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ESG COMMITMENT AND BANK'S DEFAULT RISK IN EMERGING AND DEVELOPING COUNTRIES: DOES ISLAMIC BANK MATTER?

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ABSTRACT

This paper examines the impact of ESG commitment on banks' default risk in emerging and developing countries. Using a panel dataset comprising 157 banks from 28 countries over the period 2016-2022 and the Two-Step Generalized Method of Moments (2-Step GMM), it reveals that banks' ESG commitment reduces banks' probability of default (PD). Islamic banks also matter for ESG commitments, where Islamic banks have a higher probability of default than conventional banks while committing to the governance pillar. The findings of the study imply that financial authorities and banking institutions in emerging and developing countries need to spur banks' ESG commitment. However, it must be carefully implemented in Islamic banks, considering that it likely increases Islamic banks' PD. The study contributes to the empirical research concerning the nexus between ESG commitment and banks' default by extending the measurement of the probability of default and delving deep into investigating its relation to Islamic banks.

Keywords: ESG commitment, Probability of default (PD), Emerging and developing countries, Islamic banks.
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I. INTRODUCTION

Bank default has become an endless concern to be discussed, considering the bank's vital role as an intermediary in the financial system. In fact, there are many cases during financial distress when a bank's default turns systemic and contagious that endanger market players in the financial system. As a result, rectifying a bank's failure is difficult compared to a nonbank's failure because it costs stakeholders, including the taxpayers, financial authorities, and other related stakeholders (Citterio & King, 2023). Many financial authorities attempt to mitigate the risk of banks' failure through several financial policies to ensure that the banks remain stable and do not create potential risks that may systemically and contagiously affect the financial system.

In addition, the current issue of sustainable development has become an increasingly important consideration for financial stakeholders, which is believed to impact banking stability. For instance, there is the Network for Greening Financial System (NGFS), with 138 members consisting of central banks and financial regulators across the globe (NGFS, 2024), that supports the role of banks in the greening financial system in which climate risk becomes the source of financial risk that affect the banking sectors (NGFS, 2019). Other financial institutions, including the European Banking Authority (2020), the European Central Bank (2021), and the Central Bank of England (2021), raise the same concern. These institutions focus on banks' commitment to Environmental, Social, and Governance (ESG) and their relation to the bank's risk.

Similarly, in the case of Islamic banks, there is a growing interest in linking banking sectors and sustainability practices. Practically, it can be seen from the initiative by the Central Bank of Malaysia (2018) through the Value-Based Intermediation (VBI) initiated in 2018 and from the General Council for Islamic Banks and Financial Institutions (CIBAFI) on the sustainability guidelines in 2022 (CIBAFI, 2022). The rationale for Islamic banks' ESG commitment is based on the argument that the aspiration behind the establishment of Islamic banks is based on the Islamic moral economy approach (Asutay, 2013). Aracil (2019) also asserts that sustainability practices by Islamic banks are motivated by the informal institutions derived from Shariah principles embedded within Islamic banks, while conventional banks implement sustainability practices due to their obedience to regulatory concerns imposed by financial authorities. Considering the different principles in Islamic banking operations, this leads to the research question: Do Islamic banks, which inherently embrace ESG, have lower bank default risk with more ESG commitment in comparison with conventional banks?

There are limited but growing interest in the impact of ESG commitment on banks' default. Existing studies on the relationship between ESG commitment and the probability of default by Badayi et al. (2021) and Palmieri et al. (2023) find that ESG commitment decreases the probability of default, while Li et al. (2022) claim that ESG commitment increases the probability of default. These studies focus on non-financial firms. In the case of banking sector, to the best of our knowledge, only Di Tommaso & Thornton (2020), Chiaramonte et al. (2022), and Citterio & King (2023) focus on bank default risk, while Liu et al. (2023) and Salim et al. (2023) emphasize on the issue of banks' financial stability. Di Tommaso & Thornton (2020) find that ESG reduces bank default risk, while Chiaramonte et al. (2022)

conclude that it is insignificant. In addition, Citterio & King (2023) claim that ESG is a significant predictor of a bank's default. However, the findings of those studies remain inconclusive, showing that the impact of ESG on bank default in the previous studies is unclear. Therefore, this study aims to examine the influence of ESG commitment on banks' default performance, emphasizing the presence of Islamic banks in emerging and developing countries.

The position of this study among the existing empirical literature is twofold. Firstly, it emphasizes the presence of Islamic banks in emerging and developing countries by examining their potential difference from conventional banks in relation to bank default when ESG commitment is implemented. The previous studies remain meager and do not sufficiently explain the impact of ESG on Islamic banking performance (Alam et al. 2022; Nizam et al. 2019). In addition, prior studies mostly focus on developed countries (See Di Tommaso & Thornton, 2020; Chiaramonte et al., 2022; Citterio & King, 2023). As explained by Azmi et al. (2021), amid high economic uncertainty in emerging and developing countries, banks' ESG commitment signals banks' credibility, competitiveness, and transparency that reflect their sound financial performance.

Secondly, the study adopts and extends the measurement of probability of default. The probability of default is carefully estimated following Kenc et al. (2021) and the distance-to-capital proposed by Sy & Chan-Lau (2006). These measurements differ from Chiaramonte et al. (2022), who apply the distance-to-default measurement that is impractical for the result's interpretation. Moreover, the accounting-based measures to proxy bank default used by Di Tommaso & Thornton (2020) and Citterio & King (2023) are backward-looking. According to Kenc et al. (2021), adopting the probability of default based on the market measurement is more appropriate and practical because it is forward-looking and hence benefits banks' stakeholders, especially from the investors' side, to capture future market direction.

The study is significant in informing financial authorities and bank practitioners regarding the impact of banks' ESG commitment on banks' default, emphasizing the presence of Islamic banks in emerging and developing countries. It is pivotal for formulation of necessary financial policies at the industrial and banking levels. In addition, it also contributes to empirical research development by examining the nexus between ESG commitment and banks' default in emerging and developing countries, and then investigating the potential different effects for Islamic and conventional banks. The remainder of this study is structured as follows. The next section explains the literature review, followed by the data and method in the ensuing section. After that, the result and discussion are explained and followed by the conclusion section.

II. LITERATURE REVIEW

2.1. Theoretical Framework

In the literature, the nexus between ESG commitment and bank's default risk is based on whether firms are accountable to only shareholders or to stakeholders at large. According to Friedman (1970), firms are only acountable to their shareholders. A corporation is an artificial person and hence does not have social

responsibility. By contrast, Freeman (1984) note that beyond "business concerns", an organization must have "social and ethical concerns". It views the organization from a contractual rights theory viewpoint, indicating that it is responsible for performing social and environmental duties to the stakeholders, in addition to a profit-seeking motive (Soppe, 2004). In the same vein, Elkington (1997) states that the performance of firms must not be seen only from economic or financial performance, but also from environmental and social performance, which is called sustainable finance.

