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ESG Disclosure, Risk-taking and Value-An Empirical Study of Commercial Banks in Asia

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Abstract: *This study investigates the relationship among Asian commercial banks' environmental, social and governance (ESG) scores, risk-taking and value. The empirical results find that for banks either already in high or low risk, an increase in ESG scores is significantly associated with a decrease in risk and a decrease in bank value. These two results corroborate the stakeholder theory and the overinvestment theory, respectively. In addition, this paper also tests the correlation between risk-taking and ESG, concluding that although ESG posts negative effect on bank's value, ESG and risk together are significantly associated with an increase in bank value, compensating for the inevitable impact of higher ESG resulting in reduced bank value.*

Keywords: *Risk-taking; Bank value; ESG; Asian commercial bank*

1. Introduction

After the wake of the Financial Crisis, the world has become more vigilant of risk-taking, especially in the banking sector, where the leverage and riskiness of assets could rapidly and opaquely increase. As it is commonly recognized that the financial weakness of banking in the crisis period from 2007 to 2008 was because of an accumulation of excessive risk[1][2], and subsequently bank risks can adversely post substantially negative influence to the real economy. Years of discussions about the degree to which corporation social responsibilities (CSR) and failures have contributed to bank's risk and value have seen the development of both bank's risk-taking theory and value measurement. Survey suggests that shareholder-oriented governance exacerbate risk-taking, and that to protect the stakeholders' interests, internal governance regulations are indispensable[3].

One such possible mechanism is driven by ESG (Environment, Social and Governance) performance which was initiated by the United Nations Environment Programme Finance Initiative (UNEP FI) in 1992 to regulate financial institutions and promote sustainability in decision-making process. And in call of a shared economic duty and responsibility, global players have shifted the focus in banking. For instance, ESG-based bank governance activities should follow the rule of satisfying stakeholders and improve financial performance[4]. However, some conclude that ESG performance also results in profitability deterioration and value loss of the agent through resources division in the investment[5][6]. The contention here brings up one critical issue for the solution above, which centers on shifting away from shareholder-oriented governance to mitigate bank risk: what and how is the effect of adopting bank ESG governance to address social issues on bank's risk-taking and value?

Attempting to address this question uncovers a significant absence in the empirical literature, which this thesis tries to contribute from the examination of correlation between ESG scores, risk-taking and value within the sample of 50 commercial banks in Asia from 2007 to 2018.

The paper is organized thereinafter: section II reviews relevant literature and develops hypotheses; Section III clarifies the data and methodology; Section IV reports empirical results and Section V draws the conclusion and reflection.

2. Fundamentals and Hypotheses

2.1. ESG

2.1.1. Definition

ESG is the acronym for Environment, Society and Governance. The ESG score represents an

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internationally recognized value, investment strategy and evaluation tool that focuses on environmental, social, and governance issues rather than just financial performance, and is an important indicator used to assess the financial value of a company's sustainable development. According to the PRI (Principles for Responsible Investment) brochure (UNEP FI, 2021), the ESG contains three fields including environmental issues, social issues, and governance issues with fifteen specific factors in total (See Table 1).

Table 1: ESG Components

Environmental Issues	Social Issues	Governance Issues
(1) Climate change	(1) Human rights	(1) Bribery & corruption
(2) Resource depletion	(2) Modern slavery	(2) Executive pay
(3) Waste	(3) Child labor	(3) Board diversity & structure
(4) Pollution	(4) Working conditions	(4) Political lobbying and donations
(5) Deforestation	(5) Employee relations	(5) Tax strategy

2.2. Risk-taking Theories

As it is illustrated above in the introduction, there are generally three kinds of research theories and results in academia which could be utilized to explain the relationship between bank ESG performance, risk-taking and value, including stakeholder theory and overinvestment theory.

