

Sustainability, market performance and FinTech firms

Sustainability

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317

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Abstract

Purpose – The purpose of this paper is to provide empirical evidence on the suitability of a Bloomberg Environmental (E), Social (S) and Governance (G) (ESG) disclosure index designed for companies from the USA and to investigate the sustainability quality and stock performance of FinTech companies.

Design/methodology/approach – Data from all FinTech and non-FinTech firms in the USA was acquired from Bloomberg to undertake the study and evaluate the suggested hypotheses efficiently. The final sample consists of 1,672 company-year observations from 2010 to 2019. The methodology used ordinary least squares regressions of performance metrics on the Bloomberg ESG disclosure index and its components.

Findings – The findings indicated that the Bloomberg ESG disclosure index is a valid proxy for sustainability and has a direct relationship with stock performance. Furthermore, this study suggests that non-FinTech firms outperform FinTech firms in sustainability and stock performance. The findings support stakeholder theory, which suggests that increased disclosure of ESG information will mitigate the agency problem and protect shareholders' interests.

Research limitations/implications – This study's findings were significant because the findings emphasised ESG disclosure in FinTech and non-FinTech firms, providing information to academics, legislators, regulators, financial report users, investors, environmental unions, workers, customers and society.

Originality/value – This research is unique as it evaluates ESG practices in both FinTech and non-FinTech firms.

Keywords FinTech, Stock performance, ESG, Sustainability, Stakeholder theory

Paper type Research paper

1. Introduction

Industrial revolution 4.0 and the associated technologies are swiftly transforming and changing the world's economy and markets. Artificial Intelligence (AI), Big Data, Blockchain and Machine Learning (ML), in particular, are prompting concerns regarding existing and emerging corporate practices (Moll and Yigitbasioglu, 2019). The stakeholders'



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perceptions of the traditional business practices are witnessing an alteration, similar to the labour replacement in the industrial revolution at the beginning 1900s (Tiberius and Hirth, 2019). Over the past decade, the financial industry has undergone major operating model transformations, including the introduction of the Automated Teller Machine and online banking services. Currently, the financial sector is not immune from the present globally digital transformation. Several factors have developed the financial industry's innovation activities. First, the existence of digital natives' changes customers' behaviour towards a preference for fast, convenient and low-cost services. Second, the rapid advancements in contemporary technologies (Big Data, AI, ML, Blockchain, smartphone technologies and powerful computers) offer a solid infrastructure and base to deploy these technologies to provide efficient financial services. Third, emerging technologies have enhanced operation efficiency, created highly significant potential profit and scaled up the financial sector's interest in investing in technological advancement (Pathak and Pathak, 2017).

These latter factors have motivated global financial stakeholders to create, reorganise and reinvent financial services. The Financial Stability Board (FSB) describes Financial Technology (FinTech) as a new business model consisting of a combination of financial services and information technology. Although the FinTech business model continues to evolve, the rapid increase in global investment in this new business model indicates stakeholders' acceptance and trust in this innovation. The total FinTech investment has increased from US\$55.3bn in 2019 (Chen and Chang, 2020) to US\$210bn in 2021 [1].

Two theories exist concerning the FinTech firms' revolution. First, in the FinTech services era, the shadow of consumer theory emerged. Aaker and Keller (1990) asserted that new services might effectively replace the old provided the new service attained the precise consumers' demand level. Second, according to Christensen *et al.*'s (2006) disruptive innovation theory, new market competitors have a significant probability of gaining a market share if they can deliver improved, conducive and economical services. These two theories outline the strategy for FinTech firms to enter markets, gain market share and compete with established competitors. Interestingly, FinTech firms used emerging technologies to offer services to end-users previously confined to the banking sector. Nevertheless, the FinTech firms developed and enhanced several financial services' efficiency and practicality, for instance, investment services, asset management services and instant payments (Phan *et al.*, 2020).

FinTech business expansion presents various opportunities and challenges to global financial stability. Both opportunities and challenges should attract FinTech stakeholders' attention, including policymakers, users, regulators, investors and other parties. Several innovations have not yet been examined within an entire financial cycle, encouraging the FSB to play an essential role in monitoring FinTech. The FSB's role includes monitoring practices, identifying and regulating FinTech in the financial stability aspect (Pathak and Pathak, 2017).

Concurrently, Environmental (E), Social (S) and Governance (G) (ESG) disclosure is garnering substantial momentum and growth in the attention of stakeholders at the country and worldwide levels (Mohammad and Wasiuzzaman, 2021). Moreover, they highlighted that poor ESG disclosure is generating issues about the businesses' idiosyncratic risks. Investors must consistently base their judgments on comprehensive financial reports that include both financial and non-financial information, including ESG information in the firms' financial statements, which is reliable and relevant to the financial report users (Perrini *et al.*, 2016). Numerous studies have shown that ESG disclosure has an unavoidable impact on firms' corporate performance and presents opportunities to offer insights about the firms' awareness of social responsibility, environmental aspects and governance

mechanisms, which influence the earnings volatility, firms' reputation and financing cost (Dimson, 2015; Boffo, 2020).

The lack of research on ESG disclosure in FinTech firms coupled with the growing importance of the FinTech industry drove the development of this study, which aims to focus on filling the research gap in this area by investigating the ESG disclosure in FinTech and Non-FinTech Firms. To the best of our knowledge, no previous study has tackled this topic despite the importance of ESG reporting for FinTech and Non-FinTech firms. The disclosure information in the ESG reports provided for all stakeholders of the firm, mainly customers, investors and employees. However, a significant number of FinTech firms do not pay attention to the rise importance of this corporate sustainability reporting, and this could be because of the claim that these firms do not cause any harm to the environment like non-FinTech firms. Their argument is that their operations are digital and produce no carbon footprints. However, even if these firms do not harm the environment, still ESG reports are not only about environmental matters, but they are also about social (S) and corporate governance (G) where FinTech firms can significantly contribute to these areas. The disclosure of information and data that cover FinTech firms' operations plays a significant role in providing valuable insights and long-term value for stakeholders [2].

The consequence of ESG disclosure on the firms' performance and economic position has been subjected to protracted debates in the literature, and the results were contradictory (Grougiou *et al.*, 2014). The primary prevalent stream of research contends that sustainable investment leads to various benefits to the firm. Nevertheless, some evidence exists concerning the inconsistencies in the literature regarding the existence of the impact itself or its direction (Perrini *et al.*, 2016).

This study focuses on the effect of ESG disclosure for FinTech and non-FinTech firms on firm stock performance. Prior research studies focused on the effect of ESG disclosure on risk management, corporate governance or accounting-based performance. However, this current study is the first to address the impact of ESG disclosure on the stock performance for FinTech and non-FinTech firms. Stock prices are determined in the stock market by the forces of demand and supply. Also, as these prices reflect the present value of firms' future cashflow according to investors' estimation based on their evaluation, it is expected that firm's ESG disclosure plays a significant role in determining the stock performance of a firm. In addition, the disclosure of ESG reports improves the trust of the stakeholders. FinTech firms are expected to give the utmost importance to issuing ESG reports, especially because the use of technology is evolving rapidly in all fields not only in finance, and this requires the enhancement of trust among stakeholders. For all these reasons, this current study is trying to fill the research gap and contribute to a better understanding of financial reporting transparency practices in terms of ESG disclosure in FinTech and non-FinTech firms.

Consequently, this study aimed to examine the financial performance of FinTech firms by investigating the ESG disclosure practices. The present study precisely analyses FinTech and non-FinTech firms listed in the USA. A total of 193 firms from 2010 to 2019 were investigated. The study's empirical results provide evidence that FinTech firms' sustainability quality (measured in terms of ESG) is less than non-FinTech firms, parallel with expectations that FinTech firms underperform as opposed to non-FinTech firms because of weaker ESG. The study's findings verify prior literature, claiming that better sustainability quality leads to higher performance (Kiel and Nicholson, 2003; Hutchinson and Gul, 2004; Atanasov *et al.*, 2010).