This is further supported by the United Nations initiative stating that firms are required to be sustainable through implementing Environmental, Social, and Governance (ESG) practices (United Nations, 2004). Those ESG activities are believed to be significant in strengthening financial institutions' trust, reinforcing the financial market, and obtaining more engagement from stakeholders. In addition, Harrison & Wicks (2013) state that firms are more valuable when prioritizing stakeholders' interests. Therefore, in the long term, putting stakeholders' interests as a priority impacts firm's financial performance (Waddock & Graves, 1997; Hillman & Keim, 2001; Edmans, 2023).

Concerning Islamic banks' ESG commitment and their relations to banks' default risk, the rationale mentioned above is in line with the concept of financial sustainability, in which Islamic finance also has a social role in providing Islamic social finance for the needy (Khan, 2019). In addition, Asutay (2013) explains that, under the theory of Islamic Moral Economy (IME), Islamic economics and finance attempt to promote justice in economic activities, considering the role of economic and financial activities that significantly contribute to social impact and good. IME is in alignment with stakeholders' approach that all economic and financial activities must promote accountability to all stakeholders. It attempts to solve the current problems and has an intergenerational viewpoint by preserving economic and financial resources for the future. Therefore, it adopts a balanced growth viewpoint, ensuring that not only commercial or economic/financial sectors have significant growth but also takes adequate attention to environmental, social, and other related sectors to grow concurrently.

Moreover, the self-congruence theory, proposed by Malär et al. (2011) which has been contextualized in the case of Islamic banks by Bukhari et al. (2020), posits that implementing sustainability practices in Islamic banks strengthens their value. It also shows that sustainability commitment aligns with the value proposition of Islamic banks, indicating that the commitment has been inherently embedded in Islamic banking operations, resulting in an increase in stakeholders' trust in Islamic banks. Khan & Badjie (2022) emphasize that Islamic finance commits to dealing with environmental and social issues in alignment with Maqasid al-Shariah.

However, performing environmental and social sustainability is insufficient if the interest rate is still embedded in the business models. This is also stressed by Chapra (1996), stating that financing activities based on interest is exploitative and creates social problems, which is not in line with the concept of sustainability. Thus, Khan & Badjie (2022) argue that besides implementing environmentally and socially sustainable activities, the financing free from an interest-based element has to be considered. As a consequence of this, Islamic banks have different corporate governance frameworks and structures to ensure that the banks are

in Shariah compliance, including avoiding prohibited financial activities such as interest-based financial transactions (Mollah et al., 2017; Laldin & Furqani, 2018). This framework and structure create more complexity compared to conventional banks and lead to an increase in Islamic banks' expenditure in implementing their governance activities (Mollah et al., 2017).

2.2. Previous Studies and Hypothesis Development

Empirically, there are limited studies investigating the link between ESG commitment and bank's default risk. Among them, most studies generally focus on the relationship between ESG and banking performance and document conflicting results. In the first strand of the literature, ESG commitment supports banking performance as in Chiaramonte et al. (2022), Citterio & King (2023), Andrieș & Sprincean (2023), Liu et al. (2023), and Agnese & Giacomini (2023). The reason behind the findings is that ESG activities (1) strengthen the reputation of banks, (2) lower banks' cost of funds, and (3) increase the credibility of banks.

All these reasons strengthen the banking performance, resulting in reduction of banks' default risk. For instance, Chiaramonte et al. (2022) highlight the role of banks' ESG commitment during financial turmoil, which has a positive and significant relationship to the distance to default. This means that ESG increases the bank's stability during the crisis period. The same results are also present when the ESG is separated into its pillars. According to their findings, European banks that carry environmental responsibilities, contribute to community development, satisfy employees in their working environments, and have good corporate governance have better financial stability during the crisis (Chiaramonte et al., 2022). Therefore, in this context, ESG implementation by the banks seems like insurance in which the banks performing ESG have better financial stability during unstable economic conditions (Chiaramonte et al., 2022).

In the second strand of literature, ESG does not strengthen banks' financial performance, as found by Di Tommaso & Thornton (2020) and Salim et al. (2023) for the reasons: (1) limited source of funds and (2) overspending in ESG activities. That reason confirms that banks' ESG commitment increases financial instability and leads to higher probability of default. For example, Di Tommaso & Thornton (2020) find that ESG has a negative and significant relationship to Z-score, concluding that ESG increases bank's operational cost. This finding hold even for ESG pillars, namely environmental, social, and governance pillars.

In another study, Salim et al. (2023) examine the relationship between corporate environmental performance (CEP) and corporate social performance (CSP) and banking stability. The findings reveal that CEP is negatively and significantly related to banks' stability. It shows that banks face a trade-off between CEP and risk. When it spends on environmental activities, bank stability drops as funds become insufficient to manage the risks. In a country with stricter environmental regulations, the bank is more unstable in terms of risk management. It also occurs because the bank invests too much in environmental activities to abide by government regulations (Salim et al., 2023). Concerning the discussion above, we formulate the following hypothesis.

H1: ESG commitment has a significant relationship to banks' probability of default

In addition, a few studies on the impact of ESG on Islamic banking performance include Aracil (2019), Nizam et al. (2019), and Alam et al. (2022). Nizam et al. (2019) find that Islamic and conventional banks have the same performance when banks' ESG commitments are present, although both banks' business models are indifferent. In contrast, Alam et al. (2022) state that ESG commitment affects Islamic banks differently compared to conventional banks. Additionally, Aracil (2019) concludes that Islamic banks' ESG commitment is self-driven by the Shariah principles, while conventional banks are driven by the external pressure to abide by the regulations. It shows that ethical business principles are embedded in Islamic banks' operations, showing that Islamic banks have more commitment to sustainability practices than conventional banks, which likely increase Islamic banks' value (Bukhari et al., 2020). Unfortunately, none of these studies discusses Islamic banks' default risk. Considering the discussion above, we develop the following hypothesis:

H2: there is a difference in the relationship between ESG commitment and banks' probability of default for Islamic and conventional banks.

III. METHODOLOGY

To examine the impact of ESG commitment on banks' default risk in emerging and developing countries, we adopt a Two-Step Generalized Method of Moments (2-Step GMM) based on Arellano & Bover's (1995) and Blundell & Bond's (2023) approach. In addition, Windmeijer's (2005) approach is also applied to address the issue of downward bias in dynamic panels. In terms of the sample selection criteria, we follow Kabir et al. (2015) and Ibrahim & Rizvi (2018) who suggest having a minimum of three consecutive periods while applying the 2-Step GMM. In total, this study has 157 banks in 28 countries from the period 2016 to 2022 that fulfill sample selection criteria (See Appendix 1).

The baseline model to investigate the influence of ESG commitment (ESG) on banks' probability to default (PD), proxied by distance-to-default (PD_DTD) and distance-to-capital (PD_DTC) is:

$$PD_{it} = a_0 + a_1 PD_{it-1} + a_2 ESG_{it-1} + a_3 x_{it-1} + a_4 y_{jt} + \varepsilon_{ijt} \quad (1)$$

where $ESG_{it\text{-}1}$ is ESG score lagged 1, $x_{it\text{-}1}$ is a vector of bank-specific variables lagged 1, and y_{jt} is a vector of macroeconomic and institutional development variables (See Table 1). The study then delves deep into assessing how each ESG pillar comprising environmental (E), Social (S), and Governance (G)[1] affects banks' default as formulated in equation 2.