2.2.1. Stakeholder Theory

Traditionally, business entities like corporations, organizations and banks have adhered to the shareholder primacy, thinking that the core of corporative management is to maximize profits and increase the wealth of the company's controllers continuously. From this point of view, social optimum and other general interests are often sacrificed in the actions and decisions made by the entity. However, the stakeholder theory overturns the perspective of previous traditional theories and nurtures a new thinking pattern which contributes to four aspects of competitive advantage and provides a stakeholder-oriented scope for ESG benefit analysis. (See Figure 1)

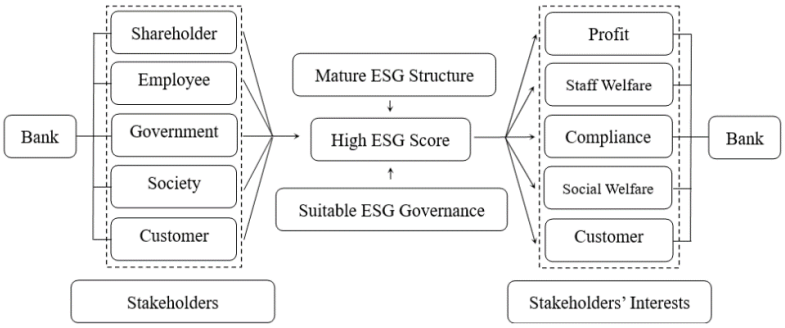

Figure 1: Stakeholder Theory through ESG in Banking

2.2.2. Overinvestment Theory

Contrarily, the overinvestment hypothesis proposes that alongside the pursuit of ESG performance, firms are inclined to allocate money in the perspective of a maximization of shareholders' wealth, which, under any circumstances, tightens the scarcity of resources while squeezing out investment, and as a result, reducing the book value and transferable asset of the firm; As a result, it is reported that ESG and bank performance are negatively and significantly connected. And agency expenses or fixed costs could be enlarged owing to investments in ESG area since agents may seek to gain their own self-interest or reputation through conducting their financial investment plan in ESG[6]. In the scenario above, investors are more clung to attach higher significance to an increase in a bank's fixed expenses considering better ESG performance, where investors may conceive those businesses in a riskier scenario[7]. This adoption of closed-loop conceptualization towards ESG-oriented investment among shareholders even deteriorates the confidence of banking promises which leads to further gloomy market expectancy with unmoderated risk-taking (see Figure 2).

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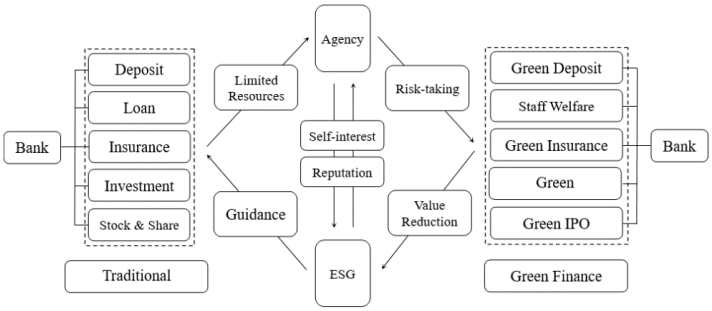

Figure 2: Overinvestment Theory through ESG in Banking

2.3. Hypotheses

Through is the fact that the empirical research between ESG activities, bank value and risk-taking is conducted from non-financial institutions, and the results reveal a diversity which could not be unified hitherto, in light of the research above, six hypotheses are thereinafter designed to test.

It has been found out that ESG activities reduces monetization costs, which could suggest a reduction in risk-taking. In particular, Bolton reports that US banks' risk-taking is negatively affected by ESG activities[8], and it is claimed that, from a sample of 3392 banks ranging across 121 countries, ESG participation decreases both default and portfolio risk[9]. Based on the studies and theories above, hypothesis 1 is developed as follows:

H1: Higher ESG scores reduces bank's risk-taking in Asian commercial banks.

Contrarily, Menz finds little evidence that enterprises which are recognized as socially responsible suffer from a greater bond risk in global markets[10]; and it is also reported that corporate social responsibility and external cost in monetization are positively associated[11]. And Consistent with the overinvestment theory, hypothesis 2 is developed as follows:

H2: Higher ESG scores increases bank's risk-taking in Asian commercial banks.

Prior studies have also investigated the relationship between ESG and value. Stocks labelled with ESG-qualification have greater valuation, measured by market-to-book ratios[12]. Additionally, profitability has been the primary focus of most researchers when evaluating the influence of ESG participation on financial performance in banking sector[13], where all researches indicate that ESG activities might potentially boost bank value. Based on the above studies, hypothesis 3 is developed as follows:

H3: Higher ESG scores increases bank's value in Asian commercial banks.

