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The relationship between environmental, social and governance pillars and financial performance in the era of financial technology and Covid-19. The case of the banking industry.

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ABSTRACT 1

1. INTRODUCTION 2

2. BACKGROUND AND HYPOTHESES DEVELOPMENT 5

 2.1 THE RELATIONSHIP BETWEEN ESG AND FINANCIAL PERFORMANCE 5

 2.2 THE ROLE OF FINTECH FIRMS IN THE RELATIONSHIP BETWEEN ESG AND FINANCIAL PERFORMANCE 10

 2.3 THE ROLE OF THE PANDEMIC IN THE RELATIONSHIP BETWEEN ESG AND FINANCIAL PERFORMANCE 13

3. METHODOLOGY 14

 3.1 THE SAMPLE 14

 3.2 DESCRIPTION OF THE VARIABLES 15

 3.3 MODEL SPECIFICATION 20

4. RESULTS AND DISCUSSIONS 21

 4.1 THE DIRECT RELATIONSHIP BETWEEN ESG AND FINANCIAL PERFORMANCE 22

 4.2 THE FINTECH MODERATING EFFECT ON ESG AND FINANCIAL PERFORMANCE 25

 4.3 THE PANDEMIC MODERATING EFFECT ON ESG AND FINANCIAL PERFORMANCE 29

5. CONCLUSIONS 33

REFERENCES 34

Abstract

We analyse the relationship between environmental, social and governance (ESG) pillars of sustainability and financial performance (FP) in the banking industry through evaluating profitability and market value. The indicator for profitability is return on assets (ROA) and for market value is Tobin's Q. Furthermore, we examine two moderating effects to analyse (i) if the financial technology (Fintech) firms outperform traditional banks by participating in ESG activities, and (ii) the change of these relationships before and after the Covid-19 outbreak. The sample contains 697 firms, which includes banking and investment banking services in EU, US and Asia, and Fintech firms identified from the KBW and Nasdaq Fintech (KFTX) Indices and NASDAQ Insurance Index (IXIS) over a 4-year period (2017-2020). The analysis was performed using feasible generalised least square (FGLS). Our results show that depending on the measure of ESG pillar, a positive relationship between ESG performance and FP. Specifically, social scores have positive impact on the profitability whilst environmental scores have positive impact on the market value. Moreover, we find that the positive relationship between ESG and FP is stronger in Fintech firms. Similarly, the pandemic enhanced the positive influence of environmental scores on market value. However, the influence of social scores on market value turns into negative after pandemic. We also find that by involving in ESG activities Fintech firms can increase more market value than traditional banks, although this method may negatively affect their profitability after pandemic. We contribute to the sustainability literature in the financial industry. For academic implication, it is necessary to evaluate sustainability by three pillars rather than as a single construct unifying the three different pillars; for investor and practitioners, ESG is relevant to be consider as the non-financial indicators to assess the FP. In the future, we hope researchers could improve the limitation of the availability of post-pandemic data in this study.

Keywords: Environmental, social and governance; Financial performance; Fintech; Pandemic

JEL Classification: G32-value of firms, O33- Technological Change: Choices and Consequences, Q56-sustainability

1. Introduction

With the development of industry, sustainability concept has emerged in the society. People start thinking about the influence of pollution in our environment. Many companies are trying to change their operating strategies to contribute sustainable issue in order to create an eco-image to consumers (Nidumolu et al., 2009); nevertheless, different ideas about the relationship between sustainable performance and financial performance (FP) have appeared among scholars (Hamilton, 1995; Poter, 1991). From the perspective of traditional view, Hamilton (1995) claimed that additional cost will be imposed when firms involve in sustainability; however, Poter (1991), from the revisionist point of view, argued that sustainability activities will augment FP and social welfare and further establish a win-win situation. The investment of sustainability will not only have results in positive accounting performance but also contribute to investment returns through showing a beneficial signal to financial market (Flammer, 2015; Wang & Tuttle, 2014).

In the financial industry, an obvious trend of the inclusion of the consideration of Environmental, Social and Governance (ESG) into the discussion of corporate social responsibilities (CSR) has emerged in the recent years (Weston & Nnadi, 2021). In addition, several relevant studies have used CSR and ESG as representative of the measure of sustainability (Abdi et al., 2020; Ionescu et al., 2019; López-Toro et al., 2021). As Tóth et al., (2021) said that there are ambitious tendencies in society promoting the sustainable activities in the economy; although these ideas are named differently, they have the same direction to move forward. Furthermore, ESG can be considered into the derivative of CSR so that these two terms are interchangeable using in some studies (Abdi et al., 2020; Li et al., 2021). Hence, in this paper CSR and ESG are also interchangeable, and we will use ESG as the representative of i) the extensive CSR, ii) the concept of sustainability, and iii) as quantitative indicators of CSR.

CSR issues have gotten an important position in society and CSR performance evaluation has been paying attention by investors, companies and academic scholars over time (Friede et al., 2015). Specially, companies are craving to know if they could improve their FP by participating in CSR practices. Many

researchers have been dedicated into the study regarding to the relationship between CSR and FP such as the study of McWilliams and Siegel (2000), which indicated a positive influence of CSR activity on business profitability; however, some results from other studies are inconclusive, ambiguous and even contradictory (Cárcel-Carrasco et al., 2022; Friede et al., 2015).

Since the emphasis of Sustainable Development Goals (SDGs) in the 2030 agenda from United Nations (UN) (2015), the interrelationship between CSR and the association of corporate managerial strategy with the sustainability are grabbing attention of firm managers. The topic of how enterprises and banks participate social and environmental issues into their operational activities and also ensure the value of stakeholders is widely discussed. Especially, people start questioning the contribution of sustainable development in banking industry because the daily financial activities have consumed a huge amount of natural resources such as paper and electricity for transactions (Y. Liu et al., 2021).

Meanwhile, the structure of financial industry is changing fundamentally due to the development of technology, which brings us a new era of the merge of technology and finance; consequently, a new term “Fintech” has emerged. Fintech is a technological innovation in financial sector that results in new business models, applications, processes or products with an associated considerable effect on financial market and institutions and the provision of financial services (Financial Stability Board, 2021). According to the report from Accenture (2020), the global investment of first half of 2020 in Fintech venture rose 3.8% to US\$23.1 billion from the US\$22.3 billion risen in the first half of 2019, which indicates that Fintech related investment now is desirable to many investors. Nevertheless, the impact of Fintech on traditional banking industry start being analysed by practitioner, investors and scholars (Lee & Shin, 2018; Palmié et al., 2019). Whether the Fintech firms are able to outperform the traditional banks in terms of FP by leveraging sustainability becomes the major concerns of investors.

Another unforgotten event during years is the Covid-19 of year 2020, which is making turbulences in the economy. With the outbreak of the pandemic, the government from every country decided to lockdown by forbidding any cross-border activities or forcing citizens to stay only at home, which has brought the halt of economic activities and irreversible impact to economy. Undoubtedly, investors

perceived that banking sector will be the one who suffer the most during pandemic. As Simoens et al., (2022) mentioned in their study that the most-hit bank experienced 27 percentage point lower stock return than the least-hit bank, which could evidence that pandemic did decline the FP of banks.

From a perspective of resource-based view (RBV), a firm utilizes tangible and intangible resources to maximize shareholder's value, which can strengthen the relationships between firm and stakeholders in order to obtain resources to enhance their financial performance (Cárcel-Carrasco et al., 2022; Y. Liu et al., 2021). Intangible resources are scarce, non-substitutable, valuable and imitable in comparison to tangible resources, thus intangible resources are the primary resource to pursue sustained competitive advantage (Barney et al., 2001; Y. Liu et al., 2021). Consequently, the investment of CSR is beneficial to build a sustainable image for companies, which brings a good reputation and attracts investors. Furthermore, RBV supports the concept of the transformation of resources into desirable outputs where capabilities are necessary to the creation of a competitive advantage, which draws that the investment of CSR is an essential resource of creating and maintaining competitive advantage (McWilliams & Siegel, 2000; Russo & Fouts, 1997).