The analysis of this study is split into two main parts. First, the relationship between the ESG characteristics and the firm's stock performance (measured in terms of stock return

above the risk-free rate) was tested using the capital asset pricing model (CAPM) and Fama–French models. All the ESG characteristics and ESG disclosure scores were found to be significantly positively related to a firm’s performance. Second, this study provides evidence of sustainability quality and performance of FinTech firms relative to non-FinTech firms by using the test of differences of means (*t*-test) analyses of selected variables from the sample. The *t*-test analyses revealed that the FinTech firms are significantly less disclosing in terms of ESG characteristics and ESG disclosure index compared to the control group (non-FinTech firms). It implies that the non-FinTech firms have an optimal sustainable qualities framework relative to FinTech firms. Finally, the lower performance of FinTech firms using the ordinary least squares regression analyses and controlling for firm-specific variables is further evidence in this study.

The present study significantly contributes to a better understanding of the FinTech firms’ financial performance and financial reporting transparency practices in terms of ESG disclosure. The key contributions of the paper are the following. First, to the best of our knowledge, the present study is the first to investigate the stock performance of FinTech firms and their financial reporting transparency practices in terms of ESG disclosure. Second, the study adds to the literature by using a large sample size that covers a panel of 1,672 companies-years observation from 2010 to 2019. Third, the study offers reliable and relevant results to a wide range of users, such as clients, employees, environmental unions, financial report users, investors, policymakers, regulators and researchers.

The study is organised as follows. Section 2 explores the theoretical basis and hypotheses development. Section 3 discusses the sample characteristics, methodology, data collection and empirical findings. Finally, Section 4 presents the research conclusion.

2. Literature review and hypothesis development

In a report published in 2019, the International Monetary Fund stressed the significance of sustainability to financial markets. The report also identified that ESG issues might significantly affect business profitability and threaten financial stability if the financial sector is exposed to substantial losses due to climate change [International Monetary Fund (IMF), 2019]. The report also recommended that lawmakers collaborate to develop coherent ESG performance and disclosure guidelines to promote disclosure and accountability and incorporate environmental aspects into business decisions and investments. The report also emphasised the importance of developing a holistic ESG theme to bridge increasing data gaps by standardising ESG terminologies and supporting coherent corporate ESG reporting, making the ESG data collection process and assessment simpler for stakeholders. Finally, it stressed the significance of independent ESG data verifiers in monitoring and verifying the transparency, coherence and validity of disclosed ESG data [International Monetary Fund (IMF), 2019]. Despite the fact that sustainable investing has been increasingly popular in the past few years, investors continue to struggle to obtain credible and comparative ESG data. The present challenge is that different data types are generated at various periods and for diverse uses in different regions worldwide. The Organisation for Economic Cooperation and Development has requested global guidelines. The World Economic Forum also announced a collaboration with prominent consulting firms to establish universal ESG monitoring standards. Both initiatives are consistent with these principles (Boffo, 2020).

In addition to the previous literature, a new line of study emphasises the link between the FinTech industry and sustainability and whether the industry’s fashionable pattern is coherent with the major sustainability pillars. Moro-Visconti *et al.* (2020) concluded that the FinTech business, through microfinance and crowdfunding, presents a solution for

sustainable financing. According to [Arner et al. \(2020\)](#), FinTech is a critical driver of financial inclusion, underpinning sustainable and balanced development. However, most of the prior research has only examined the relationship between ESG disclosures and corporate performance in non-FinTech firms, and no studies have analysed this relationship in FinTech firms. Several reasons have been documented for the belief that FinTech firms' ESG disclosure is less than non-FinTech firms. One argued that FinTech firms are not sufficiently mature in regards to the ESG practices and disclosure, especially as numerous studies have documented that a firm's age has a positive impact on the ESG disclosure score. In other words, the FinTech firms have been established only recently, leading the study's researchers to claim that FinTech firms have relatively low ages ([Aksu and Kosedag, 2006](#); [McBrayer, 2018](#); [Fahad and Nidheesh, 2020](#)). In addition, we argue that even if FinTech firms have sustainable operations and do not harm the environment (E), still ESG reports are not only about environmental matters but also about social (S) and corporate governance (G), where FinTech firms can significantly contribute in these areas.

Furthermore, recent data indicate that cryptocurrencies that are considered critical components of the FinTech sector have a major negative environmental impact owing to energy usage. This impact comes through the process of cryptocurrency mining. For instance, Bitcoin is the most popular and well-established example of a mineable cryptocurrency. Thus, FinTech companies engaging in cryptocurrency mining are projected to report less ESG information. According to [Deng et al. \(2019\)](#), a U-shaped relationship exists between FinTech and sustainable development in China. FinTech limits sustainable development when it is less than a crucial value and encourages sustainable development when a threshold is crossed. The pattern of broad economic expansion is primarily responsible for this U-shaped relationship. FinTech firms serve cross-country clients with no specific origin, and the firms' managers consider the low impact of the ESG initiatives or disclosure. Accordingly, the first hypothesis was developed to explore whether a FinTech firm or non-FinTech firm is more committed to disclosing ESG data:

- H1.* Ceteris paribus, the FinTech firms disclose less Environmental (E), Social (S) and Governance (G) information than non-FinTech firms.

The relationship between ESG disclosure and firm's performance has been elaborated by several theories in the literature. One of the main theories is the resource orchestration theory. The notion of this theory is to discuss how a company may efficiently organize its resources, transform them into capabilities and then use those capabilities to become innovative and achieve superior commercial performance. According to resource orchestration theory ([Wong et al., 2018](#)), ESG disclosure and value creation have a positive relationship. Furthermore, the shareholder theory's salience model proposes that involvement in ESG disclosure meets the needs of stakeholders (environmental and social practises) and can increase value generation ([Alshehhi et al., 2018](#)). According to resource orchestration theories, when management strategically uses ESG disclosure, they are more likely to gain a competitive advantage, resulting in increased value creation ([Chernev and Blair, 2015](#); [Freudenreich et al., 2020](#)).

On the other hand, the trade-off theory suggests that the adoption of ESG disclosure can lose the emphasis on its traditional business strategies, resulting in diminished profits. Firms' utilisation is directed towards ESG disclosure rather than generating value creation ([Wagner and Blom, 2011](#)). In view of these inconsistent results, the impact of ESG on corporate value creation remains theoretically ambiguous. [Najaf et al. \(2022a\)](#) specifically studied how FinTech firms adhere to sustainability in contrast to their counterparts. Their findings revealed that the sustainability index is a proxy for stock performance.

Furthermore, the study presented evidence that the non-FinTech firms' stock performance is highly affected by the sustainability index score compared to the FinTech firms.

Other studies use the agency theory to argue on the relationship between on the ESG disclosure and firms' performance. Peng and Isa (2020) documented that the firm's investment in ESG activities is motivated by managers to promote their personal reputation, leading them away from the primary rule of saving the firm's resources and achieving shareholder wealth. This point of view found that investments in ESG activities are against the shareholders' interest because of the reasons mentioned previously. Concurrently, other researchers found that investing in the ESG achieves shareholders' interest and contributes to maximising their investment value by building a trusted reputation and customer loyalty through the engagement in ESG activities and avoiding potential boycott or bad reputation risks, enhancing the going-concern basis for corporations (Alareeni and Hamdan, 2020).

The signalling theory argues that paying dividends to the shareholder is considered a tool to signal to investors about the corporations' performance and prospects. Thus, ESG engagement adds extra cost to the business in the short term, which negatively affects the corporation's ability to pay dividends, exerting pressure on the corporation in the short term. Nevertheless, investing in ESG could positively impact the signalling investors in the long term (Alareeni and Hamdan, 2020). Boffo (2020) documented that firms engaged in the ESG disclosure boost their market value. Interestingly, firms with a high ESG rating have a stronger reputation, which leads to a more trustworthy relationship with consumers, resulting in a decline in operational risk and leveraging firms' capability to reduce operational risk (Najaf *et al.*, 2021a).

