int. J. Financ. Econ.* **2022**, *27*, 2514–2529. [CrossRef]

49. He, W.; Shan, Y. International evidence on the matching between revenues and expenses. *Contemp. Account. Res.* **2016**, *33*, 1267–1297. [CrossRef]

50. Kend, M.; Nguyen, L.A. Big data analytics and other emerging technologies: The impact on the Australian audit and assurance profession. *Aust. Account. Rev.* **2020**, *30*, 269–282. [CrossRef]

51. Troshani, I.; Rowbottom, N. Digital corporate reporting: Research developments and implications. *Aust. Account. Rev.* **2021**, *31*, 213–232. [CrossRef]

52. Yao, T.; Song, L. Examining the differences in the impact of fintech on the economic capital of commercial banks' market risk: Evidence from a panel system GMM analysis. *Appl. Econ.* **2021**, *53*, 2647–2660. [CrossRef]

53. Zhang, D.; Lucey, B.M. Sustainable behaviors and firm performance: The role of financial constraints' alleviation. *Econ. Anal. Poli.* **2022**, *74*, 220–233. [CrossRef]

54. Lavin, J.F.; Montecinos-Pearce, A.A. Esg reporting: Empirical analysis of the influence of board heterogeneity from an emerging market. *Sustainability* **2021**, *13*, 3090. [CrossRef]

55. Drempetic, S.; Klein, C.; Zwergel, B. The influence of firm size on the ESG score: Corporate sustainability ratings under review. *J. Bus. Ethics* **2020**, *167*, 333–360. [CrossRef]

56. Hadlock, C.J.; Pierce, J.R. New evidence on measuring financial constraints: Moving beyond the KZ index. *Rev. Financ Stud.* **2010**, *23*, 1909–1940. [CrossRef]

57. Wang, F.; Sun, Z. Does the Environmental Regulation Intensity and ESG Performance Have a Substitution Effect on the Impact of Enterprise Green Innovation: Evidence from China. *Int. J. Environ. Res. Publ. Health* **2022**, *19*, 8558. [CrossRef]

58. Custódio, C.; Metzger, D. Financial expert CEOs: CEO's work experience and firm's financial policies. *J. Financ. Econ.* **2014**, *114*, 125–154. [CrossRef]

59. Zhou, D.; Bai, M.; Liang, X.; Qin, Y. The Early-life Political Event Experience of the Chair of the Board and the Firm's Innovation Decision. *Aust. Account. Rev.* **2021**, *31*, 186–212. [CrossRef]

60. Yang, C.; Xia, X.; Li, Y.; Zhao, Y.; Liu, S. CEO financial career and corporate innovation: Evidence from China. *Int. Rev. Econ. Financ.* **2021**, *74*, 81–102. [CrossRef]

61. Tian, H.; Tian, G. Corporate sustainability and trade credit financing: Evidence from environmental, social, and governance ratings. *Corp. Soc. Resp. Env. Manag.* **2022**, *29*, 1896–1908. [CrossRef]

62. Safiullah, M.; Paramati, S.R. The impact of FinTech firms on bank financial stability. *Electron. Commer. Res.* **2022**, 1–23. [CrossRef]

63. Qin, W.; Liang, Q.; Jiao, Y.; Lu, M.; Shan, Y. Social trust and dividend payouts: Evidence from China. *Pac.-Basin Financ. J.* **2022**, *72*, 101726. [CrossRef]

64. Cao, Y.; Feng, Z.; Lu, M.; Shan, Y. Tax avoidance and firm risk: Evidence from China. *Account. Financ.* **2021**, *61*, 4967–5000. [CrossRef]

65. Liang, Q.; Li, Q.; Lu, M.; Shan, Y. Industry and geographic peer effects on corporate tax avoidance: Evidence from China. *Pac-Basin. Financ. J.* **2021**, *67*, 101545. [CrossRef]

66. Jiang, W.; Lu, M.; Shan, Y.; Zhu, T. Evidence of avoiding working capital deficits in Australia. *Aust. Account. Rev.* **2016**, *26*, 107–118. [CrossRef]

67. Lu, M.; Shan, Y.; Wright, S.; Yu, Y. Operating cash flow asymmetric timeliness in Australia. *Account. Financ.* **2020**, *60*, 587–627. [CrossRef]

68. Wang, X.; Jiang, H.; Lu, M. Does the reporting location of other comprehensive income matter? The investor's perspective. *Aust. Account. Rev.* **2019**, *29*, 546–555. [CrossRef]

69. Zhai, H.; Lu, M.; Shan, Y.; Liu, Q.; Zhao, Y. Key audit matters and stock price synchronicity: Evidence from a quasi-natural experiment in China. *Int. Rev. Financ. Anal.* **2021**, *75*, 101747.