Thus, building on the RBV theory and the ESG literature related to FP, in this article we are going to address the following research questions:

- (1) Does a positive relationship exist between the ESG scores and FP in the banking industry?
- (2) Do Fintech firms outperform traditional banks in terms of profitability and market value by participating ESG?
- (3) Has the pandemic affected the way in which ESG is related to FP?

This study contributes to the earlier literature of ESG in the context of the banking industry and Fintech, the understanding of financial industry's sustainability and fill the gap that there are few studies analysing ESG issue in the banking industry by considering the impact of Fintech and pandemic, which not only explores the new path for academic researchers but also helps investors, banking managers and Fintech firms to make decisions efficiently. The contents are organized as follows. Section 2 demonstrates some backgrounds and the literature that develops the research hypotheses. Section 3

explains the methodology such as the data, sample and model that applied in this study. Section 4 reports the main results and the discussion of the results. Finally, section 5 offers a brief conclusion with the implications for partitioner and academic researchers.

2. Background and hypotheses development

2.1 The relationship between ESG and financial performance

Since the report from the world Commission on Environment and Development advocated the sustainable development concept in 1987, the awareness of sustainability has emerged among companies (Weston & Nnadi, 2021). Furthermore, the United Nations (UN) (2015) has emphasized the crucial interrelationship between CSR and sustainable development in the 2030 agenda and the alignment of corporate managerial strategy with the Sustainable Development Goals (SDGs). As Li et al. (2021) mentioned that ESG framework system illustrates the ESG principle which involves environmental (E), social (S) and governance (G) factors according to the report from European Bank Authority (EBA) (see Table 1). Based on this ESG framework, companies can evaluate their ESG practices efforts in a systematic way. Furthermore, the report from the Bank of America written by Merrill Lynch (2018) evidenced that during January 2007 to August 2019 the US and western European companies who follow the principle of sustainable development have increased their capitalisation-to-earnings ratio more than 20 % in comparison to those who did not.

Table 1.
ESG framework (International frameworks)

Dimension	Factors	Definition
Environmental (E)	⑩ GHG emissions	Environmental matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign, or individual.
	⑩ Energy consumption and efficiency	
	⑩ Air pollutants	
	⑩ Water usage and recycling	
	⑩ Waste production and management (water, solid, hazardous)	
	⑩ Impact and dependence on biodiversity	
	⑩ Impact and dependence on ecosystems	
	⑩ Innovation in environmentally friendly products and services	

Social (S)	⑩	Workforce freedom of association	Social matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign, or individual.
	⑩	Child labour	
	⑩	Forced and compulsory labour	
	⑩	Workplace health and safety	
	⑩	Customer health and safety	
	⑩	Discrimination, diversity, and equal	
	⑩	Opportunity	
	⑩	Poverty and community impact	
	⑩	Supply chain management	
	⑩	Training and education	
	⑩	Customer privacy	
Governance (G)	⑩	Community impacts	Governance matters that may have a positive or negative impact on the financial performance or solvency of an entity, sovereign, or individual.
	⑩	Codes of conduct and business principles	
	⑩	Accountability	
	⑩	Transparency and disclosure	
	⑩	Executive pay	
	⑩	Board diversity and structure	
	⑩	Bribery and corruption	
	⑩	Stakeholder engagement	
⑩	Shareholder rights		

Source: Li et al. (2021).

In addition, Friede et al. (2015) analysed the articles related to the relationship between ESG criteria and corporate FP, finally extracted the findings of around 2200 studies and concluded that the percentage of finding the nonnegative results is around 90% and there are a considerable amount of studies showing the positive results as well. However, we can notice that every study analysed the relationship between the ESG criteria and corporate FP by focusing on different industries. Abdi et al., (2020) took 27 airlines worldwide from the Thomson Reuters Eikon database during 2013 to 2019 as sample, and concluded that environmental score and governance score are positively related to FP and market value; however, social score is negatively related to FP and market value. Conca et al., (2021), they used 57 European-listed companies (EU28) in the agri-food sector as sample during year 2010 to 2018 period, and revealed a positive relationship between profitability and environmental and social information disclosure, while governmental information disclosure and market value are negatively related. In the study of López-Toro et al., (2021), they took 25 international companies from Nasdaq US Smart Pharmaceuticals Index (NQSSPH) as sample for year 2018 to 2019, and evidenced that the sustainability, which is measured by ESG indicators, is positively related to FP and market value. For Daszyńska-żygadło et al., (2021),

their results using the sample of 2693 and 931 observations in the group of banking services (BS) and investment banking & investment services (IB&IS) from Refinitiv database for year 2009 to 2016 showed that environmental and social performance have negative impact on corporate FP (both market value and profitability) in the banking industry, while governance performance has partially positive impact on corporate FP (only market value). Based on these literature review, we can notice that there are various effects of individual ESG criteria on FP or market value due to the characteristic of different sectors (see Table 2).

Table2.

Empirical Review of Studies that Analyse the Relationship between ESG and Financial Performance

Sector	Authors	Sample	Dependent					
			Variables	Descriptive	E	S	G	ESG
Air Transport Industry	Abdi et al., (2020)	27 airlines worldwide for year 2009-2016 from the Thomson Reuters Eikon database	Book to market ratio	MV	+	-	+	na
			Tobin's Q	FP	+	-	+	na
Agri-food sector	Conca et al., (2021)	57 European-listed companies (EU28) in the agri-food sector for year 2010–2018. Financial data are obtained from the Amadeus database, ESG data from Bloomberg.	ROA	Profit.	+	+		+
			PM	Profit margin	+			
		Tobin's Q	MV				-	

Multinational pharmaceutical companies	López-Toro et al., (2021)	25 international companies from Nasdaq US Smart	ROA	FP					+	
		Pharmaceuticals Index (NQSSPH) for year 2018-2019 from Thomson Reuters database	Tobin's Q	MV						+
		2693 and 931 observations in the group of BS and IB&IS for year 2009-2016 from Refinitiv database	Tobin's Q (BS)	MV		-		+		na
		73 companies listed on Dow Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	ROA (BS)	Profit.		-				na
Banking industry	Daszyńska-żygadło et al., (2021)	the group of BS and IB&IS for year 2009-2016 from Refinitiv database	Tobin'Q (IB&IS)	MV				+	na	
		73 companies listed on Dow Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	ROA (IB&IS)	Profit.		-			na	
		73 companies listed on Dow Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	Tobin's Q (Global)	MV		-	-	+		na
Tourism industry	Ionescu et al., (2019)	Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	Tobin's Q (EU)	MV		+	-	-	na	
		Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	Tobin's Q (Asia)	MV		+	-	-	na	
		Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	Tobin's Q (US)	MV						na
		Jones Sustainability Indices (DJSI) during 2010-2015 period from RobecoSAM database	Tobin's Q (US)	MV		-	-	+		na

Signal: “+” means positive relationship, “-” means negative relationship, blank means non significant, “na” means did not use combined ESG. MV means market value, FP means financial performance, Profit. means profitability. Source: Own elaboration.

From the perspective of investors, there is a growth trend of the consideration of ESG into financial field. For example, according to the information from Chartered Financial Analyst (CFA) institute (2022), they have been driving the consideration of ESG in financial analysis, which means that ESG can be a key non-financial indicator to evaluate the FP of firms. Flammer (2013) in her empirical study evidenced

that companies' sustainable efforts could have positive effect to their FP, such as the increasement of stock prices. Furthermore, Giese et al., (2019) tested the ESG impact with 1600 stocks from ESG Universal Index for the January 2007 to May 2017 time period, and they revealed that high ESG scores resulted in lower cost of capital, higher valuation and lower exposures to tail risk. Khan (2019) proofed that under his new-defined ESG metrics, ESG can potentially predict stock return in a certain level. Yadav et al., (2016) took 394 large US firms from 2012 green ranking list to conduct an empirical study and their result showed that investors are taking into consideration of firms' environmental performance which leaded to a positive abnormal stock return of firm. In addition to assessing FP, CFA institute (2022) expressed that more and more investors tend to make investment decision by evaluating the ESG data because the investors can gain the deeper understanding about companies through this way. Similarly, Weston and Nnadi (2021) explained that companies who incorporate ESG issue could bring long-term value and meaningful impact to investors rather than merely the financial return. Due to these beneficial effects, companies are increasingly making disclosure of ESG efforts in their annual report even that ESG metrics are not mandatory in financial reporting (Khan, 2019). We can see from the literature mentioned above that investors are paying attention to ESG evaluation of a company and consequently change their behaviours, which eventually impacts the FP of the firms.

