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From Stability to Sustainability: How Bank Risks and Climate Exposures Influence ESG

Nor Hazirah Mohamad-Shukri[1], Wahida Ahmad[2], Nur Hazimah Amran[3*], Nur Syahirah Rokeman[4]

[1,2,3] Arshad Ayub Graduate Business School, Universiti Teknologi MARA, 40450 *Shah Alam, Selangor, Malaysia*

[4]Department of Postgraduate and Professional Studies, Faculty of Business and Management, Universiti Teknologi MARA, 40450 *Shah Alam, Selangor, Malaysia*

*Authors' Email Address: [1]nhazirahshukri@gmail.com, [2]wahida@uitm.edu.my, *[3]hazimahamran@uitm.edu.my, [4]syahirah35@gmail.com*

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*Corresponding Author

ABSTRACT

The purpose of this study is to investigate the connection between the bank risks and climate risks with environmental, social, and governance (ESG) performance of the banking institutions in Asia Pacific countries. In this study, bank risk is represented by three dimensions which are liquidity risk, credit risk, and capital risk, while climate risk is represented by physical risk and transition risk. This study also adds bank size, profitability, and economy as the control variables. Unbalanced panel data of 75 listed banking institutions between 2010 and 2024 from 10 selected countries have been arranged and go through preliminary tests to check for robustness and validity. In accordance with the Hausman Test, this study uses Fixed Effect Model (FEM) to examine the relationship of the variables. The results reveal that capital risk has a significant negative impact on ESG performance, whereas liquidity and credit risks are positive but insignificant with the bank's ESG performance. Transition risk, proxied by fossil fuel energy consumption, shows a strong negative relationship with ESG performance, while physical risk is found to have insignificant relationship with ESG performance. Among the control variables, bank size positively and significantly influences ESG performance, confirming that larger banks possess greater resources to implement sustainable strategies. The findings suggest that robust capitalization and reduced reliance on carbon-intensive sectors would enhance bank's ESG outcomes. The study makes contribution to a broader literature on sustainable banking through the inclusion of regional evidence from APAC and offers policy recommendations to strengthen the integration of financial and climate risk management in the world of banking.

Keywords: *bank risk, climate risks, ESG performance, sustainable banking, Asia Pacific*

INTRODUCTION

As a capital provider, banking institutions play an important role in promoting a sustainable world development by integrating the Environmental, Social and Governance (ESG) considerations into their financial decision-making processes. As highlighted by Buallay et al. (2021) banks play a dual role by

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internally managing their operations and externally integrating the ESG concerns into their business plans. The United Nation (2023) defines environmental aspect of ESG as the impact of raw materials consumption to operate daily business activities on the planet. Meanwhile the social dimension refers to how the business activities operation affect society in terms of labour practices, equality, and human rights. And finally, governance is concerned with the internal processes and procedures that are implemented within the organization. Its purpose is to guarantee ethical decision-making, accountability, and openness.

The incorporation of environmental, social, and governance (ESG) concepts is necessary within the banking industry in order to bring banking operations into alignment with the Sustainable Development Goals (SDGs) of the United Nations. In particular, climate change has emerged as one of the most critical challenges that endanger the ability of future generations to survive as a result of climate-risk occurrences that have never been seen before. The growing number of occurrences and intensity of climate-related events such as unpredictable weather patterns, rising sea levels, massive floods and typhoons had heightened global concerns. As reported in a research survey conducted by World Economic Forum (2025), non-weather natural related disaster ranked as the top global risks addressed by development assistance as shown in Figure 1. These climate risks are often categorized into physical risk and transition risk. Basel Committee on Banking Supervision (2021) define physical risk as changes in weather and climate that cause damage to a country's economy and threaten the banking stability. Whereas transition risk is the financial risk arising from the changes in policy as the country is transitioning towards a low-carbon economy. In response to the escalating climate risk threats, the United Nations introduced Sustainable Development Goals (SDGs) 13, calling for urgent action from global unity to mitigate the harms posed by climate and its effects. SDGs 13 specifically focuses on shifting from global economy fossil fuels to a net-zero carbon economy. Therefore, banks must develop robust frameworks to assess and manage these climate risks while continuing to support the global sustainable agenda.