1 According to LSEG (2023), environmental pillars represent 14.4% of ESG measurement weightage consisting of resource use (2.4%), emission (2.4%), and innovation (9.6%), while social pillars represent 49.6% of ESG measurement weightage comprising workforce (19.2%), human rights (9.6%), community (12%), and product responsibility (8.8%). Additionally, governance pillars have 36% of ESG measurement weightage, which are management (24%), shareholders (7.2%), and CSR strategy (4.8%).

$$PD_{it} = a_0 + a_1 PD_{it-1} + a_2\, E/S/G_{it-1} + a_3 x_{it-1} + a_4 y_{jt} + \varepsilon_{ijt} \quad (2)$$

In addition, the difference in ESG commitment between Islamic and conventional banks in relation to banks' probability of default is investigated by interacting ESG and its pillars with Islamic banks (IB) where 1= Islamic banks, 0= conventional banks as shown in equation 3.

$$PD_{it} = a_0 + a_1 PD_{it-1} + a_2 ESG_{it-1} + a_3 (ESG_{it-1} * IB_{it}) + a_4 x_{it-1} + a_5 y_{jt} + \varepsilon_{ijt} \quad (3)$$

The study follows Chiaramonte et al. (2022), Abdul Razak et al. (2023), Salim et al. (2023), and Ibrahim & Rizvi (2017) in using the lags of ESG, ESG pillars, and bank-specific variables to address the endogeneity problem, considering that bank-level variables, that are contemporaneous, are possibly correlated with the error term (Ibrahim & Arundina, 2022).

Table 1.
Variable Definition

Variable	Definition	Data Source
Dependent Variables		
Distance to default (PD_DTD)	Merton's distance to default approach with considering the debt barrier	Bloomberg Database (Self-calculated)
Distance to capital (PD_DTC)	The extended Merton's distance to default approach with considering the capital barrier	Bloomberg Database (Self-calculated)
Main Independent Variables		
ESG Values (L.ESG)	Lag of the aggregate score of ESG performance measured by Refinitiv Eikon	Refinitiv Eikon
Environment (L.E)	Lag of the score of the bank's environmental performance measured by Refinitiv Eikon	Refinitiv Eikon
Social (L.S)	Lag of the score of the bank's social performance measured by Refinitiv Eikon	Refinitiv Eikon
Governance (L.G)	Lag of the score of the bank's governance performance measured by Refinitiv Eikon	Refinitiv Eikon
Bank-Specific Variables (Controlling Variables)		
Capital (L.ETA)	Lag of total equity divided by total assets then multiplied by 100	Fitch Connect
Asset Quality (L.NPL)	Lag of nonperforming loan/financing divided by total loan/financing then multiplied by 100	Fitch Connect
Management Efficiency (L.CTI)	Lag of the ratio of cost to income then multiplied by 100	Fitch Connect
Liquidity (L.TDTA)	Lag of total deposit divided by total asset then multiplied by 100	Fitch Connect
Revenue Diversification (L.REVDIV)	Lag of variation of net operating income comprising income from financing and non-financing activities then multiplied by 100	Fitch Connect (Self-calculated)
Size (L.LNTA)	Lag of log of bank's total asset	Fitch Connect
Dummy Islamic Bank (IB)	Dummy variable, 1= Islamic bank and 0 = conventional bank	-

Table 1.
Variable Definition (Continued)

Variable	Definition	Data Source
Macroeconomic-specific variables (Controlling Variables)		
Economic Growth (EG)	The percentage of yearly growth of gross domestic product	World Bank Indicator
Inflation (INF)	The percentage of consumer price index	World Bank Indicator
HHI	The Herfindahl-Hirschman Index (HHI) is calculated from the total squared bank's total assets of all banks at the country level, then multiplied by 100	World Bank Indicator (Self-calculated)
COVID	Dummy variable, 1= during the period of the COVID-19 pandemic and 0 = other periods	-
Governance-specific variable (Controlling Variable)		
Governance Index (GOV)	The average score of six governance indicators comprising the rule of law, regulatory quality, political stability, control of corruption, voice and accountability, and government effectiveness	World Bank Indicator

To estimate the probability of default (PD), we follow the work of Kenc et al. (2021), which is based on Merton's (1974) approach:

$$PD_t = Prob(A_{t+T} \leq K_t \mid F_t) = Prob[ln(A_{t+T}) \leq ln(K_t) \mid F_t] \quad (4)$$

The basic model assumes that a company (bank in this paper) has a certain amount of debt at time t that needs to be paid at time t+T with the assumption of zero-coupon debt. When the value of the bank's asset (A) is less than the value of debt (K) at time t+T, the default condition is present. Therefore, the higher the PD, the higher bank's probability of default is. Under Merton's (1974) approach of distance-to-default (DTD), the value of K is assumed to be constant until t+T and F_t is the information available at time t.

To estimate PD, a stochastic process is required to specify the dynamic of A. This is formulated in equation 5.

$$dA_t = \mu_A A_t dt + \sigma_A A_t dW_t \quad (5)$$

where expected compounded and continuous return is μ_A, the bank's asset return volatility is σ_A, and a standard Wiener process is dW. In addition, Merton (1974) assumes that over the bank's life, the value of μ_A and σ_A are constant as explained in equation 6.

$$lnA_{t+T} = lnA_t + (\mu_A - \frac{1}{2}\sigma_A^2)T + \sigma_A\sqrt{T}z_{t+T} \quad (6)$$

where

$$z_{t+T} = \frac{w_{t+T} - w_t}{\sqrt{T}} \quad and \; z_{t+T} \sim N(0,1) \tag{7}$$

Substituting (6) into (4), we obtain:

$$PD = N[lnA_t - ln(K) + (\mu_A - \frac{1}{2}\sigma_A^2)T + \sigma_A\sqrt{T}z_{t+T} \leq 0] \tag{8}$$

$$PD = N(-DTD \geq z_{t+T}) \tag{9}$$

where

$$DTD = \frac{\ln\left(\frac{A}{K}\right) + \left(\mu_A - \frac{1}{2}\sigma_A^2\right)T}{\sigma_A\sqrt{T}} \tag{10}$$

The formulation in equation 9 by Merton (1974) adopts the probability of default based on distance-to-default (PD_DTD), which applies the bank's assets as a default barrier to fulfill the banks' liability.