When we look at the whole economy, the banking industry has been showing its importance and augmenting influence on societies in recent years. Banks not only play an indispensable role in economic development by facilitating cash flow between lenders and borrowers and satisfying the financing demands of companies and governments, but also reshape economy direction and growth due to its large asset size and the diversified investment across countries, sectors and assets classes (Daszyńska-żygadlo et al., 2021). However, the influence of rising sustainable awareness and the promotion of Sustainable Development Goals (SDGs) by United Nations (UN) start forcing banks to make some contributions toward developing a more sustainable economy; meanwhile, new managerial strategies related to sustainability has initiated to consider to applying in the banking industry (Cuesta-González M et al., 2006). As Mejia-Escobar et al., (2020) mentioned that ESG has been seen as a paradigm to implement

as a strategy in order to contribute to not only achieving SDGs but gaining more competitiveness due to differentiation. According to the sustainable finance progress report from United Nations (2019), banks participate in sustainability practices, as well as the concept of sustainable banks, will be helpful to offer the cash flows between US\$ 5 trillion and US\$ 7 trillion in order to reach the required investment of reaching SDGs by 2030. Banking industry could be considered as the application of the industry of widest idea of sustainable finance and demonstrates the opportunities to develop sustainable business models (Mejia-Escobar et al., 2020). However, banking sustainable activities have been paid little attention from sustainable finance scholar although banks are playing a vital role in promoting a transition towards a more sustainable economy (Urban & Wójcik, 2019).

There are evidences that CSR activities could enhance banks' reputation, which may bring a positive influence on their operation (Tóth et al., 2021). The study of Raihan et al., (2015) also revealed that the increase of the banks' expenditure on CSR activities will lead to a higher productivity. Additionally, Daszyńska-żygadło et al., (2021) mentioned that it is beneficial for banks to implement CSR practices in an intensively competitive environment; as the results, banks not only become more trustable in the society due to the decline of operational risk, but also increase their FP via sustainable performance. Clearly, we can consider the investment in ESG as the intangible assets, which are powerful resources that generate more intangible asset such as reputation and trust, and further transform these assets into competitive advantages in order to increase FP. Thus, hypothesis 1 is developed as follow:

H1. ESG scores positively influence FP.

2.2 The role of Fintech firms in the relationship between ESG and financial performance

When we talk about the ESG, the society usually focus primarily on the firms that related to the industrial and mining industries, because these industries consume more coal energy and release more CO2 emission than other industries. However, we can see some evidence that ESG are showing the importance in the information technology (IT) companies gradually. Egorova et al., (2021) analysed the

impact of ESG factors on the FP of IT firms and they concluded that IT firms tend to have weaker environmental (E) and social (S) scores than other industries whilst governance (G) scores are on the average; furthermore, they implied that the position of ESG rating could lead a direction for the operating development of IT firms, which means that IT firms can increase their market value by gaining higher ESG scores.

With the development of internet and IT firms in financial sector, a new industry Fintech has shown in our economy. By the development of internet and the progress of smartphone, the financial revolution is inevitable. Despite the growth of technology application into financial sectors may lead to the situations that our current financial regulations are not capable to protect the right of everyone, it is hard to deny that many Fintech applications have emerged and penetrated our daily lives such as the use of credit cards, online payment, mobile wallet and so on (Merello et al., 2022).

Liu et al., (2020) analysed 629 Fintech business model papers in Web of Science database and revealed that the publication quantity of Fintech has increased 28-fold from only 7 publication in 2007; additionally, they found that with the demand of providing new profit, increase efficiency and meet consumers' requirements, considerable innovative Fintech business models emerge after the financial crisis in 2008. As Lee and Shin (2018) mentioned, Fintech not only lowers the cost of financial industry but also improves the quality of financial services, which would construct a more diverse and stable financial landscape. Eventually, Fintech will bring huge impact to society because financial industry is vital to our economic system. From the perspective of RBV, value proposition refers to products, services and platforms that can increase the satisfaction of customers or solve their problems in order to provide new value attribute to customers (Reyes-Mercado, 2021). We can observe that Fintech firms are able to bring more value propositions to consumers than traditional banks due to their sustainability-orient, which makes them to gain competitive advantage and the possibility to outperform traditional banks.

The main characteristic of Fintech is that it merges technology into finance in a sense of lowering the waste, for example, some communications and data processing via Fintech can improve the

efficiency of financial services (Deng et al., 2019). In the social development aspect, Fintech impacts on social development significantly due to its ability to establish a non-discriminatory society (Haddad & Hornuf, 2019). In the environmental and ecological development, Deng et al., (2019) mentioned that Fintech encourages environmental infrastructure and renewable energetic construction, helps to generate funds for energy and environment projects, and offers cheaper and adequate financing so that promotes the environmental and ecological development. We can see the evidence of the influence of sustainability on FP of Fintech firms from the study of Merello et al., (2022), which revealed that the firm values of Fintech companies are positively affected by their sustainability profile such as CSR report issued and the position in the CSR ranking.

In addition, Lee and Shin (2018) have identified five main sectors participating in Fintech ecosystem: (i) Fintech startups; (ii) Technology developers; (iii) Government (financial regulators); (iv) Financial customers; (iv) Traditional financial institutions. They conclude that the interactions between these elements make contributions to innovation, stimulate economy, boost up collaboration and competition in financial sector. In these five elements, Fintech startups are the most influential player in this Fintech ecosystem due to the disruptive innovation they bring. Under the perspective of disruptive innovation, Palmié et al. (2019) explain the three stages of the evolution in Fintech ecosystem, which are prominent industry maturity showed by the cooperation between Fintech and incumbents, the symbiosis stage by introducing cryptocurrency and blockchain, and industry resilience demonstrated by replacing the incumbents with highly prominent role of new entrants. On one hand, Fintech reshape economy, initiate more new business models and create job opportunities by bring the disruptive innovation; on the other hand, it brings fundamental impact on the basis of banking industry and disturbances the stability of financial sector. Therefore, it brings us to start thinking whether Fintech companies are capable to outperform the traditional banks in terms of applying ESG practices to leverage FP. To say from the RBV, if Fintech firms, which have an exist technology resource, can further use ESG strategy as another intangible assets to transform their sustainability characteristic into

capabilities to create competitive advantage. Based on the literature review above, we construct hypothesis 2 as follow:

H2. Fintech positively moderates the relationship between ESG scores and FP.

2.3 The role of the Pandemic in the relationship between ESG and financial performance

Covid-19 grabbed world's attention in January 2020. On 11 March of 2020, the Covid-19 outbreak was declared as a global pandemic by the world Health Organization (WHO) officially. This pandemic impacts to over 170 countries, and it not only affects our physical health but the whole economy. Additionally, the short-term global economic activities are significantly limited due to the restriction of quarantine policy in many countries. As for the long-term consequence, this pandemic could increase the unemployment in society and bankruptcy of companies. Besides, financial market has been affected dramatically. For example, the market reaction in the US stock market, in March 2020, the circuit breaker mechanism was triggered four times in ten days. The stock markets in EU and Asia have plunged as well following the US crash. The main index in UK, FTSE, experienced the decline of 10 % on 12 March 2020, which was the worst reduction since 1987. Similarly, the stock market in Japan was in the highest position in December 2019 and then it plummeted more than 20% during the outbreak of pandemic. In order to ease the impact of pandemic, not only Federal Reserve (FED) a zero-interest policy and quantitative easing program (QE) but also investors have adjusted their investment strategies (Budiarso et al., 2020; Zhang et al., 2020).