Semenova and Hassel (2013) stated that integrating ESG in the disclosures leverages firms' brand, offsetting by having loyal and reliable clients, reduced capital costs and a positive reputation. Mejia-Escobar *et al.* (2020) highlighted that adopting ESG reduces risks and increases efficiency in the long term, as it offers a realistic picture of the difficulties and opportunities that a firm might encounter. The authors believed that adopting ESG would help an organisation mitigate risks and improve results in the long run. They concluded that the outcome is good for consumers, lenders and market valuation. These findings align with other studies. For instance, Fatemi *et al.* (2018) have revealed that the degree of ESG disclosure is positively connected to firm value. Besides, Bajic and Yurtoglu (2018) stated that ESG disclosure positively impacts the stock price.

Dimson (2015) demonstrated that firms improve their accounting performance and governance when a significant international network of long-term shareholders collaborates through coordinated engagement to persuade firms on social and environmental concerns. Schaltegger *et al.* (2019) examined a sample of Fortune 500 companies and discovered positive connections between the management of sustainability practices and firm value. Albitar *et al.* (2020) suggested in recent research that a positive and significant relationship exists between ESG disclosure score and firm performance across a sample of FTSE 350 companies. Similarly, Mohammad and Wasiuzzaman (2021) discovered that ESG disclosure enhances firm performance considerably using a sample of 661 firms listed on the Bursa Malaysia. Alareeni and Hamdan (2020) investigated the impact of ESG disclosure on the firms' operational (Return on assets), financial (Return on equity) and market performance (Tobin's Q). Their study documented that ESG disclosure positively impacts firms' financial performance. Nevertheless, the ESG sub-component (environment and Corporate Social Security) negatively impacts Return on assets and Return on equity. Furthermore, Murata and Hamori (2021) find that ESG disclosures mitigate future stock price crash risk to a certain level. Nevertheless, the mitigation degree depends on the region.

Several studies have found substantial evidences of the positive impact of ESG disclosure on firm's value, competitive advantage (Porter *et al.*, 2019; Alsayegh *et al.*, 2020) and disclosure quality (Lopez-De-silanes *et al.*, 2020). Schaltegger *et al.* (2019) argue that firms engaging in ESG disclosures had reduced systemic and non-systematic risks because of a decreased likelihood of litigation or adverse market response. Based on the above discussion, most of the literature supports the positive relationship between ESG disclosure and firm market performance. However, because of the lack of research on this domain in the FinTech industry, this study suggests the second hypothesis that examines the impact of ESG disclosure scores on stock market value for FinTech and non-FinTech firms as follows:

- H2.* Ceteris paribus, the FinTech firms have weak stock performance than non-FinTech firms because of fewer Environmental (E), Social (S) and Governance (G) disclosures.

3. Method, sample and data

The FinTech and non-FinTech firms were examined according to the ESG disclosure scores. Simultaneously, a wide range of literature was comprehensively analysed to identify disclosure scores concerning the firm's market performance (Najaf *et al.*, 2021b). By using the CAPM and Fama–French model, the researchers made an effort to identify the relationship between the firm market performance and Bloomberg disclosure scoring to ensure the effectiveness of the Bloomberg disclosure score. Subsequently, the FinTech and non-FinTech firms were compared according to market performance. Table 1 has details and definitions for each ESG variables.

3.1 Data and descriptive statistics

The institutions from the prominent KBW Nasdaq Financial Technology Index (KFTX) were chosen as a representative sample of FinTech firms. The KFTX was designated as the first official FinTech index recognised by earlier literature (Li *et al.*, 2017). Besides, KFTX's constituents include both FinTech and cross-business entities. The KFTX lists 48 FinTech institutions. The Bloomberg database was used to collect ESG and financial data. In addition, data concerning the five Fama–French factors (2×3) and the risk-free rate (R_f) were obtained from the Kenneth R. French online library. Appendix 2 includes a list of FinTech firms.

The matched sample of non-FinTech enterprises was then chosen using Bloomberg's "Relative Valuation (RV)" algorithm. The RV function is a business valuation approach that contrasts a firm's value to that of its rivals to assess the firm's financial strength. The RV models differ from absolute value models as they seek to assess a firm's intrinsic worth based on its anticipated future free cash flows discounted to present value. Investors may use RV models, including absolute value models, to identify if a firm's stock is a smart investment. When Bloomberg performs an RV, the sector of a firm should be used to identify the most appropriate multiple to apply, such as price to cash flow in real estate and price to sales in retail (Investopedia, 2020). This approach produces 145 non-FinTech firms that are matched based on credit rating, EPS review, industry and ownership (Najaf *et al.*, 2022b). As governance structure does not change regularly but rather changes gradually over time, annual data were used for all variables. From 2010 to 2019, a total of 193 publicly listed firms were included in the sample. Firms whose governance structure data is lacking were eliminated from the sample. Thus, this research covered 1,672 annual observations (firm-years).

Table 1.
Definition of
environmental, social
and governance
indicators

Indicator	Definition
<i>Environmental (E) disclosure score</i>	Proprietary Bloomberg score based on the extent of a company's environmental disclosure as part of Environmental, Social and Governance (ESG) data. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. Each data point is weighted in terms of importance, with data such as greenhouse gas emissions carrying greater weight than other disclosures
<i>Social (S) disclosure score</i>	Proprietary Bloomberg score based on the extent of a company's social disclosure as part of Environmental, Social and Governance (ESG) data. The score ranges from 0.1 for companies that disclose a minimum amount of social data to 100 for those that disclose every data point collected by Bloomberg. Each data point is weighted in terms of importance, with workforce data-carrying greater weight than other disclosures
<i>Governance (G) disclosure score</i>	Proprietary Bloomberg score based on the extent of a company's governance disclosure as part of Environmental, Social and Governance (ESG) data. The score ranges from 0.1 for companies that disclose a minimum amount of governance data to 100 for those that disclose every data point collected by Bloomberg. Each data point is weighted in terms of importance, with the board of directors' data carrying greater weight than other disclosures
<i>ESG disclosure score</i>	Proprietary Bloomberg scores based on the extent of a company's Environmental, Social and Governance (ESG) disclosure. The score ranges from 0.1 for companies that disclose a minimum amount of ESG data to 100 for those that disclose every data point collected by Bloomberg. Each data point is weighted in terms of importance, with data such as greenhouse gas emissions carrying greater weight than other disclosures

Table 2 illustrates the sample distribution, which indicates the number of firms in a given period. The table also displays the average percentage of each ESG component individually. The ESG performance is not measured monthly or quarterly but rather annually and does not transform unexpectedly but instead evolves gradually and consistently.

Thus, Table 2 depicts the mean trend of ESG performance from 2010 to 2019. The number of firms that decline each year stays between 150 and 188. Social and governance disclosures increase more than environmental disclosure, implying that social and governance concerns are taken seriously, whereas environmental concern is overlooked. The firms handle environmental issues lightly when disclosing, potentially because of less accountability or pressure to or from C-suit.

Similarly, we test the ESG over the different industrial sectors. The FinTech and non-FinTech firms are distrusted over three main categories: Financial, Information Technology (IT) and Industrials. We have a maximum of 672 firms from the financial sector, followed by IT and industrial. On average, FinTech firms' disclosure score for environmental, social and governance is less than their counterparts in all three industrial sectors. The sample distribution provides validity for our hypotheses (Table 3).