In the context of the banking industry, Sy & Chan-Lau (2006) argue that DTD must consider the nature of the banking industry, in which the financial authority usually issues prompt corrective action (PCA) to respond to financial turmoil experienced by the banks through the capital requirement policy. Consequently, how the bank can fulfill its liability must be seen from the bank's capital viewpoint. This condition is then called distance-to-capital (DTC), formulated as follows.

$$DTC = \frac{\ln\left(\frac{A}{\lambda K}\right) + \left(\mu_A - \frac{1}{2}\sigma_A^2\right)T}{\sigma_A\sqrt{T}} \tag{11}$$

where

$$\lambda = \frac{1}{1 - PCAR} \tag{12}$$

where PCAR is the capital adequacy ratio. In this study, the Basel III capital adequacy ratio is adopted, which is 8% (Basel Committee on Banking Supervision, 2011), to calculate the DTC value.

IV. RESULTS AND ANALYSIS

4.1. Descriptive Statistics and Probability of Default Estimation Result

Table 2.
Descriptive Statistic

Variable	All Banks			Conventional Banks			Islamic Banks		
	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.	Obs	Mean	Std. dev.
PD_DTD	1,017	36.322	20.794	910	37.140	21.045	107	29.361	17.076
PD_DTC	1,017	41.107	21.106	910	41.940	21.300	107	34.023	17.959
ESG	954	52.102	19.126	872	54.097	18.183	82	30.882	15.804
E	954	44.643	28.333	872	47.502	27.433	82	14.238	18.120
S	954	54.889	23.847	872	57.463	22.688	82	27.510	18.050
G	954	53.523	21.813	872	54.467	21.540	82	43.490	22.305
ETA	1,094	10.830	3.902	982	10.791	3.999	112	11.171	2.914
NPL	1,080	3.852	2.890	968	3.896	2.852	112	3.474	3.188
CTI	1,094	43.595	12.701	982	44.033	12.670	112	39.755	12.372
TDTA	1,094	72.148	14.207	982	71.125	14.547	112	81.121	5.183
REVDIV	1,094	10.300	5.988	982	10.586	6.232	112	7.789	1.654
TA (USD Bn)	1,094	219	610	982	240	641	112	33.4	33.4
HHI	1,099	12.039	5.885						
EG	1,099	3.091	3.933						
INF	1,096	3.630	3.999						
GOV	1,099	0.019	0.465						

The estimation results of the probability of default are exhibited in Table 2, which is also explained in Figures 1 and 2, showing the bank's default risk from 2016 to 2022. In the case of PD_DTD, conventional banks have closely followed the movement of PD_DTD for all banks in emerging and developing countries. The PD_DTD score of all banks is higher in 2020 and 2021 by 39.90% and 38% compared to other periods while it is higher by 41.31% and 39.58% for conventional banks. It indicates an increase in financial instability during the Covid -19 pandemic. In contrast, during the pandemic period, Islamic banks were not significantly influenced by the rise of financial instability. It shows that Islamic banks are more stable during the financial turmoil in 2020 and 2021.

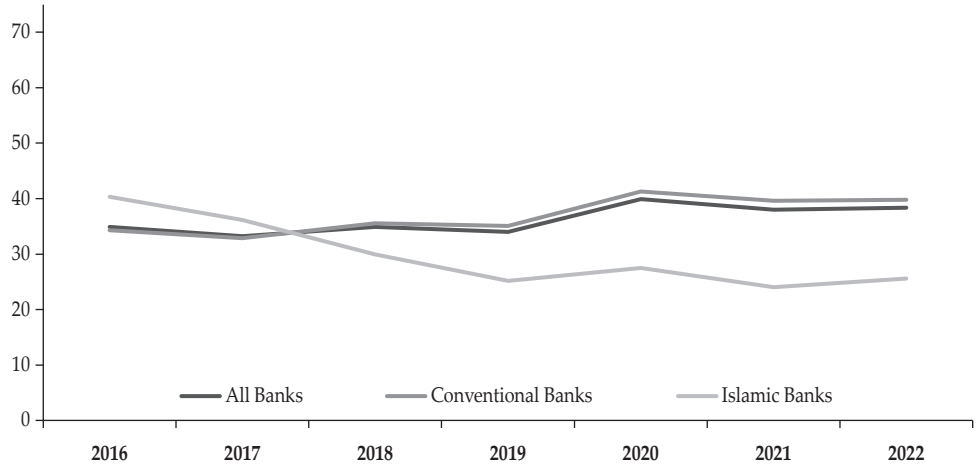

Figure 1.
Probability of Default Based on Distance-to-Default (PD_DTD)

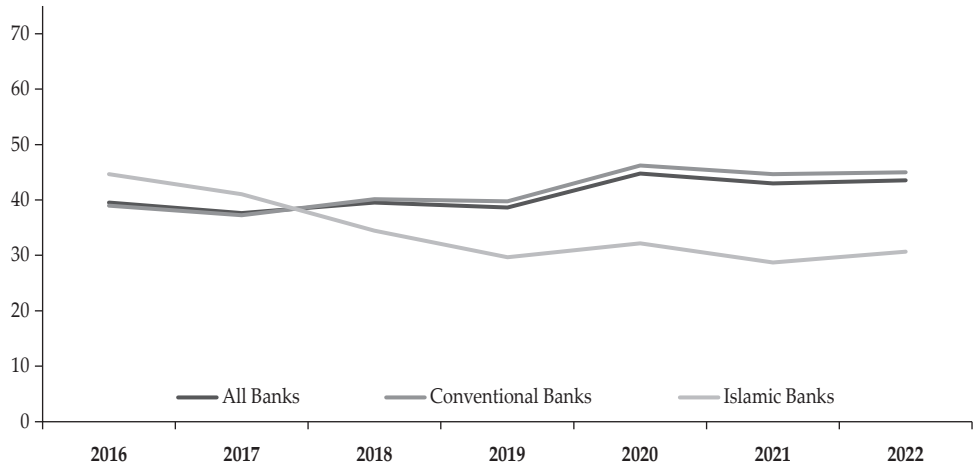

Figure 2.
Probability of Default Based on Distance-to-Capital (PD_DTC)

PD_DTC is overall higher than distance-to-default. It occurs because the barrier used in the distance-to-capital model is the bank's capital instead of the bank's assets. In general, the trend of the movement is similar to PD_DTD. The finding of the study reveals that Islamic banks are more stable during the pandemic period, with the PD_DTC score of 32.15% and 28.70% in 2020 and 2021. On the contrary, overall, banks in emerging and developing countries are riskier, with 44.76% and 43% of PD_DTC scores during 2020 and 2021. The finding of PD_DTC confirms that Islamic banks are better off than other banks in emerging and developing countries.

In the ESG commitment (See Table 2), banks in emerging and developing countries have an aggregate score of 52.10 with environmental, social, and governance scores of 44.64, 54.88, and 53.52, respectively. The ESG pillars' score indicates that banks in emerging and developing countries focus on the social and governance pillars instead of the environmental one. The same trend occurs in conventional banks but differs from Islamic banks, which significantly emphasize the governance pillar. In addition, Islamic banks' ESG commitment is still left behind compared to other banks in emerging and developing countries, indicating that the banks may not have sufficient concern for ESG commitment.