Several studies have supported that sustainable-oriented firms can better cope with downside risk and be more resilient during the turbulent period. The industry equilibrium model of Albuquerque et al., (2019) presents that by engaging in CSR, firms can differentiate their product, lower the systematic risk, and ultimately enhance the firm value. Similarly, Hoepner et al., (2018) evidenced that the successful ESG engagements is beneficial to mitigate the company's exposure to the downside risk. Furthermore, investors may value more the ESG performance of firms and interpret it as a risk mitigation and future return indicators, especially, after the Covid-19 outbreak (Broadstock et al., 2021). The empirical results

of Broadstock et al., (2021) not only revealed that higher ESG portfolios outperform lower ESG portfolio in the normal period, but also evidenced that ESG performance of firms helps to alleviate financial risk when the financial crisis happened, which is in line with RBV that effective and effective resources are the elements of business which helps firms to overcome the difficult conditions (Kristinae et al., 2020). Thus, we posit hypotheses 3 as follow:

H3. Pandemic positively moderates the relationship between ESG scores and FP.

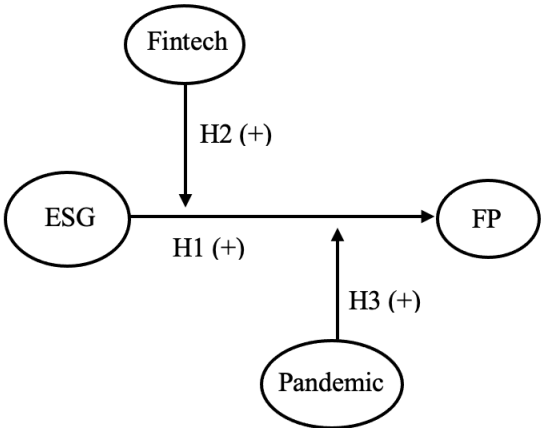


Figure 1. Theoretical research model

3. Methodology

In this section we start from the introduction of our sample, followed by the description of variables we used in this study, and finally the model specification.

3.1 The sample

Our sample was derived from Refinitiv database (Eikon) (Refinitiv, n.d.), which is one of the biggest providers of financial markets data and infrastructure in the world. Refinitiv, as a part of London Stock Exchange Group, has the strength and stability of a more than 300-years-old organisation, which makes them capable to broaden their impact of financial community by providing data solutions. Several academic researchers have applied Refinitiv database in the field of ESG and FP such as the studies of Abdi et al., (2020), Daszyńska-żygałło et al., (2021) and López-Toro et al., (2021).

The sample set contains two groups. The first group contains 860 banks, which belong to the sector of banking and investment banking services, registered in EU, US and Asia, and must include ESG scores calculated in Refinitiv database; the second group is formed by 100 Fintech firms identified from the KBW and Nasdaq Fintech (KFTX) Indices and NASDAQ Insurance Index (IXIS), which is the same sample set as the Fintech study of Merello et al. (2022). There is a duplicate firm in both IXIS and KFTX indices; besides, there are 13 duplicate firms in both banking and investment banking services and Fintech lists, which we identified them as Fintech firm. We excluded 7 Fintech firms which are not able to be found by their names in database and the consequently extracted 860 banking and investment banking services, and 93 Fintech firm during the 2017-2020 period. Subsequently, we dropped the missing values; thus, we obtained an unbalanced panel. The final sample formed by 1630 observations with 697 firms.

3.2 Description of the variables

Our work focuses on analysing the effect of ESG scores on financial performance of banking industry by considering return on assets (ROA) and Tobin's Q during the 2018-2020 period. Specifically, return on assets (ROA) extracted from Refinitiv database (Eikon) is for assessing their profitability and Tobin's Q calculated by market capitalization divided by total assets for evaluating their market value (Conca et al., 2021; Daszyńska-żygadło et al., 2021). Companies with higher ROA ratio means that they have higher profitability and they are more likely to have better market performance (Abdi et al., 2020). The reason why we use return on assets (ROA) in our study instead of return on equity (ROE) is because ROA is a more reliable indicator than ROE in bank industry due to the less exposure of leverage effects (Daszyńska-żygadło et al., 2021). Tobin's Q is a combination of accounting- and market-based financial measure, which is capable to capture the market value of firm's goodwill (Daszyńska-żygadło et al., 2021), and has been applied in several studies that analyse the relationship between ESG and FP (Abdi et al., 2020; Conca et al., 2021; Daszyńska-żygadło et al., 2021; Ionescu et al., 2019; López-Toro et al., 2021). The companies with higher Tobin's Q will indicate that they have competitive advantages such

as brand, reputations and technological innovations, which may lead to a long-term influence of firm's operating performance (Daszyńska-żygadło et al., 2021).

For analysing the effect of ESG criteria on FP, we used ESG scores and three individual Environmental (Env), Social (Soc), and Governance (Gov) pillar scores to proxy the ESG effort of banks following the studies like Abdi et al., (2020), Daszyńska-żygadło et al., (2021), Ionescu et al., (2019), and López-Toro et al., (2021). The ESG scores and three individual ESG pillar scores are provided by Refinitiv database (Eikon). Some information source of this database came from companies themselves such as annual reports, companies' websites and CSR reports, and other independent data are delivered by non-governmental organisation and public domains. Owing to the manual and standardized data collection procedure, the database ensures the comparability and transparency of the ESG data we used in this study.

Additionally, in order to evaluate if Fintech firms have a moderating effect on the relationship between ESG and FP, we constructed a dummy variable that takes value of 1 when the company is a Fintech company, and 0 otherwise. We used the same method for analysing the pandemic moderating effect by constructing a dummy variable that value of 1 indicates the year of pandemic and 0 otherwise.

Furthermore, we also included several control variables in this study for the purpose of avoiding omitted variables biased: A quantitative variable that describes the number of directors in the board in year t is captured in the BoardSize variable. Earnings per share (EPS), the ratio between earning and the number of shares of a company is measured by EPS variable. The total assets that a company report in year t is indicated in TotalAssets variable. The new income that a company report in year t is showed as NetIncome variable. The return on equity (ROE), which calculated as total equity divided by net income, is presented as ROE variable. Total liability divided by total equity, which indicates the leverage of firms, is defined as LEV variable. Sales per employee, which is computed as total sales divided by all the employee of a company in year t , is captured in SalesEmp variable. The size of firms, which is calculated as the natural logarithm of total assets, is measured by the SIZE variable. The selection of these variables was made following the studies of Abdi et al., (2020), Conca et al., (2021), Daszyńska-

żygadło et al., (2021), and Merello et al., (2022). Besides, we included Fintech dummy variable to control its direct effect on FP. Table 3 shows the description of all the variables that we used in this study. Table 4 shows the descriptive statistics of the studied variables (Table 3). Besides, correlation analysis and VIF tests were performed to evaluate the strength of the selected independent variables and to identify if there is multicollinearity issue (Table 5). Because none of variables has a VIF value that is higher than 10, multicollinearity will not be considered to cause any serious issue.

Table 3.

Descriptive variables

Variable	Description	Source
ROA	Net Income of total assets	Eikon
TobinsQ	Calculated as market capitalization divided by total assets	Computed from Eikon
ESG	Environmental, social and governance scores	Eikon
Env	Environmental scores	Eikon
Soc	Social scores	Eikon
Gov	Governance scores	Eikon
Fintech	Dummy of Fintech	Constructed from Eikon
Pandemic	Dummy of Pandemic	Constructed from Eikon
BoardSize	Size of the Board of Directors	Eikon
EPS	Earnings per share	Eikon
TotalAssets	Total Assets	Eikon
NetIncome	Net Income	Eikon
ROE	Net Income of total equity	Eikon
LEV	Total liabilities to total equity	Eikon
SalesEmp	Sales of total employees	Eikon
SIZE	Natural logarithm of total assets	Computed from Eikon

Table 4.

Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ROA	2.75	5.091	-32.789	53.4
TobinsQ	60.627	175.144	.03	2236.968
ESG	48.481	19.159	2.4	94.25
Env	30.522	30.886	0	98.98

Soc	50.272	22.005	1.08	97.58
Gov	53.57	21.582	1.18	96.97
Fintech	.084	.278	0	1
Pandemic	.301	.459	0	1
BoardSize	11.377	3.277	1	32
EPS	3.727	6.077	-2.355	70.8
TotalAssets	2.234e+11	5.761e+11	1.336e+08	5.098e+12
NetIncome	1.711e+09	4.699e+09	-2.986e+09	4.694e+10
ROE	.148	.331	-.934	8.281
LEV	1.595	3.302	0	71.767
SalesEmp	528442.04	1016655.6	10107.59	20256840
SIZE	24.139	2.056	18.711	29.26

Number of observation = 1630

Table 5. Matrix of correlations & Variance inflation factors (VIFs)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) ROA	1.000															
(2) TobinsQ	0.685	1.000														
(3) ESG	-0.040	0.012	1.000													
(4) Env	-0.067	-0.021	0.824	1.000												
(5) Soc	0.019	0.047	0.888	0.773	1.000											
(6) Gov	-0.064	-0.009	0.727	0.377	0.369	1.000										
(7) Fintech	0.379	0.428	-0.047	-0.076	-0.004	-0.043	1.000									
(8) Pandemic	0.007	-0.022	-0.042	-0.078	-0.067	0.032	-0.001	1.000								
(9) BoardSize	-0.189	-0.128	0.212	0.236	0.231	0.071	-0.086	-0.017	1.000							
(10) EPS	0.248	0.191	0.035	0.005	0.053	0.029	0.160	-0.029	-0.005	1.000						
(11) TotalAssets	-0.146	-0.112	0.392	0.433	0.315	0.272	-0.103	-0.021	0.305	-0.020	1.000					
(12) NetIncome	-0.036	-0.024	0.313	0.331	0.266	0.211	-0.020	0.014	0.221	0.061	0.860	1.000				
(13) ROE	0.372	0.250	0.021	-0.000	0.030	0.026	0.215	0.003	-0.052	0.159	-0.054	0.017	1.000			
(14) LEV	-0.070	-0.070	0.061	0.108	0.055	0.012	-0.052	-0.027	-0.028	-0.034	0.067	0.016	0.170	1.000		
(15) SalesEmp	0.143	0.057	-0.050	-0.014	0.003	-0.112	0.078	0.006	-0.109	0.065	-0.037	-0.018	0.044	0.082	1.000	
(16) SIZE	-0.371	-0.271	0.595	0.659	0.541	0.328	-0.181	-0.048	0.443	-0.008	0.659	0.540	-0.128	0.154	-0.020	1.000
VIFs																
ROA (Eq. 1)			1.66				1.34	1.11	1.27	1.15	5.04	4.02	1.35	1.09	1.04	3.74
ROA (Eq. 2)						1.24	1.36	1.13	1.30	1.15	5.17	4.06	1.35	1.09	1.04	4.17
Tobin's Q (Eq.1)			1.65		3.25	2.60	1.32	1.09	1.27	1.11	5.00	4.01	1.25	1.09	1.03	3.22
Tobin's Q (Eq. 2)					3.17	2.62	1.33	1.11	1.30	1.11	5.14	4.05	1.26	1.09	1.04	3.51

3.3 Model specification

By using panel data, we can control unobservable heterogeneity (Merello et al., 2022) and have more dimensions than time-series and cross-sectional data (Daszyńska-Żygadło et al., 2021). In addition, we included the first lag of the dependent variable as an explanatory variable for controlling firm-specific effects by capturing the effect of the omitted variables (Brush et al., 2000; Hernandez-Vivanco et al., 2019). The method applied in this study is feasible generalised least square (FGLS). According to the study of Hansen (2007), generalised least square (GLS) with random effect is suitable for testing correlation during a time period and firm-specific effects; specially, GLS estimator helps to restore the losing efficiency aspects of using simple ordinary least square (OLS) when there is expected correlation over time. Besides, the advantage of using GLS is that it detects the problems of autocorrelation and heteroscedasticity automatically, thus enhance the statistic quality (Hsu et al., 2015). Furthermore, by using FGLS model with GLS estimator, it provides a more flexible covariance structure for disturbances with random effects and it assumes that the error is known instead of being estimated (Al-Suwaidi et al., 2018). The main models are represented in equations (1) - (6).

Equation 1 and 2 measure the direct effects of ESG on FP:

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 ESG_{it} + \beta_3 Fintech + \beta_4 BoardSize_{it} + \beta_5 EPS_{it} + \beta_6 TotalAsset_{it} + \beta_7 NetIncome_{it} + \beta_8 ROE_{it} + \beta_9 LEV_{it} + \beta_{10} SalesEmp_{it} + \beta_{11} Year + \mu_{it} \quad (1)$$

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 Env_{it} + \beta_3 Soc_{it} + \beta_4 Gov_{it} + \beta_5 Fintech + \beta_6 BoardSize_{it} + \beta_7 EPS_{it} + \beta_8 TotalAsset_{it} + \beta_9 NetIncome_{it} + \beta_{10} ROE_{it} + \beta_{11} LEV_{it} + \beta_{12} SalesEmp_{it} + \beta_{13} Year + \mu_{it} \quad (2)$$

Equation 3 and 4 estimate the Fintech moderating effects on the relationship between ESG and FP:

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 ESG_{it} + \beta_3 Fintech + \beta_4 Fintech * ESG_{it} + \beta_5 BoardSize_{it} + \beta_6 EPS_{it} + \beta_7 TotalAsset_{it} + \beta_8 NetIncome_{it} + \beta_9 ROE_{it} + \beta_{10} LEV_{it} + \beta_{11} SalesEmp_{it} + \beta_{12} Year + \mu_{it} \quad (3)$$

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 Env_{it} + \beta_3 Soc_{it} + \beta_4 Gov_{it} + \beta_5 Fintech + \beta_6 Fintech * Env_{it} + \beta_7 Fintech * Soc_{it} + \beta_8 Fintech * Gov_{it} + \beta_9 BoardSize_{it} + \beta_{10} EPS_{it} + \beta_{11} TotalAsset_{it} + \beta_{12} NetIncome_{it} + \beta_{13} ROE_{it} + \beta_{14} LEV_{it} + \beta_{15} SalesEmp_{it} + \beta_{16} Year + \mu_{it} \quad (4)$$

Equation 5 and 6 quantify the pandemic moderating effects on the relationship between ESG and FP:

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 ESG_{it} + \beta_3 Pandemic + \beta_4 Pandemic * ESG_{it} + \beta_5 Fintech * ESG_{it} + \beta_6 BoardSize_{it} + \beta_7 EPS_{it} + \beta_8 TotalAsset_{it} + \beta_9 NetIncome_{it} + \beta_{10} ROE_{it} + \beta_{11} LEV_{it} + \beta_{12} SalesEmp_{it} + \beta_{13} Year + \mu_{it} \quad (5)$$

$$FP_{it} = \beta_0 + \beta_1 FP_{it-1} + \beta_2 Env_{it} + \beta_3 Soc_{it} + \beta_4 Gov_{it} + \beta_5 Pandemic + \beta_6 Pandemic * Env_{it} + \beta_7 Pandemic * Soc_{it} + \beta_8 Pandemic * Gov_{it} + \beta_9 Fintech * Env_{it} + \beta_{10} Fintech * Soc_{it} + \beta_{11} Fintech * Gov_{it} + \beta_{12} BoardSize_{it} + \beta_{13} EPS_{it} + \beta_{14} TotalAsset_{it} + \beta_{15} NetIncome_{it} + \beta_{16} ROE_{it} + \beta_{17} LEV_{it} + \beta_{18} SalesEmp_{it} + \beta_{19} Year + \mu_{it} \quad (6)$$

where FP denotes both to i) ROA and ii) Tobin's Q; $i = 1, \dots, N$ and $t = 1, \dots, T$, which indicates firms and time periods respectively.