Contrarily, studies have also found out that organizations with higher ESG participation have poorer value[14]. It is found that firm's value is reduced by ESG-oriented participation in banking business from overall, legal, and normative ESG activity in corporate governance and regulation[15]. Hypothesis 4 is developed as follows:

H4: Higher ESG scores reduces bank's value in Asian commercial banks.

To further investigate the internal correlation and interaction between risk-taking and bank value under the same scope of ESG performance, and also to further investigate the mixed result of ESG literature on banking performance, hypothesis 5 & hypothesis 6 are developed as follows:

H5: Higher ESG scores increases bank's value indirectly through bank's risk-taking in Asian commercial banks; H6: Higher ESG scores reduces bank's value indirectly through bank's risk-taking in Asian commercial banks.

3. Data and Methodology

3.1. Data Acquisition

All bank-related data is collected through BankFocus and author utilizes Asset4 as the data resource for ESG, which is recognized to be one of the most academic and valuable sources of firms' ESG engagement, both in width and depth in line with UNFI (See Figure 3) and covering more than 4500

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companies around the world.

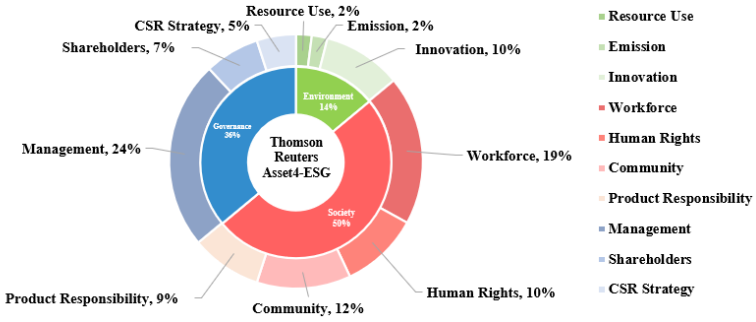

Figure 3: Asset4 ESG Score Structure in Banking Service

3.2. Models and Variables

3.2.1. Models

In order to test H1 and H3, the quantifying model of bank's risk is formulated as follows:

$$r_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 X_{it} + D_t + \varepsilon_{it} \quad (1)$$

In which the dependent variable, v_{it}, quantifies the value of bank i in period t, and model (1) has already defined ESG_{it}, r_{it}, X_{it}, and D_t, in model (2) particularly, r_{it} is measured by Z-score for the concern in data's processing availability and convenience.

$$v_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 r_{it} + \beta_3 X_{it} + D_t + \varepsilon_{it} \quad (2)$$

To test H3 and H6, that whether ESG score's impact on bank value is conditional due to their mutual influence on risk-taking, the model is designed as follows:

$$v_{it} = \beta_0 + \beta_1 ESG_{it} + \beta_2 ESG_{it} \times r_{it} + \beta_3 X_{it} + D_t + \varepsilon_{it} \quad (3)$$

Where all variables are previously defined already in the above models.

3.2.2. Variables

Source and Definition of Variables are given below (see Table 2).

Table 2: Source and Definition of Variables

Variable	Source	Description
Z-score	Author's Calculation	Return on assets plus the capital asset ratio divided by the standard deviation of returns on asset at given year
Nonperforming Loans (NpL)	BankFocus	Ratio of nonperforming loans to total loans at given year
ESG	Asset4	Weighted percentage rating at given year
Leverage (Lev)	BankFocus	The ratio of total book value of liabilities to total assets at given year
Profitability (Prof)	BankFocus	The ratio of earnings before interest and taxes to book value of total assets at given year
Loan Provisions (LP)	BankFocus	The ratio of loan loss provision to total loans at given year
Efficiency (Eff)	BankFocus	The ratio of operating expenses to total operating income at given year
Total Assets (TA)	BankFocus	Natural logarithm of total assets at given year
Tobin's q (Tq)	BankFocus	Bank's market value divided by the assets' book value at given year
Equity Price (EP)	BankFocus	Stock prices' quarterly average at given year
Crisis Dummy (Dt)	Author's Calculation	Binary constant in the period from 2007 to 2009

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3.3. Methodology

Since the lagged indicator of the dependent variable will lead to endogeneity, and the obtained parameter estimates will be biased and get non-consistent estimates, which leads to the distorted economic implications, author uses the dynamic generalized method of moments which focuses on instrumental variable, where the previous ESG scores and risk-taking variables can be used as instrument variables enabling timely ESG realizations while removing the requirement for external instruments.