4.2. Baseline Result

The baseline result of the influence of ESG and its pillars on PD_DTD is exhibited in Table 3. Model 1 shows that L.ESG has a negative and significant relationship at a 10 percent significance level to PD_DTD. According to the coefficient results, an increase in one standard deviation of ESG commitment reduces 1.8 (19.126 x -0.094) percentage points of the probability of default score, indicating that ESG reduces the banks' probability of default. We also document the negative and significant relationship between the L.G and PD_DTD. Our result suggests that an increase of one standard deviation in the governance pillar of ESG reduces 2.33 (21.813 x -0.107) percentage points of banks' probability of default in emerging and developing countries. However, for environmental (L.E) and social (L.S) pillars, the results are not statistically significant, meaning that they do not influence banks' probability of default.

Table 3.
The Relationship Between ESG and Its Pillars to PD_DTD

Variables	Model 1	Model 2	Model 3	Model 4
L.PD_DTD	0.354	0.163	**0.345***	**0.409****
	(1.213)	(0.701)	(1.723)	(2.514)
L.ESG	-0.094*			
	(-1.667)			
L.E		0.001		
		(0.033)		
L.S			-0.044	
			(-0.970)	
L.G				-0.107**
				(-2.440)
Bank Control	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes

Table 3.
The Relationship Between ESG and Its Pillars to PD_DTD (Continued)

Variables	Model 1	Model 2	Model 3	Model 4
Cons	17.883	35.679	19.760	14.736
	(0.494)	(0.480)	(0.598)	(0.601)
No of obs.	764	764	764	764
No of bank	157	157	157	157
No of inst.	17	18	18	18
AR1	0.155	0.369	0.028	0.003
AR2	0.513	0.831	0.526	0.514
Hansen test	0.449	0.103	0.204	0.128

t statistics in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In Table 4, we examine the impact of ESG on PD_DTC. Th results indicate that ESG has a negative and significant relationship with PD_DTC at a 5 percent significance level (see model 1). According to the coefficient value, an increase of one standard deviation of ESG score reduces 2.20 (19.126 x -0.115) percentage points of banks' probability of default. Moreover, L.G. also has a negative and significant relationship with PD_DTC, as shown in model 4. An increase of one standard deviation the governance pillar score lowers up to 3.27 (21.813 x -0.150) percentage points of banks' probability of default using the distance-to-capital approach. Further, the results in Models 2 and 3 suggest that the impact of L.E and L.S on PD_DTC is not significant. In all, the findings in the PD_DTC approach is generally in line with those documented for PD_DTD.

Table 4.
The Relationship Between ESG and Its Pillars to PD_DTC

Variables	Model 1	Model 2	Model 3	Model 4
L.PD_DTC	0.572	0.549	0.352	0.163
	(1.473)	(1.379)	(1.530)	(0.733)
L.ESG	-0.115**			
	(-2.433)			
L.E		-0.001		
		(-0.019)		
L.S			-0.049	
			(-1.079)	
L.G				-0.150**
				(-2.221)

Table 4.
The Relationship Between ESG and Its Pillars to PD_DTC (Continued)

Variables	Model 1	Model 2	Model 3	Model 4
Bank Control	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes
Cons	-36.091	-22.839	15.389	11.146
	(-0.646)	(-0.375)	(0.456)	(0.185)
No of obs.	764	764	764	763
No of bank	157	157	157	156
No of inst.	17	17	18	19
AR1	0.117	0.125	0.071	0.463
AR2	0.685	0.868	0.686	0.517
Hansen test	0.107	0.111	0.112	0.108

t statistics in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3. Further Result: Does Islamic Bank Matter?

An interaction variable is applied to assess whether Islamic banks are better than conventional banks in terms of banks' probability of default while they commit to ESG activities and ESG pillars. Table 5 exhibits the effect of the interactions beteerm Islamic bank dummy and ESG measures on PD_DTD. The findings reveal that the interaction variable between ESG and Islamic banks (L.ESG*IB), the environmental pillar of ESG and Islamic banks (L.E*IB), and the social pillar of ESG and Islamic banks (L.S*IB) are not significant at any level (see Models 1 to 3). The statistical results show no difference between Islamic and conventional banks in the relations betweem aggreagte ESG score, and the environmental and social pillars and the distance to default. Only the interaction between the governance pillar of ESG and Islamic banks (L.G*IB) carries a positive and significant coefficient at a 5 percent significance level, meaning that Islamic banks have a higher probability of default compared to conventional banks. The finding also explains that Islamic banks have a 0.508 percentage point higher probability of default compared to conventional banks when implementing the governance pillar of ESG. In other words, Islamic banks are riskier in terms of the probability of default than their counterparts.

Table 5.
The Relationship Interaction Variable of ESG and Its Pillars with Islamic Banks to PD_DTD

Variables	Model 1	Model 2	Model 3	Model 4
L.PD_DTD	0.147	0.134	0.164	0.037
	(0.852)	(0.753)	(0.959)	(0.153)
L.ESG*IB	0.020			
	(0.142)			
L.ESG	-0.039			
	(-0.494)			
L.E*IB		-0.010		
		(-0.122)		
L.E		0.005		
		(0.151)		
L.S*IB			0.038	
			(0.392)	
L.S			-0.052	
			(-0.974)	
L.G*IB				0.508**
				(2.013)
L.G				-0.133
				(-1.385)
IB	-8.284	-6.791*	-9.114*	-27.257**
	(-1.305)	(-1.873)	(-1.786)	(-2.388)
Bank Control	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes
Cons	46.173	51.647	39.957	38.337
	(1.250)	(1.442)	(1.147)	(0.658)
No of obs.	763	763	764	764
No of bank	156	156	157	157
No of inst.	21	21	21	20
AR1	0.247	0.280	0.215	0.321
AR2	0.634	0.560	0.741	0.651
Hansen test	0.163	0.149	0.188	0.423

t statistics in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In Table 6, the PD_DTC is adopted to measure whether Islamic banks differ from conventional banks when implementing ESG and its pillar activities. The findings show that only the interaction between the governance pillar of ESG and Islamic banks (L.G*IB) is statistically and positively significant. It sheds light on the fact that Islamic banks have a higher PD_DTC than conventional banks, indicating a difference between the two sorts of banks. Precisely, according to the coefficient value in the interaction variable (see model 4), Islamic banks have a higher PD_DTC of 0.469 percentage points compared to their counterpart when implementing the governance pillar of ESG.