4. Results and discussions

The analysis was conducted on ROA and Tobin's Q as dependent variables with panel data over the period of 2018-2020. We applied FGLS in data analysis software, STATA 17.0. In order to ensure the validation of using FGLS, we firstly test if the stationary trend exists in our data by performing the unit root method test proposed by Harris and Tzavalis (1999). The null hypothesis is that panels contain unit roots and if we reject it means that the data is stationary, validating the use of FGLS. HT tests shows that data of ROA ($z=-31.658$, $p=0.000$) and Tobin's Q ($z=-8.573$, $p=0.000$) are both stationary, which ensure that we can use FGLS regression. Besides, there are no autocorrelation and heteroskedasticity issues.

Our empirical results are presented in Table 6 to 11 below. Firstly, in section 4.1. we discuss the results relating the direct effect of ESG scores on FP. Secondly, we comment the results of Fintech moderating effect on the relationship between ESG and FP in section 4.2. Finally, the results of pandemic moderating effect are presented and discussed in the section 4.3.

4.1 The direct relationship between ESG and financial performance

Table 6 shows the results of the influence of ESG scores on ROA of banks. Model 1 demonstrates the measure of ESG by a whole score and Model 2 shows the ESG by three individual pillars. We can observe that ESG scores do not significantly affect to ROA in model 1; however, we notice that social scores (Soc) positively affects to the ROA ($\beta=0.014$, $p<0.05$) if we measure ESG by its three pillars in model 2, which means that social scores have positive impact on the profitability of firms. Furthermore, the dummy variable, Fintech, has negative influence on ROA in both models, which indicates that if the firm is defined as a Fintech company, its ROA (profitability) is worse than a traditional bank. In addition, earning per share (EPS), return on equity (ROE) and sales per employee (SaleEmp) have positive influences on ROA whereas firm size has a negative impact on ROA, which evidences that a bank with higher EPS, ROE and sales per employees could have higher profitability so that it tends to generate more income, but the bigger the size of a bank the lower its profitability performance.

Table 6.
The influence of ESG scores on ROA

	Model 1		Model 2	
	Coef.	Std. err.	Coef.	Std. err.
ROA_{t-1}	0.823***	0.024	0.816***	0.025
2019.Year	-0.158	0.277	-0.200	0.276
2020.Year	0.224	0.273	0.253	0.272
ESG	0.009	0.006		
Env			0.002	0.005
Soc			0.014**	0.006
Gov			-0.007	0.004
Fintech	-0.839**	0.327	-0.874***	0.327
BoardSize	0.008	0.029	-0.002	0.030
EPS	0.027*	0.015	0.027*	0.015
TotalAssets	0.000	0.000	0.000	0.000
NetIncome	0.000	0.000	0.000	0.000
ROE	2.591***	0.363	2.582***	0.362
LEV	-0.036	0.027	-0.035	0.027
SalesEmp	6.88e-07***	0.000	6.70e-07***	0.000

SIZE	-0.261***	0.079	-0.307***	0.083
Constant	5.584***	1.731	6.83***	1.874
Log likelihood	-2176.302		-2171.986	
Chi-square	2896.803		2932.637	
AIC	4376.604		4371.972	
BIC	4434.562		4439.589	

***p < 0.01, **p < 0.05, * p < 0.1

Table 7 shows the results of ESG scores on Tobin's Q of banks. Model 1 specifies the measure of ESG by a whole score and Model 2 demonstrates the ESG by three individual pillars. We can observe that ESG scores do not significantly affect the Tobin's Q in model 1; however, we see that environmental scores (Env) positively affect the Tobin's Q ($\beta=0.325$, $p<0.05$) if we measure ESG by its three pillars in model 2, which implies that environmental scores have positive impact on market value of firms. Furthermore, the dummy variable, Fintech, has positive influence on Tobin's Q in both models, which evidences that if the firm is defined as a Fintech company, its Tobin's Q (market value) is higher than a traditional bank. Additionally, board size (BoardSize), earnings per share (EPS) and return on equity (ROE) have positive impacts on Tobin's Q whereas firm size has a negative influence on Tobin's Q, which reveals that a bank with higher EPS, ROE and sales per employee would have a higher market value, but the bigger the size of a bank the lower its market value.

Table 7.

	The influence of ESG scores on Tobin's Q			
	Model 1		Model 2	
	Coef.	Std. err.	Coef.	Std. err.
TobinsQ_{t-1}	0.760***	0.015	0.758***	0.015
2019.Year	-16.263**	7.901	-15.706**	7.896
2020.Year	-26.03***	7.742	-24.171***	7.753
ESG	0.095	0.162		
Env			0.325**	0.135
Soc			-0.166	0.177
Gov			-0.085	0.124
Fintech	57.853***	9.278	58.776***	9.277

BoardSize	1.566*	0.840	1.676**	0.848
EPS	2.308***	0.430	2.299***	0.428
TotalAssets	0.000	0.000	0.000	0.000
NetIncome	0.000	0.000	0.000	0.000
ROE	42.846***	10.007	42.314***	9.987
LEV	0.047	0.769	-0.051	0.768
SalesEmp	0.000	0.000	0.000	0.000
SIZE	-6.814***	2.086	-8.36***	2.171
Constant	154.569***	45.199	197.218***	48.390
Log likelihood	-5277.152		-5274.147	
Chi-square	4852.696		4890.368	
AIC	10580.300		10578.290	
BIC	10643.090		10650.740	

***p < 0.01, **p < 0.05, * p < 0.1

To summarize, from Table 6 and Table 7 we can observe that the influences of ESG scores on FP are various depending on the measure of ESG and FP. When we consider the impact of a whole ESG scores on FP, there is no significant effects on FP (either ROA nor Tobin's Q); however, if we measure ESG by three individual pillars (Env, Soc and Gov), social scores (Soc) have positive impact on ROA (profitability) and environmental scores (Env) have positive influence on Tobin's Q (market value). Hence, H1 is partially supported.

Our results shows that the social scores (Soc) positively affects to the firms' profitability, which is lined with Conca et al., (2021) that social scores can positively increase the profitability of firms. Regarding to the impacts of environmental (Env) and governance scores (Gov) to profitability, the extremely low coefficient of the variables may imply a scarce ability of influencing firms' profitability by the better environmental or governance performance, which presents an irrelevant effect of environmental and governance scores on profitability. Therefore, firms can enhance their profitability by participating in gaining a higher social score. Additionally, the results revealed that the profitability of Fintech firm is worse than a traditional bank, which may because that the size of Fintech firms are usually smaller than traditional bank. Besides, the results show a positive relationship between

environmental scores (Env) and market value, which is in line with Abdi et al., (2020) and Ionescu et al., (2019) that environmental scores positively affects market value of firms. As for the impacts of social (Soc) and governance scores (Gov) on market value, the evidences show a slight negative relationship with market value, however, their low coefficients indicate the weak power to affect firms' market value by the better social and governance performance, which translates into non-significant effect. Our results imply that the higher environmental score of the firms could be seen as a potential financial-return generator for investors, and brings more capital to firms and higher their market value. In addition, our results also evidence the concept that derived from RBV that ESG can be consider as an intangible resource that leverage FP of firms.

4.2 The Fintech moderating effect on ESG and financial performance

Table 8 presents the results of Fintech moderating effect on the relationship between ESG scores and ROA. Model 3 demonstrates the interaction of Fintech and ESG on ROA by a whole ESG score and Model 4 shows the interaction of Fintech and ESG on ROA by three individual ESG pillars. We cannot observe any significant results of interactions between Fintech and ESG whether in model 3 nor model 4. However, the dummy Fintech variable negatively affects ROA in both models, which is the same as in Table 6 that if a firm is defined as a Fintech company, it will have a decline in profitability in comparison to traditional bank. Furthermore, although there are no interaction effects between Fintech and social scores (Soc) and governance scores (Gov), the direct effect of social scores (Soc) positively affect the ROA ($\beta=0.013$, $p<0.05$), and the direct effect of governance scores (Gov) has a negative impact on ROA ($\beta= -0.08$, $p<0.10$) in model 4, which indicates that the profitability is affected by social and governance scores in the same level whether the firm is defined as a Fintech company or a traditional bank. Additionally, earning per share (EPS), return on equity (ROE) and sales per employees (SaleEmp) have positive influences on ROA whereas firm size has a negative impact on ROA, which are the same as the direct effect in Table 6.