3.2 Univariate tests

Table 4 displays co-relation statistics (two-tailed test), including Pearson and Spearman-rank correlations for the variables analysed. Pearson and Spearman-rank correlation both

(1) Year	(2) No. of firms	FinTech firms				Non-FinTech firms			
		(3) Environmental (%) Average	(4) Social (%) Average	(5) Governance (%) Average	(6) ESG (%) Average	(7) Environmental (%) Average	(8) Social (%) Average	(9) Governance (%) Average	(10) ESG (%) Average
2010	149	11.06	7.96	50.87	13.84	24.12	19.02	56.44	26.18
2011	155	12.32	9.31	50.75	14.45	25.66	20.51	56.17	27.12
2012	158	11.03	12.19	51.10	15.30	25.59	21.95	55.79	27.23
2013	162	15.93	14.96	51.74	16.41	26.87	24.52	56.16	29.03
2014	166	16.57	18.23	50.83	17.37	26.93	25.84	55.88	28.99
2015	171	16.47	17.30	52.76	19.06	27.28	25.55	56.47	30.59
2016	173	14.49	18.85	53.97	20.47	26.75	25.86	57.24	30.94
2017	178	15.38	21.16	54.77	22.37	27.60	27.81	57.85	32.16
2018	182	15.58	22.57	54.83	23.03	27.71	29.92	58.23	32.83
2019	178	13.25	19.68	53.51	19.84	25.46	27.99	57.24	30.55
Total	1,672	14.80	17.19	52.59	18.40	26.55	25.04	56.76	29.64

Table 2.
Sample distribution
of the percentage of
environmental, social
and governance
components and
environmental, social
and governance over
years

Table 3.
Sample distribution
of the percentage of
environmental, social
and governance
components and
environmental, social
and governance over
industrial sectors

(1) Year	(2) No. of firms	FinTech firms			Non-FinTech firms					(10) ESG (%) Average
		(3) Environmental (%) Average	(4) Social (%) Average	(5) Governance (%) Average	(6) ESG (%) Average	(7) Environmental (%) Average	(8) Social (%) Average	(9) Governance (%) Average		
Financials	678	18.70	16.34	53.33	19.07	23.84	20.68	56.51	27.82	
Industrials	322	18.36	21.32	52.22	21.39	26.95	31.84	57.48	33.26	
Information technology	672	10.48	16.47	52.17	17.08	29.55	26.17	56.64	29.64	
Total	1,672	14.80	17.19	52.59	18.40	26.55	25.04	56.76	29.64	

Table 4.
Correlation
coefficients (Pearson
and Spearman-rank
[italicised]
correlations are
presented)

Variables	Code	1	2	3	4	5	6	7	8	9
Stock value	1									
Environmental disclosure score	2	0.324*								
Social disclosure score	3	0.432*	0.376*							
Governance disclosure score	4	0.408*	0.744*	0.743*						
ESG disclosure score	5	0.499*	0.727*	0.649*	0.3750*					
Firm age	6	0.128*	0.090	0.883*	0.7562*	0.3982*				
Board size	7	0.361*	0.156*	0.0160	0.6253*	0.9744*	0.1356*			
Audit dummy	8	0.134*	0.0290	0.152*	0.821*	0.8495*	0.0050	0.3004*		
Leverage	9	0.112*	0.076*	0.0370	0.115*	0.8128*	0.0470	0.2013*	−0.0390	
				0.0190	0.341*	0.097*	0.0010	0.0550	0.0170	0.2618*
					0.090*	0.322*		0.2436*	−0.0600	0.1181*
					0.071*	0.121*		0.1939*	−0.0390	0.0280
						0.094*		0.1104*	0.0000	0.1733*
								0.141*	−0.0390	0.1184*
								0.184*	0.0020	0.3194*
									−0.0450	−0.0360

Note: *shows significance at the 0.05 level

exhibit similarities for these four independent testing variables (ESG components combined and separated) and the stock value variable. Thus, the correlation between environmental disclosure and stock value is 0.324 (Pearson correlation) and 0.376 (Spearman-rank) with a 95% confidence interval, providing rudimentary evidence for a positive prevalent nexus between environmental disclosure and stock value. At the 0.05 level of significance, the correlation test for stock value and ESG disclosure is 0.499 (Pearson) and 0.3750 (Spearman-rank), showing a positive association between stock value and ESG disclosure. Similar indicators exist for social and environmental disclosure, prompting the present study's researchers to delve more into this interesting nexus. Table 4 shows no signs of multicollinearity. Furthermore, the study takes into account the variance inflation factor measure to manage multicollinearity throughout the regression analysis.

The extreme outliers were removed by winsorising the sample observations at the 1st and 99th percentiles. For FinTech firms, the mean of the analysed dependent variables, namely, stock valuation, environmental disclosure, governance disclosure score, social disclosure score and ESG disclosure score, are 3.36, 14.80, 24.10, 56.26 and 26.60, respectively. In comparison, similar variables for non-FinTech firms had mean values of 3.53, 26.57, 28.84, 59.10 and 34.83. The ESG includes the disclosure score of the firm's environment, society and governance. At the same time, the ESG score is the average combination of environmental, social and governance scores. The ESG disclosure score lies between 0.1 and 100. The higher scores indicate better quality of sustainability reporting. The average scores show that FinTech firms disclose less than non-FinTech firms. Table 5 displays the testing of the mean and median difference of variables from two distinct categories, FinTech and non-FinTech firms. The mean and median stock value of FinTech firms is substantially lower than non-FinTech firms, providing a first notion that validates the hypothesis to continue evaluating. The same attestation stands for individual and aggregate ESG disclosure, implying that FinTech firms lag behind non-FinTech firms regarding ESG disclosure. Therefore, the findings confirm the hypothesis that FinTech firms have a low degree of ESG disclosure.

3.3 Environmental (E), Social (S) and Governance (G) disclosures scores and equity performance under capital asset pricing model

The capital asset pricing model, Fama–French three-factor model (Fama and French, 1992) and Fama–French five-factor model (Fama and French, 2015) were tested against ESG disclosures. These tests are crucial because the effect of ESG on returns varies by pillar and sector (Zhang *et al.*, 2022). Single-factor and multifactor models were considered when exploring whether the results persist across models because of the systematic and idiosyncratic risks. Previous studies documented that the performance varies across the selected models because of anomalies (Linter, 1975; Fama and French, 1996), although other variables remain the same. Besides, the level of ESG performance has varied in terms of predictive power for excess returns (Zhang *et al.*, 2022). Therefore, this study starts by testing the single-factor model (CAPM) and, subsequently, Fama–French three-factor model and Fama–French five-factor model (multifactor models). The Fama–French five-factor model was considered because it is widely practised in the real world. Moreover, in contrast to the three-factor model, the five-factor model takes into account additional factors such as investment and profitability factors, which could be a potential reason for the variation of the results.

Consistent with this viewpoint, Table 6 displays the testing results of stock return against both individual components of ESG (Models 1 to 3) and aggregate ESG disclosures (Model 4). The findings display that ESG disclosures exert a significant effect on the rise of

Categories	Variables	FinTech firm = 1 (<i>n</i> = 429)		Non-FinTech firms = 0 (<i>n</i> = 1,243)		<i>t</i> -test Diff. between means	Mann–Whitney Diff. between medians
		Mean	Median	Mean	Median		
Dependent variables	Stock value	3.36	2.96	3.53	3.53	(−0.17) ***	(−0.57) ***
	Environmental disclosure score (%)	14.80	9.30	26.57	24.81	(−11.77) ***	(−15.51) ***
	Social disclosure score (%)	24.10	14.04	28.84	21.67	(−4.74) ***	(−7.63) ***
	Governance disclosure score (%)	56.26	51.79	59.10	55.36	(−2.84) ***	(−3.57) ***
Firm control variables	ESG disclosure score (%)	26.60	15.28	34.83	23.96	(−8.23) ***	(−8.68) ***
	Firm age (No.)	22.48	16	31.16	22	(−8.68) ***	(−6.00) ***
	Board size (No.)	11.09	9	11.06	11	(−0.03) ***	(−2.00) ***
	Big4 (No.)	1	1	0.99	1	(0.01) *	(0.00) *

Notes: This table presents the non-parametric tests (*t*-test and Mann–Whitney). The superscript asterisks *, **, and *** denote statistical significance at the 10, 5 and 1% levels, respectively

Table 5.
Differences in
dependent variable
mean and median
between FinTech
and non-FinTech
firms (*n* = 1,672)

Table 6.
Regressions analyses
of environmental,
social and
governance and
performance under
capital asset pricing
model

Variables	Dependent variable: R_{it}^{rf}			
	Model 1	Model 2	Model 3	Model 4
MKT_{it}^{rf}				
Environmental disclosure	0.001 [0.328]	0.000 [0.051]	−0.001 [−0.266]	0.000 [0.041]
Social disclosure score	0.014*** [11.205]			
Governance disclosure score		0.026*** [16.865]	0.048*** [15.184]	
ESG disclosure score				0.033*** [22.460]
Constant	3.139*** [59.962]	2.666*** [51.638]	0.477** [2.573]	2.269*** [41.243]
Observations	1,037	1,460	1,589	1,590
R^2 value	10.49%	18.20%	16.51%	24.69%
VIF	1.00	1.00	1.00	1.00