Table 6.
The Relationship Interaction Variable of ESG and Its Pillars with Islamic Banks to PD_DTC

Variables	Model 1	Model 2	Model 3	Model 4
L.PD_DTC	0.183	0.163	0.302	0.036
	(0.997)	(0.866)	(0.915)	(0.153)
L.ESG*IB	0.057			
	(0.407)			
L.ESG	-0.130*			
	(-1.883)			
L.E*IB		-0.023		
		(-0.260)		
L.E		0.009		
		(0.236)		
L.S*IB			0.022	
			(0.233)	
L.S			-0.043	
			(-0.870)	
L.G*IB				0.469**
				(2.071)
L.G				-0.121
				(-1.377)
IB	-11.418*	-6.830*	-7.251	-25.229**
	(-1.738)	(-1.842)	(-1.479)	(-2.462)
Bank Control	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes

Table 6.
The Relationship Interaction Variable of ESG and Its Pillars with Islamic Banks to PD_DTC (Continued)

Variables	Model 1	Model 2	Model 3	Model 4
Cons	24.673	44.273	25.410	38.957
	(0.744)	(1.218)	(0.592)	(0.735)
No of obs.	764	764	764	764
No of bank	157	157	157	157
No of inst.	21	21	18	20
AR1	0.317	0.299	0.284	0.360
AR2	0.897	0.570	0.749	0.662
Hansen test	0.194	0.160	0.355	0.413

t statistics in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Delving deep into the sub-pillars of each ESG pillar, this paper then investigates which sub-pillars explain the difference between Islamic and conventional banks when practicing ESG commitment. The findings of the study reveal that Islamic banks are not better off than conventional banks in terms of banks' probability of default when committing to the governance pillar, specifically in the management score (See Table 7). It can be seen from a positive and significant relationship between IB*Sub-pillar (G1) and PD_DTD, indicating that Islamic banks have a higher probability of default, amounting to 0.408 percentage points when committing to the management sub-pillar. Similarly, a point increase in Islamic banks' commitment to management score results in an increase in banks' probability to default based on distance to capital amounting to 0.387 percentage points (See Table 8).

To discuss the findings of the study, by focusing on the nexus of ESG commitment and banks' probability of default, the finding reveals a negative and significant influence of ESG on banks' probability of default measurement. The result is also consistent for all measurements of banks' default risk proxied by the probability of default using the distance-to-default approach (PD_DTD) and the distance-to-capital approach (PD_DTC). It generally uncovers the condition that when banks in emerging and developing countries implement ESG activity, it lowers banks' probability of default. This finding is different from Di Tommaso & Thornton (2020), who find that ESG increases banks' default risk because banks have limited sources of funds. Thus, committing to ESG activity reduces banks' source of funds for managing risks (Di Tommaso & Thornton, 2020). Similarly, Chiaramonte et al. (2022) show that ESG implementation does not significantly affect banks' probability of default.

However, other strands of empirical evidence by Liu et al. (2023) support the findings of the study, revealing that banks' ESG implementation decreases banks' risk. Banks with higher ESG scores are cost-saving, indicating that the banks have a better level of financial efficiency (Liu et al., 2023). It may give banks lower risks

due to prudent financial management. Furthermore, Citterio & King (2023) argue that ESG becomes a crucial element in determining banks' bankruptcy risk. It also confirms that implementing ESG matters for banking stability.

As explained by Buallay (2019) and Khoury et al. (2023), banks implementing ESG activities have lower cost of funding and higher financial reputation in the market (Azmi et al., 2021). ESG commitments improve the credit rating and credibility of the banks (Chiaramonte et al., 2022). Considering these conditions, it certainly gives banks more access to funding at a lower cost. That condition also potentially assists banks in managing their risk, especially liquidity risks, which are crucial for banks located in emerging and developing countries. Therefore, banks performing ESG activities are expected to have more financial stability, including in managing their risk.

Table 7.
The Relationship Between Interaction Variable of ESG Sub-pillars and Islamic Banks to PD_DTD

Variables	Environmental Pillars			Social Pillars				Governance Pillars		
	E1	E2	E3	S1	S2	S3	S4	G1	G2	G3
L.PD_DTD	0.242	0.257	0.156	0.302	0.464*	0.271	0.345	0.025	0.051	0.053
	(1.191)	(1.337)	(0.918)	(0.947)	(1.882)	(0.805)	(1.110)	(0.098)	(0.217)	(0.211)
L.Sub-Pillars*IB	-0.117	-0.137	-0.061	0.042	-0.019	0.071	0.021	0.408*	0.150	-0.077
	(-1.511)	(-1.429)	(-0.808)	(0.526)	(-0.225)	(0.961)	(0.316)	(1.899)	(0.883)	(-0.595)
L.Sub-Pillars	0.005	0.006	0.007	-0.062	0.016	-0.084*	0.023	-0.103	-0.029	-0.021
	(0.103)	(0.099)	(0.197)	(-1.332)	(0.426)	(-1.748)	(0.641)	(-1.465)	(-0.560)	(-0.391)
IB	-5.025	-5.355	-6.393*	-9.137*	-4.826*	-10.010*	-6.198	-22.840**	-14.142	-4.906
	(-1.185)	(-1.269)	(-1.770)	(-1.701)	(-1.679)	(-1.793)	(-1.545)	(-2.274)	(-1.401)	(-0.719)
Bank Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cons	41.712	40.893	49.609	29.075	22.175	30.714	36.832	42.205	46.143	39.569
	(1.043)	(1.003)	(1.314)	(0.689)	(0.550)	(0.730)	(0.797)	(0.679)	(0.826)	(0.714)
No of obs.	763	763	763	763	763	763	763	763	763	763
No of bank	156	156	156	156	156	156	156	156	156	156
No of inst.	21	21	21	18	18	18	18	20	20	20
AR1	0.118	0.082	0.186	0.248	0.024	0.302	0.148	0.374	0.356	0.396
AR2	0.866	0.828	0.505	0.572	0.422	0.453	0.655	0.658	0.764	0.924
Hansen test	0.351	0.319	0.144	0.419	0.249	0.574	0.311	0.381	0.272	0.198

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In this regression, environmental pillars consist of resource use (E1), emission (E2), and innovation (E3), while social pillars comprise workforce (S1), human rights (S2), community (S3), and product responsibility (S4). Additionally, governance pillars are management (G1), shareholders (G2), and CSR strategy (G3).

Table 8.
The Relationship Between Interaction Variable of ESG Sub-pillars and Islamic Banks to PD_DTC

Variables	Environmental Pillars			Social Pillars				Governance Pillars		
	E1	E2	E3	S1	S2	S3	S4	G1	G2	G3
L.PD_DTC	0.214	0.237	0.158	0.224	0.400	0.190	0.282	0.017	0.053	0.058
	(0.828)	(0.967)	(0.843)	(0.591)	(1.437)	(0.483)	(0.799)	(0.068)	(0.231)	(0.232)
L.Sub-Pillars*IB	-0.140	-0.163	-0.066	0.035	-0.052	0.084	0.015	0.387**	0.137	-0.098
	(-1.542)	(-1.455)	(-0.803)	(0.414)	(-0.526)	(0.999)	(0.215)	(1.982)	(0.849)	(-0.828)
L.Sub-Pillars	0.011	0.015	0.011	-0.069	0.025	-0.099*	0.034	-0.098	-0.027	-0.009
	(0.207)	(0.235)	(0.278)	(-1.393)	(0.600)	(-1.816)	(0.841)	(-1.513)	(-0.560)	(-0.174)
IB	-4.742	-5.130	-6.596*	-9.322	-4.761	-10.895*	-5.916	-21.830**	-12.916	-3.794
	(-1.025)	(-1.109)	(-1.736)	(-1.588)	(-1.514)	(-1.740)	(-1.363)	(-2.386)	(-1.430)	(-0.587)
Bank Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cons	43.256	42.961	47.699	31.561	27.989	32.630	41.804	44.363	46.099	41.593
	(0.945)	(0.913)	(1.196)	(0.681)	(0.627)	(0.713)	(0.823)	(0.792)	(0.905)	(0.791)
No of obs.	763	763	763	763	763	763	763	763	763	763
No of bank	156	156	156	156	156	156	156	156	156	156
No of inst.	21	21	21	18	18	18	18	20	20	20
AR1	0.310	0.234	0.281	0.496	0.091	0.548	0.311	0.440	0.368	0.418
AR2	0.839	0.884	0.527	0.839	0.600	0.676	0.885	0.661	0.831	0.983
Hansen test	0.216	0.189	0.169	0.386	0.227	0.535	0.292	0.404	0.272	0.187