4. Empirical Results

4.1. Descriptive Statistical Analysis

The descriptive statistical analysis has been shown thereinafter in Table 3 (See below).

Table 3: Descriptive Statistical Analysis (2007Q1 to 2018Q4)

Variable	Mean	Standard Deviation	Maximum	Minimum
Z-score	1.996	3.499	4.389	-7.369
NpL	2.771	3.952	76.000	0.012
Lev	9.140	3.304	79.300	0.775
Prof	0.706	0.446	28.540	0.014
LP	0.620	0.738	4.780	-0.148
Eff	5.421	1.836	27.414	1.583
TA	3.932	0.720	40.423	0.838
ESG	0.413	0.197	0.827	0.090
Tq	6.202	2.310	11.090	0.301
EP	2.955	1.292	0.128	0.001
Countries/ Regions(n)	Japan (18), China (7), Indonesia (5), Israel (3), Thailand (3), India (2), Singapore (2), Korea (2), Malaysia (2), Qatar (1), Kuwait (1), Jordan (1), Oman (1), Hong Kong (1), Taiwan (1)			

4.2. ESG and Bank's Risk-taking

The GMM estimates of Equation (1), (2) and (3) are shown in Table 4 (See below).

Columns (1) and (2) report the empirical result which significantly support the hypothesis that lower bank's risk-taking is linked with higher ESG scores, which means that the H1 is supported by the empirical result rather than H2, higher ESG scores reduces bank's risk-taking in Asian commercial banks. As it is shown in the Table 4, under each bank's risk measurements including Z-score and nonperforming loans, ESG and risk-taking are negatively, statistically significantly connected. However, the quite modest economic influence which ESG has on bank's risk-taking is unexpected, where ESG score increases one standard deviation (0.197), bank's risk-taking would only be reduced by between 2.246 and 3.408 percentage point, when the risks' sample means in bank-related characteristics measures are: Z-score, 1.996; NpL, 2.771.

It is observed that coefficients on the risk-taking variables are mostly statistically significant and in line with the literature on bank risk. It is reported that the regression coefficient between total assets and Z-score; total assets and nonperforming loans were -0.258*** and -0.029**, which were significant at the level of 1% and 5% respectively, indicating that the likelihood of bank distress and value decline are reduced by higher levels of total assets acting as buffers. The regression coefficient between profitability and Z-score, profitability and nonperforming loans were -0.009** and -1.084***, which were significant at the level of 5% and 1% respectively, indicating that banks with higher profitability are less risky since larger retained earnings allow more capital accumulation for itself. On the contrary, the regression coefficient between loan provisions and leverage with nonperforming loans were significantly positive at 0.022* and 3.943** respectively, reconfirming the fact that loan provisioning raises bank risk because of its smooth function on earnings and external monitoring prevention; leverage raises risk-taking since the losses lifted on depositors and bondholders are not internalized by banks.

Moreover, it is seen that banks have less efficiency, such as those banks lack of efficiency are

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riskier because of the limited opportunity to increase levels in capital. The Arellano-Bond and Hansen test statistics in the system GMM estimates show that there is no correlation of second-order serial in the perturbations, which further indicates that the instruments used are not correlated with the residuals.

4.3. ESG and Bank's Value

Columns (3) and (5) of Table 4 report the estimates of Equation (2). The coefficients show the correlation between each bank's value variable and ESG score, among which were mostly negative and statistically significant. Thus, H4 is supported by the empirical result rather than H3, higher ESG scores reduces value in Asian commercial banks.

In contrast to the results of bank's risk-taking, result of bank value was in line with the overinvestment theory that ESG may have reduced Asian banks' value through the division of scarcity resources for investment. This finding is also consistent with several preceding researches but stays opposed against Bolton's discovery of a positive relationship regarding banks of US. The ESG score had little influence on European banks' value, which could be named as negligible. Similarly, according to the result ESG score is increased by one standard deviation, bank's value would be reduced by between 0.225 to 2.257 percentage points, when bank values' sample means in bank-related characteristics measures are: Tobin's q, 6.202 and the equity price, 2.955.