Notes: This table investigates the explanatory power of Bloomberg ESG disclosure scores and stock return using the CAPM. The table reports the coefficients of ESG components and ESG disclosure score. The econometric model for panel A is $R_{it}^{rf} = \alpha + \beta_1 MKT_{it}^{rf} + \sum_{i=1}^3 ESG_{it} + \varepsilon_{it}$ [equation \(1\)](#), where R_{it}^{rf} is the stock return in excess of risk-free rate; MKT_{it}^{rf} is the return of a value-weighted portfolio of all US (NYSE, AMEX and NASDAQ) listed stocks minus risk-free rate; and the ESG includes the individual components of Environmental, Social and Governance disclosure scores. The econometric model for panel B is $R_{it}^{rf} = \alpha + \beta_1 MKT_{it}^{rf} + \beta_2 ESG_{it} + \varepsilon_{it}$ [equation \(2\)](#), where ESG is a combine Bloomberg ESG disclosure score. Beneath each estimator, the values in the parentheses are t -values; the clustered robust t -statistic are reported at the firm level. The variance inflation factors (VIFs) are well below the tolerance level, and the superscript asterisks *, ** and *** denote statistical significance at the 10, 5 and 1 % levels, respectively

stock returns. Moreover, Model 4 in the same table shows that the ESG disclosure plays a significantly positive role in the stock return. Overall, the findings suggest that investors consider the magnitude of ESG disclosure before investment decisions. The investors also seem to act further and check the ESG disclosure separately before the investment decision.

By using the Fama–French three-factor model, this section investigates the impact of ESG disclosure on performance. Table 7 depicts the impact of environmental, social, governance and ESG disclosure on performance as measured by the Fama–French three-factor model. The result from Models 1 to 4 shows that the relevance for explaining the performance is statistically significant, implying that the market performance is dependent on the ESG disclosure. For instance, the higher the ESG disclosure, the better the performance. The performance is specifically contingent on each ESG disclosure. As a whole, the findings indicate that ESG disclosure significantly helps to soar the firm's performance even after capturing the effect of the firm's size, weight and accounting value, suggesting the necessity of the ESG disclosure for the higher stock return.

By using the Fama–French five factors model, this section analyses the effect of ESG disclosure on performance. The study specifically seeks to determine if the impact of ESG on performance decays with the inclusion of all the five factors in the model (Table 8). Interestingly, the result shows that individual and aggregate score of the ESG persistently shows a positive effect on performance. The present study's findings corroborate with earlier studies which show that ESG explains industry returns in addition to Fama–French factors (Diaz *et al.*, 2021; Zhang *et al.*, 2021). Contrarily, the present study's findings contradict the study of Naffa and Fain (2022), who found weak evidence for ESG as valid new factors in the Fama–French five-factor model. The model's explanatory power was also shown to improve significantly. Overall, the data imply that ESG plays a substantial role in positively describing firm performance even after capturing the effect of the firm's size, weight, strength, accounting value and firm's standing, suggesting the necessity of the ESG disclosure for better performance. This finding implies that the asset-pricing model can evolve further to consider market pertinent factors.

3.4 FinTech versus non-FinTech Environmental (E), Social (S) and Governance (G) and performance

After checking the validity of Bloomberg ESG disclosure scoring, the ESG disclosure of FinTech firms was found to be weaker than non-FinTech firms. Subsequently, the regression analyses of FinTech versus non-FinTech firms stock return shows a lower trend for FinTech firms because of less disclosure of ESG. Other factors in the regression analyses that control the impact of the observable firm-specific features were set in accordance with previous studies and theories. In each tail of the sample distribution, the firm-level variables were winsorised at the 1% level. The *firm age*, the *board size*, *auditor dummy* and *leverage* were controlled because of their significant relationship with firms' performance. Companies naturally become larger and older as they grow and expand. Therefore, corporate performance varies with *firm age* and prior literature suggests that the younger firms (Dickinson, 2011; Tran and Le, 2020). As we have FinTech firms as sub-sample which are younger than non-FinTech firms, we control the effect of the firm's age.

The performance and ESG disclosures will change as per the board size of a firm, as the prior literature suggests that a large board size enhances the performance and strengthen corporate governance (Najaf *et al.*, 2022b). Furthermore, *leverage* was controlled because it helps to improve corporate performance (Jenter *et al.*, 2018). According to the shareholders, having top-ranked audit firms audit the firm is an indication of excellent governance.

Table 7.
Regressions analyses
of environmental,
social and
governance and
performance under
Fama–French three-
factor model

Variables	Dependent variable: R_{rfit}			
	Model 1	Model 2	Model 3	Model 4
<i>MKT_rf</i>	−0.007** [−2.515]	−0.007*** [−2.919]	−0.008*** [−3.342]	−0.007*** [−3.124]
<i>SMB</i>	0.016*** [4.045]	0.013*** [3.764]	0.017*** [4.772]	0.017*** [5.052]
<i>HML</i>	0.0222*** [10.193]	0.024*** [11.971]	0.024*** [11.962]	0.023*** [12.115]
Environmental disclosure	0.014*** [11.791]	0.025*** [17.255]		
Social disclosure score			0.047*** [15.920]	
Governance disclosure score				0.032*** [23.253]
ESG disclosure score			0.713*** [4.077]	2.467*** [44.832]
Constant	3.307*** [60.537]	2.858*** [54.748]		
Observations	1,037	1,460	1,589	1,590
R^2 value	22.77%	28.80%	27.81%	35.08%
VIF	1.47	1.45	1.49	1.49

Notes: This table investigates the explanatory power of Bloomberg ESG disclosure scores and stock return using the Fama–French model. The table reports the coefficients of ESG components and ESG disclosure score. The econometric model for panel A is $R_{rfit} = \alpha + \beta_1 MKT_rf_t + \sum_{j=1}^3 ESG_{jt} + \varepsilon_{it}$ [equation \(3\)](#), where R_{rfit} is the stock return in excess of risk-free rate; MKT_rf_t is return of value-weighted portfolio of all US (NYSE, AMEX and NASDAQ) listed stocks minus risk-free rate; and the ESG includes the individual components of Environmental, Social and Governance disclosure scores. The econometric model for panel B is $R_{rfit} = \alpha + \beta_1 MKT_rf_t + \beta_2 ESG_{it} + \varepsilon_{it}$ [equation \(4\)](#), where ESG is a combine average Bloomberg ESG disclosure score. Beneath each estimator, the values in the parentheses are t -values; the clustered robust t -statistic are reported at the firm level. The variance inflation factors (VIFs) are well below the tolerance level, and the superscript asterisks *, ** and *** denote statistical significance at the 10, 5 and 1% levels, respectively

Table 8.
Regressions analyses
of environmental,
social and
governance and
performance under
Fama–French five-
factor model

Variables	Dependent variable: $R_{rf_{it}}$			
	Model 1	Model 2	Model 3	Model 4
MKT_{rf}	−0.012*** [−4.026]	−0.013*** [−5.607]	−0.014*** [−5.898]	−0.013*** [−5.721]
SMB	0.036*** [7.277]	0.038*** [8.858]	0.041*** [9.097]	0.041*** [9.489]
HML	0.037*** [10.749]	0.042*** [14.292]	0.043*** [13.815]	0.041*** [14.067]
RMW	−0.001 [−0.119]	−0.005 [−1.065]	−0.006 [−1.393]	−0.006 [−1.299]
CMA	−0.046*** [−8.258]	−0.058*** [−11.619]	−0.057*** [−11.091]	−0.055*** [−11.420]
Environmental disclosure	0.014*** [11.959]	0.025*** [17.756]	0.049*** [16.609]	
Social disclosure score				
Governance disclosure score				
ESG disclosure score				
Constant	3.454*** [54.757]	3.040*** [54.292]	0.796*** [4.590]	0.033*** [24.042] 2.623*** [45.703]
Observations	1,037	1,460	1,589	1,590
R^2 value	27.17%	34.26%	32.09%	39.27%
VIF	2.12	2.09	2.10	2.10