t statistics in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In this regression, environmental pillars consist of resource use (E1), emission (E2), and innovation (E3), while social pillars comprise workforce (S1), human rights (S2), community (S3), and product responsibility (S4). Additionally, governance pillars are management (G1), shareholders (G2), and CSR strategy (G3).

Theoretically, the findings support stakeholders' arguments. Implementing ESG is part of banks' responsibility to make stakeholders' interests the priority. As explained by Freeman (1984) and Harrison & Wicks (2013), prioritizing stakeholders' interests creates value, which is positively related to the firm's value. In addition, Waddock & Graves (1997), Hillman & Keim (2001), and Edmans (2023) shed light on the fact that focusing on stakeholders' value significantly impacts the firm's financial performance in the long term. The findings also have similarities with the NGFS's (2019) concern regarding the potential climate risks that the banks must embrace through investing in ESG activities. Thus, committing to ESG activities is a part of risk management that benefits the banks by mitigating any structural changes due to the effect of climate change (NGFS, 2019).

In terms of the relationship between ESG pillars and banks' probability of default, the findings of the study indicate that each pillar of ESG affects banks' probability of default differently. This is confirmed by the argument of Alam et al. (2019), who state that implementing each pillar of ESG has a different impact on the banks' performance. For the environmental and social pillars of ESG, the banks' commitment to both pillars does not significantly influence banks' default-based measurement. The findings are similar to Chiaramonte et al. (2022), who find an insignificant relationship between environmental and social pillars and banks' default risk, and Salim et al. (2023), who conclude that implementing the social pillar of ESG in banks does not affect banks' risk.

Additionally, the influence of the governance pillar on banks' default-based measurement is negative and significant. It explains that implementing the governance pillar of ESG lowers banks' PD_DTD and PD_DTC. The findings of the study are similar to Liu et al. (2023), who find that implementing the governance pillar of ESG reduces banks' risk. The finding also emphasizes the impact of banks' risk reduction when they perform better in the governance pillar implementation. Yuen et al. (2022) note the significance of implementing ESG activities, including the governance pillar, for better financial performance.

Moreover, as stated by Liu et al. (2023), banks with higher performance of the governance pillar have good corporate governance. It is because implementing the governance pillar relates to the relationship between shareholders and the board of directors, the presence of audit committee members as a part of the governance element, promoting diversity at the firm level, completing accounting reports, and possessing high transparency of reporting to the stakeholders. In addition, banks with good governance practices prefer to cooperate with other banks that have the same good governance level (Liu et al., 2023). With a good reputation and credibility, banks implementing the governance pillar of ESG possess a lower probability of default, indicating that banks can manage the risks well.

Furthermore, a negative and significant relationship between the governance pillar of ESG and banks' default-based measurement supports the stakeholder theory approach. This is in line with Jensen's (2002) argument that the firm must maximize stakeholders' value. Soppe (2004) adds that the firm promoting stakeholders' maximization implements a virtue-ethical approach in its business operation. As stated by Edmans (2023), in the long run, the firm's stakeholder approach has better financial performance, including better risk management practices, particularly when the firm implements ESG pillars.

To identify the difference between Islamic and conventional banks, the impact of the interaction variable between the governance pillar of ESG and Islamic banks on banks' default-based measurement is significant and positive. It means that Islamic banks are different from conventional banks; specifically, the direction informs us that they have a higher probability of default when implementing the governance pillar than conventional banks. This finding differs from Nizam et al. (2019) and Alam et al. (2022), who find that Islamic banks are not different from conventional banks when implementing ESG and the governance pillar of ESG, respectively.

When additional analyses are applied to examine what governance sub-pillars impact banks' probability of default when interacting with IB, the results show that the interaction variable between management score and IB on banks' probability of default is positive and significant. It explains that the commitment to incorporate best practices of corporate governance principles based on the management score of governance pillar measurement in Islamic banks increases banks' default risk. According to LSEG (2023), the management score consists of several indicators' measurements, including corporate governance board committee, board structure policy, compensation, board function policy, board diversity, board education background, and board size.

The findings of the study are partly against the notion of the self-congruence theory in the Islamic banking context by Bukhari et al. (2020), explaining that implementing a stakeholder approach is in line with the Shariah principle in Islamic banks' practice. However, it has potential reasons why Islamic banks are worse off in terms of banks' probability of default. The first is that Islamic banks have different values in Shariah compliance and ethical framework from conventional banks. In the case of Islamic banks, Asutay (2013) clearly explains that the banks must abolish prohibited transactions that are not in line with the Shariah principles, such as interest-based financial activities. Hence, the practices of Islamic banks have a broader value but remains different from conventional banks that have nothing to do with interest-based financial transactions.

Consequently, as a second potential reason, it affects governance structure and stakeholder engagement, which is larger and more complex. As shown by Laldin & Furqani (2018), Islamic banks' Shariah committee needs to ensure the accountability of Islamic banks in relation to Shariah aspects, including managing Shariah risks, reviewing Shariah issues, researching, and performing Shariah audits. There is also a potential agency problem of whether all activities can be implemented based on Shariah compliance (Mollah et al., 2017). In addition, as the third potential reason, Islamic banks and conventional banks have different risk exposures. Mollah et al. (2017) shed light on the fact that Islamic banks are riskier than conventional banks due to their complexity and different financing schemes. Therefore, with the arguments mentioned above, the governance framework in Islamic banks is more costly and creates more risks that potentially increase banks' probability of default while implementing the governance pillar. The different frameworks of Islamic banks' governance may not be captured in the governance pillar of ESG. In addition, a potential redundancy may be present when concurrently committing to the governance pillar and corporate governance in the Islamic framework, resulting in additional expenditure that the banks must allocate and spend.