Columns (4) and (6) of the Table 4 report the results of estimating Equation (3). The aim is to figure out whether ESG score's impact on bank value is conditional due to their mutual influence on risk-taking, as it is suggested in the coefficient on the interaction term $ESG_{it} \times r_{it}$. Considering parsimony, only those results with risk quantified by the Z-score are regressed and reported from the author. Under both Tobin'q and equity price measurements, the interaction term's coefficient is positively and statistically significant, which suggests that ESG scores and bank value are indirectly and positively correlated through their mutual influence on risk-taking. It appears that active ESG participation prevents banks from taking excessive risks, which indirectly increases bank's value, hence H5 is supported by estimates rather than H6, higher ESG scores increases bank's value indirectly through bank's risk-taking in Asian commercial banks.

Table 4: GMM Estimates of ESG, Risk-taking and Value

Variable	Z-score	NpL	Tobin'q		Equity Price	
	(1)	(2)	(3)	(4)	(5)	(6)
Risk Indicator Lag	-0.165***	0.915***	0.879***	0.872***	1.180***	0.928***
	(4.873)	(0.082)	(0.291)	(0.290)	(-0.087)	(-0.178)
Z-score			0.025*	-0.068**	-0.369**	1.242**
			(1.136)	(0.940)	(0.357)	(-0.119)
ESG × Z-score				0.314**		0.524**
				(0.403)		(0.028)
Leverage	1.963	3.943**	0.009*	0.010**	1.599***	1.996***
	(-1.739)	(6.148)	(0.129)	(-0.063)	(0.372)	(0.307)
Profitability	-0.009**	-1.084***	0.141***	0.142***	0.183***	0.159***
	(-1.146)	(5.017)	(0.089)	(0.089)	(0.074)	(0.137)
Loan_Provisions	0.374***	0.022*	-0.606**	-0.190**	-0.121**	-0.092**
	(-3.530)	(1.590)	(0.011)	(-0.160)	(0.225)	(0.263)
Efficiency	-0.367**	-0.052**	-0.025	-0.417	0.910**	1.062***
	(0.719)	(-0.403)	(0.778)	(0.841)	(0.272)	(-0.044)
Total_Assets	-0.258***	-0.029**	2.289***	2.833***	1.636***	1.519**
	(0.437)	(-2.444)	(0.008)	(0.395)	(-0.084)	(0.328)
ESG	-0.173*	-0.114***	-1.747**	-1.777**	-0.174***	-0.096**
	(-0.083)	(0.428)	(0.003)	(0.386)	(-0.093)	(0.376)
Crisis_Dummy	0.237**	0.428**	2.120***	2.129***	-0.284***	-0.228***
	(-2.587)	(-0.060)	(0.135)	(0.370)	(0.838)	(0.228)
Intercept	-1.523***	0.768**	-1.943	-1.971	-1.105**	-1.042**
	(-0.109)	(1.717)	(0.646)	(0.306)	(0.583)	(0.236)
Observations	600	600	528	528	528	528
AR (1) test (p value)	0.013	0.048	0.055	0.038	0.002	0.000
AR (2) test (p value)	0.308	0.140	0.431	0.507	0.212	0.240
Hansen test (p value)	0.525	0.540	0.645	0.412	0.726	0.617

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

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4.4. Robustness

The empirical findings are tested robust from numerous measurements in bank's risk-taking and bank's value. The author investigates whether these two indicators mentioned above are affected by ESG score differentially in Asian commercial banks at various levels as an extra robustness test. Better ESG performance is related with lower risk-taking in US businesses below the industry median, whereas other studies suggest the opposed[16]. The author investigates whether this phenomenon, risk-taking and value are differently affected by ESG in Asian commercial banks, is relating to each bank's risk and bank's value which are higher or lower evaluated compared with the median from the sample data (See Table 5 below). Considering the parsimony, the reported findings solely utilized the Z-score and Tobin's q as measurements. According to Table 4, bank's risk-taking and bank's value are both negatively and significantly correlated with ESG score, regardless of the level of bank's risk-taking and value. However, this influence is mathematically symmetrical in regression result on both sides but not equally beneficial in bank's interest where higher ESG score is appearing to have a greater decline in risk-taking for banks whose risk-taking is lowered by 1.338% among banks whose Z-scores are above the median and is lowered by 1.320% among banks whose Z-scores are below the median owing to the increase of ESG score by one standard deviation.