Notes: This table investigates the explanatory power of governance characteristics and governance Index using the Fama–French model. This table reports the coefficients of ESG components and combine ESG disclosure score. The econometric model for panel A is $R_{rf_{it}} = \alpha + \beta_1 MKT_{rf_{it}} + sSML_{it} + hBML_{it} + rRMW_{it} + cCMA_{it} + \sum_{j=1}^3 ESG_{ijt} + \varepsilon_{it}$ equation (5), where $R_{rf_{it}}$ is the stock return in excess of risk-free rate; $MKT_{rf_{it}}$ is return of value-weighted portfolio of all US (NYSE, AMEX and NASDAQ) listed stocks minus risk-free rate; SML means small minus big portfolio returns of US market; BML implies high minus low book value stock of US market; RMW is robust minus weak portfolio returns; CMA is conservative minus aggressive portfolio return; and the ESG includes the individual components of Environmental, Social and Governance disclosure scores. The econometric model for panel B is $R_{rf_{it}} = \alpha + \beta_1 MKT_{rf_{it}} + sSML_{it} + hBML_{it} + rRMW_{it} + cCMA_{it} + \beta_2 ESG_{ijt} + \varepsilon_{it}$ equation (6), where ESG is a combine Bloomberg ESG disclosure score. Beneath each estimator, the values in the parentheses are t -values; the clustered robust t -statistic are reported at the firm level. The variance inflation factors (VIFs) are well below the tolerance level, and the superscript asterisks *, **, and *** denote statistical significance at the 10, 5 and 1% levels, respectively

Following the principles, the *auditor dummy* was controlled, as shareholders' perceptions of excellent ESG disclosure will lead to improved performance (HassanOMER *et al.*, 2020).

This section uses a model to determine if FinTech businesses perform better and disclose more ESG information. As a result, the results in Table 9 (Models 1–5) reveal that FinTech firms do not outperform non-FinTech firms in performance or ESG disclosure. Conversely, these data suggest that FinTech firms have smaller negative stock returns, as indicated in Model 1. Contrasting to non-FinTech firms, FinTech firms report less ESG. Hence, FinTech firms are far from achieving positive stock returns and lag considerably behind non-FinTech firms in terms of ESG disclosures. The findings may be rationalised by the fact that FinTech is relatively new and immature, thus incapable of reaping a positive stock return. Moreover, ESG disclosure does not garner attention. Possibly, FinTech may not be affected by negative externalities and is unconcerned with ESG. These findings could be spurious, but the consistency of the results across methodologies and proxy variations eliminates this possibility. According to our findings, a company's sustainability initiatives may enable it to better manage its resources and conduct business while offering a solution to sustainability-related problems.

A sample of US FinTech and non-FinTech firms was used, which necessitated controlling for any unobserved time-variant impact by year dummies (Beck *et al.*, 2013). The industry's membership was controlled. Many elements possibly correlate to business performance may be clustered by industry. Product market concentration (Ali *et al.*, 2014) and the degree of regulation are two of these determinants (Ahmad and Hussain, 2001). Industry membership is proxied via a set of dummies that match Bloomberg classifications. The Global Industrial Classification Standard is used to designate the industry sectors. Data was gathered for both the Global Industrial Classification Standard primary and sub-sectors. For 10 years of data, two dummies from three industries were used (Shin *et al.*, 2018). Furthermore, the yearly dummies were controlled. Financial performance may fluctuate over time because of macroeconomic changes (Dickinson, 2011). For instance, firms may have exceptional losses during recessionary periods, despite improved performance. Table 9 displays the model, whereas Appendix 1 has details and definitions for each variable and reference.

3.5 Self-selection test

According to studies, market performance is most likely endogenous. Hence, considering it as an exogenous variable may skew the results (Bertoli *et al.*, 2022; Richardson *et al.*, 2016; Yiwei *et al.*, 2021). A similar argument might be made for selection bias in FinTech firms. Selection bias occurs when the unobservable attributes of FinTech firms differ systematically from those of non-FinTech firms.

A two-step treatment effect model was estimated to identify if selectivity bias was an issue in the studies (Lennox *et al.*, 2012). In the first phase, a probit regression was predicted to determine the likelihood of choosing a FinTech firm. The Inverse Mills Ratio (IMR) was calculated to be included in the baseline model in the second step [equation (1)]. However, we have excluded firms age from the baseline model as Abdi *et al.* (2022) suggested that firm size and firm age have different moderating effects on ESG disclosures and financial performance. Hence, in the self-section model, if we keep both, then it will create a biased coefficient. We keep firm size for self-selection testing. The selection model (or first-stage model) described below was used. The definitions of the variables are included in the respective tables:

$$ESG_{it} = \alpha + \beta_i Fin_{it} + \sum_{i=1}^{n=4} Controls_{it} + \delta 1 Year_t + \delta 2 Industry_i + \varepsilon_{it} \quad (1)$$

Variables	Stock return Model 1	Environment Model 2	Social Model 3	Governance Model 4	ESG Model 5
<i>Fin</i>	−0.472*** [−6.552]	−12.843*** [−3.634]	−7.320*** [−4.130]	−2.838*** [−3.048]	−8.954*** [−5.498]
<i>Firm age</i>	0.003** [2.539]	0.002 [0.035]	−0.007 [−0.177]	0.020 [0.972]	0.018 [0.463]
<i>Board size</i>	0.112*** [7.545]	2.167*** [3.649]	1.478*** [4.759]	1.201*** [5.571]	2.023*** [5.326]
<i>Big4</i>	0.566*** [2.810]	8.571*** [3.134]	5.139 [1.306]	1.580 [1.149]	5.584** [2.117]
<i>Leverage</i>	0.017*** [2.878]	0.671** [2.448]	0.355*** [2.901]	0.140 [1.040]	0.390*** [2.872]
<i>Constant</i>	−0.315 [−1.453]	−0.463 [−0.064]	0.766 [0.154]	42.232*** [18.851]	0.810 [0.191]
<i>Year Effect</i>	Yes	Yes	Yes	Yes	Yes
<i>Ind. Effect</i>	Yes	Yes	Yes	Yes	Yes
Observations	1,672	1,037	1,460	1,589	1,590
R^2 value	79.17%	15.35%	23.98%	18.93%	26.75%
VIF	1.83	2.20	1.92	1.79	1.72

$$\text{Stock return}_{it} = \alpha + \beta_1 \text{Fin}_{it} + \sum_{i=1}^4 \text{Controls}_{it} + \delta 1 \text{Year}_j + \delta 2 \text{Industry}_j + \varepsilon_{it} \quad (\text{Model 1})$$

$$\text{ESG}_{it} = \alpha + \beta_1 \text{Fin}_{it} + \sum_{i=1}^4 \text{Controls}_{it} + \delta 1 \text{Year}_j + \delta 2 \text{Industry}_j + \varepsilon_{it} \quad (\text{Models 25})$$

Notes: Where ESG_{it} represents various indicators of Environment, Social and Governance disclosure scores of sample firms. We use Stock return = (stock value_{*t*} − stock value_{*t-1*}) − 1 as the proxy for performance; Controls_{it} is the list of firm-level control variables (firm size, board size, firm age, auditor and financial leverage); and ε_{it} is a white-noise error term. Also, we control for the unknown fixed effect of industry_j and year_j . We prefer to cluster on the firm level rather than industry level, as some of the industries in our sample have an uneven number of firms. The definition of all variables is provided in [Appendix 1](#). Asterisks *, ** and *** denote statistical significance at the 10, 5 and 1% levels, respectively

Table 9.
Analysis of
environmental, social
and governance
disclosure scores and
performance because
of the FinTech

$$\begin{aligned} Fin_{it} = & \alpha + \beta_i \textbf{Firmssize}_{it} + \beta_i ESG + \sum_{i=1}^{n=3} Controls_{it} + \delta 1 Year_i + \delta 2 Industry_i \\ & + \delta 3 IMR_{it} + \varepsilon_{it} \end{aligned} \tag{2}$$

The basic model [equation (1)] does not include a variable (firm size) marked as exclusion restrictions (in bold). The first variable, an indicator variable, is the firm size (*i*) in the year (*t*). The researchers argue that because firm size is likely to have compatible interests in organisational and administrative controls and ESG, FinTech firms are more likely to have less or more ESG disclosures. Firm size may be important for explaining FinTech firms' ESG and performance but are not often regarded as common determinants. Three independent tests were conducted to identify the adequacy of exclusion constraints. The first test is running the selection model regression with no exclusion variables (firm size). The second and third tests take into account only one exclusion instrument variable (firm size). All three tests produce IMR findings comparable to those shown in Table 9. The primary test variable values remain statistically identical.