4.4. Robustness Test

Table 9.
Robustness Check for Bank's Probability of Default

Variables	ESG Combined		Exclude Large Banks		Exclude Small Banks	
	Model 1 (PD_ DTD)	Model 2 (PD_ DTC)	Model 3 (PD_ DTD)	Model 4 (PD_ DTC)	Model 5 (PD_ DTD)	Model 6 (PD_ DTC)
L.Dep.Var	0.361	0.307	0.139	0.104	0.315**	0.358**
	(1.251)	(0.910)	(0.682)	(0.504)	(2.152)	(2.426)
L.ESG	-0.093*	-0.099*	-0.154	-0.150	-0.173***	-0.161**
	(-1.658)	(-1.690)	(-1.505)	(-1.394)	(-2.777)	(-2.562)
Bank Control	Yes	Yes	Yes	Yes	Yes	Yes
Macro Control	Yes	Yes	Yes	Yes	Yes	Yes
Gov Control	Yes	Yes	Yes	Yes	Yes	Yes
cons	18.576	18.886	34.859	35.730	19.695	14.355
	(0.523)	(0.495)	(0.722)	(0.675)	(0.663)	(0.491)
No of obs.	764	764	536	536	585	585
No of bank	157	157	120	120	120	120
No of inst.	17	17	20	20	20	20
AR1	0.147	0.323	0.530	0.758	0.006	0.004
AR2	0.412	0.591	0.721	0.696	0.179	0.213
Hansen test	0.463	0.391	0.435	0.769	0.698	0.514

t statistics in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the robustness check in Table 9, there are three strategies to test the consistency of the baseline findings. The first strategy is to use another measurement of ESG, namely the ESG score minus ESG controversy (see Models 1 and 2). The second strategy is to exclude the top 25% banks in terms of size from the sample (see Models 3 and 4) and remove the bottom 25% as the third strategy (see Models 5 and 6). The findings of the study reveal that L.ESG has a negative and significant relationship with the probability of default shown in Models 1 to 6, except when the top 25% or largest banks are excluded (see Models 3 and 4). The findings conform to the baseline results, indicating that banks committing to ESG activities have a lower probability of default.

V. CONCLUSION AND RECOMMENDATION

This paper investigates the impact of ESG commitment on banks' probability of default while emphasizing the presence of Islamic banks in emerging and developing countries. The findings of the study reveal that ESG reduces banks' probability of default, and the implementation of each ESG pillar affects banks' default differently, either measured by distance-to-default or distance-to-capital. Additionally, Islamic banks are found to be different from conventional banks in terms of their commitment to the governance pillar, specifically in the management sub-pillar. Based on the findings, it can be concluded that ESG commitment matters for banks in emerging and developing countries, which is shown to reduce banks' default risk. However, Islamic banks' ESG commitment must be carefully implemented to avoid the potential underperformance in banks' default risk management, particularly in the governance pillar, which needs to consider the presence of the Shariah governance framework implemented in Islamic banking operations.

Hence, the findings imply that financial authorities and institutions in emerging and developing countries need to encourage banks to have sufficient transparency in ESG reporting and disclosure. Amid the limited information about ESG performance in the banking sector of emerging and developing countries, this encouragement is reasonable concerning the significant role of banking sectors in sustainable development as well as how it reduces banks' probability of default. Moreover, in the case of countries with dual banking systems in which Islamic and conventional banks co-exist, tailored-made ESG regulation needs to be considered by financial authorities with specific attention to the presence of Islamic banks' corporate governance and ESG commitment in the governance pillar. The findings of the study contribute to the development of empirical research in relation to Islamic banks and ESG commitment, which have potential redundancy with the Shariah-compliant concept.

Finally, for future research direction, we suggest incorporating interaction variables between control variables and ESG, as well as its pillars. These interaction variables can provide deeper insights into how specific conditions affect bank's default risk when there are marginal changes in ESG and its pillars. This approach could reveal how banks' particular characteristics influence ESG practices in driving performance. Similarly, the interaction variables could be applied when macroeconomic and institutional development variables interact with ESG and its pillars as the main independent variables. This interaction allows a more nuanced understanding of how broader economic conditions and institutional factors impact the relationship between ESG practices and bank's default risk.

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APPENDIX

Appendix 1.
Number of Countries and Banks

Country	Banks	Country	Banks
Bahrain	2	Oman	5
Brazil	5	Pakistan	4
Chile	4	Peru	2
China	23	Philippines	4
Colombia	4	Poland	8
Egypt	3	Qatar	6
Hungary	1	Romania	2
India	9	Rusia	3
Indonesia	6	Saudi Arabia	10
Jordan	4	South Africa	6
Kuwait	6	Thailand	10
Malaysia	7	Turkey	7
Marocco	1	UAE	10
Mexico	4	Uganda	1

Appendix 2.
Correlation Coefficient Between Variables

	PD_ DTD	PD_ DTC	L. ESG	L.E	L.S	L.G	L.ETA	L.NPL	L.CTI	L.TDTA	L. REVDIV	L. LNTA	IB	EG	INF	HHI	COVID	GOV
PD_DTD	1.000																	
PD_DTC	0.994	1.000																
L.ESG	-0.068	-0.063	1.000															
L.E	-0.047	-0.043	0.751	1.000														
L.S	-0.003	-0.001	0.907	0.729	1.000													
L.G	-0.160	-0.154	0.651	0.253	0.301	1.000												
L.ETA	0.125	0.114	-0.050	-0.210	-0.067	0.085	1.000											
L.NPL	0.109	0.096	-0.030	-0.013	0.025	-0.126	0.052	1.000										
L.CTI	0.232	0.221	0.229	0.140	0.285	0.048	0.097	0.318	1.000									
L.TDTA	-0.016	-0.010	-0.273	-0.237	-0.293	-0.093	-0.294	-0.163	-0.269	1.000								
L.REVDIV	0.012	-0.004	0.184	0.122	0.242	0.009	0.551	0.165	0.216	-0.666	1.000							
L.LNTA	-0.176	-0.151	0.246	0.387	0.222	0.069	-0.398	-0.254	-0.342	0.147	-0.246	1.000						
IB	-0.115	-0.115	-0.344	-0.332	-0.356	-0.142	0.027	-0.067	-0.096	0.221	-0.142	-0.196	1.000					
EG	-0.111	-0.114	0.061	0.151	0.040	0.040	-0.201	-0.032	-0.088	0.098	-0.090	0.168	-0.108	1.000				
INF	-0.002	-0.013	0.264	0.312	0.296	0.010	-0.099	0.124	0.098	-0.270	0.286	-0.065	-0.088	0.217	1.000			
HHI	-0.008	-0.007	-0.111	-0.279	-0.187	0.149	0.274	0.128	-0.017	0.008	-0.002	-0.282	0.338	-0.240	-0.086	1.000		
COVID	0.085	0.088	0.038	-0.137	0.044	0.006	0.002	0.080	0.016	0.001	0.008	0.034	0.000	-0.305	-0.074	0.025	1.000	
GOV	0.039	0.042	-0.120	-0.136	-0.190	0.062	-0.022	0.046	-0.076	0.126	-0.325	-0.062	0.210	-0.100	-0.422	0.116	0.029	1.000

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