Table 8.

The Fintech moderating effect on the relationship between ESG scores and ROA

	Model 3		Model 4	
	Coef.	Std. err.	Coef.	Std. err.
ROA_{t-1}	0.823***	0.024	0.813***	0.025
2019.Year	-0.157	0.276	-0.193	0.276
2020.Year	0.219	0.273	0.256	0.273
ESG	0.008	0.006		
Fintech	-1.437*	0.857	-2.163**	1.057
Fintech*ESG	0.013	0.017		
Env			0.003	0.005
Fintech*Env			-0.013	0.019
Soc			0.013**	0.006
Fintech*Soc			0.023	0.023
Gov			-.008*	0.005
Fintech*Gov			0.009	0.015
BoardSize	0.006	0.029	-0.005	0.030
EPS	0.027*	0.015	0.028*	0.015
TotalAssets	0.000	0.000	0.000	0.000
NetIncome	0.000	0.000	0.000	0.000
ROE	2.508***	0.380	2.513***	0.383
LEV	-0.036	0.027	-0.035	0.027
SalesEmp	6.87e-07***	0.000	6.64e-07***	0.000
SIZE	-0.262***	0.079	-0.31***	0.083
Constant	5.701***	1.738	7.061***	1.885
Log likelihood	-2176.017		-2171.158	
Obs.	925.0000		925.0000	
Groups	566.0000		566.0000	
Chi-square	2899.160		2939.551	
AIC	4378.034		4376.315	
BIC	4440.821		4458.422	

***p < 0.01, **p < 0.05, * p < 0.1

Table 9 reveals the results of the Fintech moderating effect on the relationship between ESG scores and Tobin's Q. Model 3 shows the interaction of Fintech and ESG on Tobin's Q by a whole ESG score and Model 4 presents the interaction of Fintech and ESG on Tobin's Q by three individual ESG pillars. We observe that the interaction between Fintech and ESG scores positively affects the Tobin's Q

($\beta=2.009$, $p<0.01$) in model 3 and the interaction of Fintech and social scores (Soc) shows a positive influence on the Tobin's Q ($\beta=1.207$, $p<0.10$) in model 4, which evidences that if a firm is defined as Fintech company, its Tobin's Q (market value) will be positively affected by its whole ESG scores and social scores (Soc) in a stronger level in comparison to traditional bank. However, there is no interaction effect of Fintech and environmental scores (Env) can be observed although the direct effect of environmental scores (Env) shows a significantly positive impact on Tobin's Q ($\beta=0.314$, $p<0.05$), which reveals that the environmental scores (Env) shows the same importance on market value whether the firm is defined as Fintech company or traditional bank. In addition, earnings per share (EPS) and return on equity (ROE) have positive impacts on Tobin's Q whereas firm size has a negative influence on Tobin's Q, which are similar to the results of the direct effect in Table 7.

Table 9.

The Fintech moderating effect on the relationship between ESG scores and Tobin's Q

	Model 3		Model 4	
	Coef.	Std. err.	Coef.	Std. err.
TobinsQ_{t-1}	0.755***	0.015	0.752***	0.015
2019.Year	-15.946**	7.831	-15.64**	7.825
2020.Year	-26.676***	7.674	-24.893***	7.691
ESG	-0.088	0.167		
Fintech	-34.321	24.239	-40.824	29.968
Fintech*ESG	2.009***	0.489		
Env			0.314**	0.138
Fintech*Env			0.277	0.527
Soc			-0.255	0.181
Fintech*Soc			1.207*	0.647
Gov			-0.176	0.129
Fintech*Gov			0.634	0.436
BoardSize	1.295	0.835	1.331	0.844
EPS	2.325***	0.426	2.326***	0.425
TotalAssets	0.000	0.000	0.000	0.000
NetIncome	0.000	0.000	0.000	0.000
ROE	29.578***	10.429	27.825***	10.548
LEV	0.008	0.762	-0.104	0.761

SalesEmp	0.000	0.000	0.000	0.000
SIZE	-6.86***	2.067	-8.56***	2.150
Contant	169.917***	44.947	219.153***	48.181
Log likelihood	-5268.783		-5264.951	
Obs.	925.0000		925.0000	
Groups	566.0000		566.0000	
Chi-square	4958.197		5007.146	
AIC	10565.570		10565.900	
BIC	10633.180		10652.840	

***p < 0.01, **p < 0.05, * p < 0.1

To sum up, from Table 8 and Table 9 we can summarize that the Fintech moderating effect on the relationship between ESG scores and FP are various depending on the measure of ESG and FP. When we consider the impact of a whole ESG scores on FP, there are no significant interaction effects on ROA (profitability) whereas significantly positive interaction effects between Fintech and ESG scores are shown on Tobin's Q (market value); however, if we measure ESG by three individual pillars (Env, Soc and Gov), there are no significant interaction effects on ROA (profitability) but a positive interaction effect between Fintech dummy and social scores (Soc) are presented on Tobin's Q (market value). Hence, Fintech does have positive moderating effect on the relationship between ESG and FP in some circumstances, and H2 is partially supported.

Our results reveal that the positive moderating effect of Fintech on the relationship between ESG scores and market value, which implies that a Fintech firm can increase more market value than traditional banks by engaging in ESG activities. We also measured by three separated pillars and found that Fintech and social scores (Soc) show a positively significant moderating effect on market value whilst the moderating effect of Fintech and environmental (Env) and governance scores (Gov) did not show any significance, which may implies that for Fintech firms, their investment in social activities may bring them higher market value than the investment in environmental or governance activities. The similar results from the study of Merello et al., (2022) evidence that the market value of Fintech firms can be increased by their participation of sustainability, based on this, we further discover that Fintech

firms are able to obtain more increase of market value than banks through ESG activities. In addition, our results also provide a support to the study of Egorova et al., (2021) that IT firms can gain more market value through focusing on higher their ESG position.

4.3 The Pandemic moderating effect on ESG and financial performance

Table 10 shows the results of the pandemic moderating effect on the relationship between ESG scores and ROA. Model 5 shows the interaction of pandemic and ESG on ROA by a whole ESG score and Model 6 presents the interaction of pandemic and ESG on ROA by three individual ESG pillars. The results revealed that there are no significance interacting effects between pandemic and ESG scores on ROA in model 1. However, there is a negative direct effect of governance scores (Gov) on ROA ($\beta = -0.013$, $p < 0.05$) but a positive interaction effect between pandemic and governance scores (Gov) on ROA ($\beta = 0.016$, $p < 0.10$) in model 6, which indicates that governance scores (Gov) negatively affected the profitability of firms before pandemic whereas a positive influence on the profitability of firms after pandemic. Furthermore, we noticed that the Fintech moderating effect was not significant without the pandemic moderator in Table 8 but now due to the join of pandemic moderator there is a significantly negative interaction effect between Fintech and ESG score ($\beta = -0.014$, $p < 0.05$), which may indicate that it would lead to a decrease of profitability if a Fintech firm has more ESG investment after the outbreak of pandemic. Additionally, earning per share (EPS), return on equity (ROE) and sales per employees (SaleEmp) have positive influences on ROA whereas firm size has a negative impact on ROA, which are the same as the direct effect in Table 6.

Table 10.