The IMR calculated in equation (1) from the selection model was included. The results of the selection regression [equation (2)] are presented in Column 1 of Table 10. FinTech and firm size have a negative insignificant relationship (-0.311 , $t = -1.309$, $\alpha = 0.10$ and one-tailed).

Columns 2 and 3 in Table 10 show the main regressions without and with the IMR, respectively. After the inclusion of the IMR, the endogenous variable, Fin_{it} , remains significant at the 0.01 level (one-tailed) (Refer to Column 3). The IMR coefficient is significant, implying that the model may struggle with selection bias. Hence, the endogeneity must be controlled. The endogeneity was tested in subsequent Table 11 using the Generalised Methods of Moments (GMM) model.

3.6 Control for endogeneity – (system Generalised Methods of Moments)

The GMM established by Arellano and Bond (1991) and Arellano and Bover (1992) was used in the study to answer the same research issue (1995). As a result, the dynamic system GMM

Variables	Performance indicators		
	Model 1 Fin	Model 2 ESG	Model 3 ESG
ESG	−0.040*** [−11.349]	–	–
Fin	–	−8.954*** [−14.222]	−0.318*** [−7.187]
Firm Size	−0.006*** [−3.157]	–	–
Firm age	–	0.018 [1.224]	−0.151*** [−166.428]
Board size	−0.013 [−0.781]	2.023*** [13.487]	−0.334*** [−43.796]
Big4	0.021 [0.110]	5.584*** [5.782]	0.941*** [12.663]
Leverage	−0.009 [−1.084]	0.390*** [5.897]	−0.229*** [−53.041]
Constant	0.650** [2.288]	0.810 [0.347]	−8.515*** [−55.857]
IMR _{it}	–	–	31.035*** [484.313]
Year Effect	Yes	Yes	Yes
Ind. Effect	Yes	Yes	Yes
Observations	1,628	1,628	1,628
Pseudo R ² /R ² value	13.85%	26.75%	99.77%

Table 10.
Self-selection test

Notes: We prefer to cluster on the firm level rather than industry level, as some of the industries in our sample have an uneven number of firms. The definition of all variables is provided in Appendix 1. Asterisks ***, ** and * denote statistical significance at the 10, 5 and 1 % levels, respectively

Table 11.
Control for
endogeneity (system
generalised methods
of moments)

Variables	Stock return Model 1	Environment Model 2	Social Model 3	Governance Model 4	ESG Model 5
<i>lEnvironment</i>	0.678*** [0.00]	0.902*** [0.05]	0.813*** [0.01]	0.987*** [0.03]	0.907*** [0.04]
<i>lSocial</i>					−2.881* [1.47]
<i>lGovernance</i>					−0.048*** [0.02]
<i>lESG</i>					0.530* [0.31]
<i>lStock value</i>					0.141 [0.66]
<i>Fin</i>	−0.124** [0.05]	−9.103* [4.45]	−2.397* [1.27]	−3.776* [2.10]	−0.076 [0.10]
<i>Firm age</i>	0.001 [0.00]	−0.029 [0.02]	−0.011 [0.01]	−0.023 [0.02]	0.406 [2.50]
<i>Board size</i>	0.018 [0.01]	0.189 [0.17]	1.144*** [0.19]	0.157 [0.19]	Yes
<i>Big4</i>	0.223*** [0.09]	1.726 [25.04]	−0.383 [1.18]	1.922 [1.44]	Yes
<i>Leverage</i>	0.001 [0.00]	−0.127 [0.21]	0.086 [0.10]	−0.065 [0.09]	Yes
<i>Constant</i>	0.861*** [0.12]	2.483 [24.87]	−6.414*** [2.20]	−1.040 [2.61]	Yes
<i>Year Effect</i>	Yes	Yes	Yes	Yes	Yes
<i>Ind. Effect</i>	Yes	Yes	Yes	Yes	Yes
Observations	1,472	879	1,261	938	1,389
Wald χ^2	(28,029.79)***	(1,388.82)***	(6,819.72)***	(2,090.46)***	(10,844.96)***
Number of Instruments	161	57	81	93	49
Number of Groups	184	140	182	143	184
Arellano–Bond: AR(1)	0.000	0.000	0.000	0.000	0.000
Arellano–Bond: AR(2)	0.323	0.187	0.484	0.698	0.568
Sargan test (<i>p</i> -value)	0.000	0.081	0.074	0.032	0.001

$$ESG_{it} = \alpha + \beta_1 lESG_{it-1} + \beta_2 Fin_{it} + \sum_{i=1}^4 Controls_{it} + \delta_1 Year_i + \delta_2 Industry_i + \varepsilon_{it} \quad (\text{Models 1-4})$$

$$Stock\ return_{it} = \alpha + \beta_1 lStock\ return_{it-1} + \beta_2 Fin_{it} + \sum_{i=1}^4 Controls_{it} + \delta_1 Year_i + \delta_2 Industry_i + \varepsilon_{it} \quad (\text{Model 5})$$

Notes: Where ESG_{it} represents various indicators of Environment, Social and Governance disclosure scores of sample firms. We use Stock return = (stock value_{*t*}/stock value_{*t-1*}) − 1 as the proxy for performance; $Controls_{it}$ is the list of firm-level control variables (firm size, board size, firm age, big4 and leverage); and ε_{it} is a white-noise error term. Also, we control for the unknown fixed effect of *industry*_{*i*} and *year*_{*i*}. We prefer to cluster on the firm level rather than industry level, as some of the industries in our sample have uneven number of firms. The definition of all variables is provided in [Appendix 1](#). Asterisks *, ** and *** denote statistical significance at the 10, 5 and 1% levels, respectively

model in [equation \(2\)](#) was evaluated by integrating the lag dependent variable in the model, which may solve endogeneity concerns while also providing highly reliable parameter estimates. In general, the GMM can solve the endogeneity problem. In multivariate analysis, the endogeneity of numerous right-hand side variables poses problems. To address endogeneity, the two-step system GMM model developed by [Blundell and Bond \(1998\)](#) was used.

[Table 11](#) shows the results (Models 1–5), which are constant with the baseline estimates. Furthermore, the diagnostic tests demonstrate the absence of autocorrelation and the rationale of the instrumental variables. Ultimately, the analysis concludes that stock returns for FinTech firms are lower than for non-FinTech firms. Additionally, even for individual components, FinTech firms exhibit an inverse sign with ESG disclosure, indicating that FinTech firms do not outperform non-FinTech firms concerning ESG disclosure. The findings can be rationalised by the fact that it is likely no extra incentive for FinTech firms to engage in ESG activities, or the FinTech firms are not particularly driven or interested in ESG disclosure.

3.7 Robustness test and discussion

The second hypothesis implies that the FinTech firms disclose less about the ESG information, which exacerbates market performance. For the robustness test, the interaction term between the ESG and FinTech firms was used to view its marginal effect on the market performance. The economic model is exhibited in [Table 12](#).