Apart from the above, bank value is reduced by 1.086% among banks whose Tobin's q is above the median and is reduced by 0.233% among banks whose Tobin's q is below the median owing to the increase of ESG score by one standard deviation.

Furthermore, according to the estimates on Tobin's q measurement, the correlation of ESG and risk-taking is stronger among banks with lower value than those with higher ones, where banks with value below median obtain 0.333**, and the other obtains 0.050**, despite the fact that bank's value is directly, significantly, and negatively connected with ESG score.

Table 5: GMM Estimates of ESG, Risk-taking and Value Above and Below Median

Variable	Above Median		Below Median	
	Z-score	Tobin'q	Z-score	Tobin'q
	(1)	**(2)**	**(3)**	**(4)**
Risk/Value Indicator Lag	0.828*** (0.027)	1.178*** (0.046)	0.196* (0.164)	0.255** (-0.186)
Z-score		0.432 (0.059)		-0.011 (0.156)
ESG × Z-score		0.050** (0.585)		0.333** (0.960)
Leverage	0.901*** (0.136)	-2.026 (0.793)	-1.398* (0.330)	0.787*** (0.272)
Profitability	-0.275*** (0.027)	0.307*** (0.290)	-0.639*** (-0.171)	0.183** (0.112)
Loan Provisions	0.548*** (1.474)	-0.378** (0.281)	-0.166 (5.295)	-0.047** (0.944)
Efficiency	-0.052** (0.208)	-0.963 (-0.319)	-0.102*** (0.039)	1.479* (1.995)
Total Assets	-0.409*** (0.056)	0.124** (1.044)	-0.325*** (0.027)	0.226*** (0.025)
ESG	-0.068*** (-0.150)	-0.047** (0.329)	-0.670** (0.281)	-0.101*** (0.057)
Crisis Dummy	0.466*** (0.089)	0.466*** (0.089)	0.466*** (0.089)	0.466*** (0.089)
Intercept	11.312*** (9.259)	7.519 (5.006)	-2.925 (7.536)	8.419** (4.052)
Observations	300	300	276	276
AR (1) test (p value)	0.045	0.025	0.034	0.018
AR (2) test (p value)	0.619	0.395	0.569	0.350
Hansen test (p value)	0.643	0.804	0.604	0.782

Note: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

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5. Conclusion

5.1. Summary

The empirical results report three key results.

Firstly, higher ESG scores reduces Asian commercial banks' risk-taking in regardless of the financial and nonfinancial status quo of the banks themselves including risk-taking and value; secondly, higher ESG scores reduces Asian commercial banks' value; thirdly, higher ESG scores increases Asian commercial banks' value indirectly through Asian commercial banks' risk-taking.

As a result, H1, H4, H5 are supported while H2, H3, H6 are objected.

5.2. Insights and Prospects

There is a paucity of empirical research between ESG score, risk-taking and value in the banking sector, where more studies are needed urgently to adequately fulfill current demands for an ESG-oriented approach in bank's governance, which could shift the focus of banking governance from shareholder-centered principle towards a boarder stakeholders' picture.

The finding of this paper could be further elaborated in three directions: 1) Division of ESG score, ESG score could be investigated separately from three dimensions including environment, society, and governance, which could cross-verify the result that ESG performance influences risk-taking and value, study the separate and fixed effect from ESG, and finalize which part would play the major role or generate joint effect in one certain industry such as banking; 2) Weighted Regression and Machine Learning, according to different countries or regions' GDP and ESG index published by UN, it would be applicable to set the corresponding weight to the ESG score of banks which are in the same region but face different information disclosure standards and regulatory supervisions. The weighted setting could be the simplest way to control the insufficient data noise, but on the other hand, it should be under secured and through scrutiny such as KNN method as a classic machine learning method to provide the time-series data matrix with estimated weights for variables within the model while winsorizing the data itself; 3) Adoption of other nonfinancial factors, multiple nonfinancial factors could be investigated through empirical tools, including board size, gender diversity, races and peoples, political tendency, etc. Considering that more facets of nonfinancial factors may directly or indirectly be associated with ESG's influence on risk-taking and value.

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