The pandemic moderating effect on the relationship between ESG scores and ROA				
	Model 1		Model 2	
	Coef.	Std. err.	Coef.	Std. err.
ROA_{t-1}	0.817***	0.024	0.815***	0.025
ESG	0.003	0.007		
Pandemic	-0.401	0.517	-0.612	0.610
Pandemic*ESG	0.014	0.009		

Fintech*ESG	-0.014**	0.007		
Env			0.005	0.006
Pandemic*Env			-0.007	0.009
Soc			0.011	0.008
Pandemic*Soc			0.007	0.012
Gov			-0.013**	0.006
Pandemic*Gov			0.016*	0.009
Fintech*Env			0.004	0.017
Fintech*Soc			-0.010	0.016
Fintech*Gov			-0.005	0.014
BoardSize	0.017	0.029	0.004	0.030
EPS	0.026*	0.015	0.0268*	0.015
TotalAssets	0.000	0.000	0.000	0.000
NetIncome	0.000	0.000	0.000	0.000
ROE	2.69***	0.369	2.622***	0.381
LEV	-0.035	0.027	-0.032	0.027
SalesEmp	6.84e-07***	0.000	6.68e-07***	0.000
SIZE	-0.280***	0.079	-0.3040253***	0.084
Constant	6.108***	1.788	6.929***	1.939
Log likelihood	-2176.370		-2171.437	
Obs.	925.000		925.000	
Groups	566.000		566.000	
Chi-square	2896.243		2937.219	
AIC	4376.740		4378.873	
BIC	4434.697		4465.810	

***p < 0.01, **p < 0.05, * p < 0.1

Table 11 presents the results of the pandemic moderating effect on the relationship between ESG scores and Tobin's Q. Model 5 shows the interaction of pandemic and ESG on Tobin's Q by a whole ESG score and Model 6 shows the interaction of pandemic and ESG on Tobin's Q by three individual ESG pillars. We observe that there are no significance interacting effects between pandemic and ESG scores on Tobin's Q in model 5. However, there is a positive interaction effect of environmental scores (Env) on Tobin's Q ($\beta=0.539$, $p<0.05$) but a negative interaction effect between pandemic and social scores (Soc) on Tobin' Q ($\beta= -0.610$, $p<0.10$) in model 6, which indicates that pandemic enhances the

positive influence of environmental scores (Env) and the negative influence of social scores (Soc) on market value. Furthermore, we can notice that under the moderating effect of pandemic, although the significantly positive result of the interaction effect of Fintech and ESG scores remained, its coefficient decreases from 2.009 (in Table 9) to 1.392. In addition, earnings per share (EPS) and return on equity (ROE) have positive impacts on Tobin's Q whereas firm size has a negative influence on Tobin's Q, which are similar to the results of direct effect in Table 9.

Table 11.

The pandemic moderating effect on the relationship between ESG scores and Tobin's Q

	Model 1		Model 2	
	Coef.	Std. err.	Coef.	Std. err.
TobinsQ_{t-1}	0.754***	0.015	0.751***	0.015
ESG	-0.010	0.203		
Pandemic	-13.629	14.623	5.749	17.277
Pandemic*ESG	-0.012	0.265		
Fintech*ESG	1.386***	0.186		
Env			0.073	0.175
Pandemic*Env			0.539**	0.244
Soc			0.044	0.240
Pandemic*Soc			-0.610*	0.342
Gov			-0.073	0.172
Pandemic*Gov			-0.094	0.241
Fintech*Env			0.640	0.473
Fintech*Soc			0.573	0.470
Fintech*Gov			0.360	0.386
BoardSize	1.551*	0.837	1.650*	0.845
EPS	2.270***	0.427	2.263***	0.425
TotalAssets	0.000	0.000	0.000	0.000
NetIncome	0.000	0.000	0.000	0.000
ROE	33.372***	10.185	30.084***	10.463
LEV	0.061	0.764	-0.058	0.762
SalesEmp	0.000	0.000	0.000	0.000
SIZE	-7.018***	2.087	-9.165***	2.177
Constant	153.630***	46.320	204.176***	49.422

Log likelihood	-5271.823	-5265.384
Obs.	925.000	925.000
Groups	566.000	566.000
Chi-square	4919.663	5001.594
AIC	10569.650	10568.770
BIC	10632.430	10660.530

***p < 0.01, **p < 0.05, * p < 0.1

In brief, from Table 10 and Table 11 we can summarize that the pandemic moderating effect on the relationship between ESG scores and FP are various depending on the measure of ESG and FP. When we consider the impact of a whole ESG scores on FP, there are no significant pandemic interaction effects on either ROA (profitability) nor Tobin's Q (market value) whereas significantly positive interaction effects between Fintech and ESG scores are shown on Tobin's Q (market value); however, if we measure ESG by three individual pillars (Env, Soc and Gov), the pandemic moderator reveals a significantly positive interaction effect with governance scores (Gov) on ROA (profitability), a significantly positive interaction effect with environmental scores (Env) and a negative interaction effect with social scores (Soc) on Tobin's Q (market value). Hence, pandemic does have positive moderating effect on the relationship between ESG and FP in some cases, and H3 is partially supported.

Our results of the positive pandemic moderating effects (the interaction effect with governance scores on profitability and the interaction effect with environmental scores on market value) indicate that after the pandemic, the firms can increase more level of FP through the environmental and governance participation in comparison to the level before pandemic, which are in line with the existing similar findings that it is helpful to lower the systemic risk and alleviate the downside risk by engaging in CSR or having better ESG performance (Albuquerque et al., 2019; Broadstock et al., 2021; Hoepner et al., 2018). However, our result shows the negative pandemic moderating effect with social scores on market value, which may imply that the better social performance will decrease the market value of firms after the pandemic. This is contradictory to the existing studies (Albuquerque et al., 2019; Broadstock et al., 2021; Hoepner et al., 2018), because all of them find that better ESG performances

will let firms have competitive advantage to maintain or enhance their FP in order to overcome the financial crisis. Furthermore, we observe that the coefficient of the positive interaction effects between Fintech and ESG scores on Tobin's Q decreases from 2.009 (in Table 9) to 1.392 (in Table 11), which may imply that although Fintech firms can strengthen more market value than banks by better ESG performance, the level will decrease after the pandemic.

5. Conclusions

The aim of this article is to research into the effects of environmental, social and governance (ESG) scores on financial performance (FP) in the banking industry and to analyse the Fintech moderating effect and pandemic moderating effect on this relationship. We used 697 firms during 2017-2020 as sample and revealed that depending on the measure of ESG and FP, there are significantly positive relationships between ESG and FP, and proofs of the positive Fintech moderating effect and positive pandemic moderating effect on this relationship. Under general circumstances, the profitability is positively affected by social scores, and the market value is positively influenced by environmental scores. Nevertheless, with the outbreak of pandemic, the positive relationship between environmental scores and market value are enhanced whereas the relationship between social scores and market value become negative. As for the Fintech companies, our results show that they usually have lower profitability but higher market value than traditional banks; furthermore, they can enlarge their market value through better ESG performance although this method could hurt their profitability after pandemic.

Our empirical results bring an extra support to the study of the relationship between ESG and FP even there are still some limitations in our study. For example, we use data for only four years. Besides, we consider all Fintech firms together without categorizing them by different services they provide, which may weaker explanatory power of our results. Future research will be focused on overcoming these limitations, as well as having more post-pandemic data available to apply into related studies.

In addition, this study contributes to the understanding of financial industry's sustainability and fill the gap that there are few studies analysing ESG in the banking industry by considering the impact of

both Fintech firms and the pandemic. Furthermore, as for the academic implications, we find that we may need to evaluate sustainability separately by three pillars, because we found the different results depending on the environmental, social and governance dimensions. Additionally, we find evidence that Fintech firms have the potential to outperform traditional banks by the ESG engagement, which explores a new path for the future researchers. We hope that there are more studies to dedicate the sustainability-related study in Fintech industry in the future.

Finally, we hope that this research will not only contribute to capital market, which means investors can use the results to do investment decision efficiently, but also influent more banks and Fintech firms to pay attention to their behaviours and business strategies for the purpose of having ESG contribution to our society.

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