Until now, the findings show that the FinTech firms disclose less ESG information, which results in worsening the market performance. By controlling for firm-level variables, [Table 12](#) indicates that the Fin*ESG has a significant and negative impact on the market performance. The finding implies that the ESG of the firms pertaining to the FinTech group

Variables	Performance indicators		
	Model 1 With control and fixed effect	Model 2 Without fixed effect	Model 3 Without control and fixed effect
Fin	−0.724*** [−4.175]	−0.725*** [−4.181]	−0.897*** [−8.097]
ESG	0.024*** [9.909]	0.024*** [9.907]	0.027*** [17.257]
Fin*ESG	−0.026*** [2.640]	−0.022*** [2.644]	−0.032*** [6.391]
Firm age	0.001 [0.597]	0.001 [0.625]	
Board size	0.077*** [6.620]	0.078*** [6.601]	
Big4	0.278** [1.975]	0.278* [1.950]	
Leverage	0.004 [0.839]	0.004 [0.849]	
Constant	1.458*** [8.637]	1.464*** [8.612]	2.505*** [46.927]
Year Effect	Yes	No	No
Ind. Effect	Yes	No	No
Observations	1,590	1,590	1,590
R ² value	31.97%	31.96%	27.87%
VIF	2.12	2.25	3.66

$$Stock\ return_{it} = \alpha + \beta_1 Fin_{it} + \beta_2 ESG_{it} + \beta_3 Fin * ESG_{it} + \sum_{i=1}^4 Controls_{it} + \delta_1 Year_j + \delta_2 Industry_i + \varepsilon_{it}$$

(Model 6)

Table 12.

Robustness test

Note: Asterisks *, ** and *** denote statistical significance at the 10, 5 and 1% levels, respectively

is adversely affecting the market performance. Hence, the shareholders are sensitive to the amount of ESG disclosures. The findings corroborate with prior findings and support the second hypothesis.

4. Conclusion

The impact of ESG on firms' performance has been a subject of extensive research and policy considerations in recent years. Nevertheless, few studies investigated the financial performance of FinTech firms and their financial reporting transparency practices regarding ESG disclosure. The present study adds to the understanding of how FinTech firms experience stock performance with variations in ESG performance by using a panel of 1,672 company-year data from 2010 to 2019. In predicting the model, the GMM is used in addition to the ordinary least squares to account for heterogeneity and endogeneity issues. This study explored the effect of ESG on the performance of FinTech and non-FinTech firms, as ESG disclosures have become a significant issue among investors before making investment decisions. Furthermore, the study explored how far technology-based financial institutions are gaining or losing performance because of ESG disclosures. The findings indicate a negative relationship between ESG disclosure and FinTech firms' stock performance. The findings also revealed that non-FinTech firms are overreaching FinTech firms in attaining performance out of ESG disclosure. Moreover, the findings are comparable across model and method variations. The findings are compatible with the hypotheses that support the theories.

The study's findings have important implications. First, ESG disclosures are progressively being viewed from the sustainability model's viewpoint. Thus, it should be prioritised to facilitate a high and sustainable financial system. Second, parallel reasoning and discourse are required to explain why FinTech firms fail to capitalise on ESG. Third, the study's findings should encourage FinTech firms' managers to adopt a mechanism that includes ESG as an integral part of their management system. Fourth, regulators and policymakers should consider the quality of ESG disclosure, which is frequently cited as the cause of the objective variance. Fifth, the FinTech firms are still younger than non-FinTech firms in operations. Investors can only establish trust in FinTech firms after reading their environmental disclosures. The FinTech firms' managers should anticipate the negative effect of ESG effect on stock performance and make an effort to disclose more ESG information. Finally, potential investors have more information to consider regarding ESG before making an investment decision. The key message of this study is that ESG plays a significant role in clarifying the returns of FinTech firms. Therefore, ESG should not be ignored while making investment decisions.

Future research can explore the explanatory power of ESG on performance across the sectors in an economy. Researchers can also explore this issue by taking into consideration a global sample to document if the findings are market variant, as all jurisdictions are not on the same wavelength for ESG initiatives.

Notes

1. <https://assets.kpmg/content/dam/kpmg/xx/pdf/2022/02/pulse-of-fintech-h2-21.pdf>
2. www.strattoncraig.com/insight/the-fintech-factor-why-financial-technology-firms-should-care-about-esg-reporting/

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Table A1.
Variables' summary

Focused independent variables		
Variable	Definition	Relevant studies
Fin	This is a dichotomous variable where “1” indicates FinTech firms and “0” indicates counterparts’ firms	Najaf et al. (2021b)
<i>Firm-level control variables</i>		
Firm age	Numeric variable indicating the age of the business as determined by the logarithm of the business’s age since incorporation	Dickinson (2011)
Board size	Total number of board members of a firm (i) in the year (t)	Jenter et al. (2018)
Leverage	Total Debt/ Total Assets	Faccio et al. (2011)
Big4	Dummy variable equal to 1 if the company is audited by “Big 4” audit firm otherwise “0”	HassanOMER et al. (2020)
Firm size	Numeric variable representing the size of the firm as measured by the logarithm of total assets	Tran and Le (2020)
<i>Fixed effect controls</i>		
Year	1 (0) for observations from year <i>t</i> and 0 for other observations	Dickinson (2011)
Industry	1 (0) if during year <i>t</i> , company <i>i</i> operating in industry <i>j</i> and 0 otherwise	Ali et al. (2014)

Serial no.	Bloomberg ticker	Name
1	ACIW US Equity	ACI WORLDWIDE INC
2	ADS US Equity	ALLIANCE DATA SYSTEMS CORP
3	AXP US Equity	AMERICAN EXPRESS CO
4	AX US Equity	AXOS FINANCIAL INC
5	BKI US Equity	BLACK KNIGHT INC
6	EPAY US Equity	BOTTOMLINE TECHNOLOGIES (DE)
7	BR US Equity	BROADRIDGE FINANCIAL SOLUTIO
8	CATM US Equity	CARDTRONICS PLC - A
9	CBOE US Equity	CBOE GLOBAL MARKETS INC
10	CME US Equity	CME GROUP INC
11	CLGX US Equity	CORELOGIC INC
12	CSGP US Equity	COSTAR GROUP INC
13	ENV US Equity	ENVESTNET INC
14	EFX US Equity	EQUIFAX INC
15	EEFT US Equity	EURONET WORLDWIDE INC
16	EVTC US Equity	EVERTEC INC
17	FDS US Equity	FACTSET RESEARCH SYSTEMS INC
18	FICO US Equity	FAIR ISAAC CORP
19	FIS US Equity	FIDELITY NATIONAL INFO SERV
20	FISV US Equity	FISERV INC
21	FLT US Equity	FLEETCOR TECHNOLOGIES INC
22	GPN US Equity	GLOBAL PAYMENTS INC
23	GDOT US Equity	GREEN DOT CORP-CLASS A
24	GSKY US Equity	GREENSKY INC-CLASS A
25	INFO US Equity	IHS MARKIT LTD
26	ICE US Equity	INTERCONTINENTAL EXCHANGE IN
27	JKHY US Equity	JACK HENRY and ASSOCIATES INC
28	LC US Equity	LENDINGCLUB CORP
29	MKTX US Equity	MARKETAXESS HOLDINGS INC
30	MA US Equity	MASTERCARD INC - A
31	CASH US Equity	META FINANCIAL GROUP INC
32	MCO US Equity	MOODY'S CORP
33	MSCI US Equity	MSCI INC
34	NDAQ US Equity	NASDAQ INC
35	PYPL US Equity	PAYPAL HOLDINGS INC
36	RP US Equity	REALPAGE INC
37	SPGI US Equity	S&P GLOBAL INC
38	SEIC US Equity	SEI INVESTMENTS COMPANY
39	SQ US Equity	SQUARE INC - A
40	SSNC US Equity	SS&C TECHNOLOGIES HOLDINGS
41	TRI US Equity	THOMSON REUTERS CORP
42	TRU US Equity	TRANSUNION
43	VRSK US Equity	VERISK ANALYTICS INC
44	VIRT US Equity	VIRTU FINANCIAL INC-CLASS A
45	V US Equity	VISA INC-CLASS A SHARES
46	WU US Equity	WESTERN UNION CO
47	WEX US Equity	WEX INC
48	WETF US Equity	WISDOMTREE INVESTMENTS INC

Table A2.
List of FinTech firms