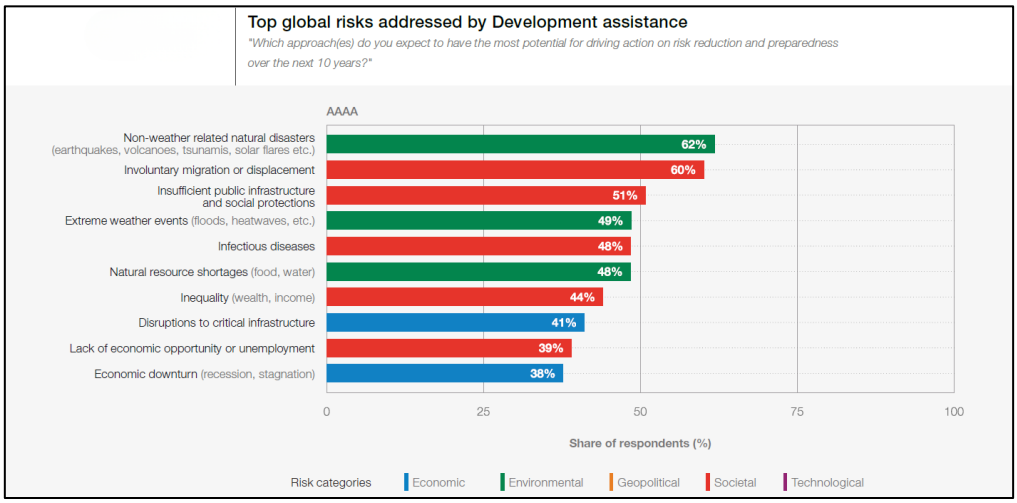

Figure 1: Top Global Risks Addressed by Development Assistance

Source: The Global Risks Report 2025 (World Economic Forum, 2025)

However, financial conflict arises for banks when trying to support the sustainable financing and investments decisions while at the same time safeguarding their liquidity to ensure compliance with Basel III liquidity requirements. Under Basel III, banks are mandated to keep a sufficient buffer of High-Quality Liquid Assets (HQLA) in order to guarantee that they can withstand financial stress and maintain operational continuity (Basel Committee on Banking Supervision, 2010). However, the green financing projects may not entirely fulfil the criteria for HQLA due to their longer maturities and lower liquidity while having higher risk profiles (World Bank Group, 2017). This undermines the banking stability due to the operational cost pressure that banks are facing when incorporating ESG into their financing and investment decisions. Specifically, in a diverse and intense economic setting, banks may

face significant challenges in incorporating ESG into their business activities. Nevertheless, Margitova et al. (2024) highlight that banks with robust and well-integrated ESG framework are better equipped to comply with regulatory complexity and reducing the greenwashing risk. Evidently, transition risk is found to be positively influencing the financing growth in a low-carbon economy resulting to improve in the interest income and enhance overall banking performance (Chalabi-Jabado & Ziane, 2024). Consistently, Erhemjamts et al. (2024) supports that banks operating in countries that experience higher frequency of climate-related risks events tend to increase their ESG investment by providing more green financing towards the firm.

LITERATURE REVIEW

ESG performance has been widely applied to assess whether organizations operate in a sustainable and responsible manner. According to Meiden and Silaban (2023), ESG can be defined as a diverse concept which includes environmental, social, and governance practices that represent the sustainability profile of an organisation. According to Fauzie et al. (2024), the application of ESG is significant because it improves the worldwide competitiveness of banks. This, in turn would help banks to continue to be relevant in an environment where the investors and regulators are expecting responsible behaviour from an institution. This statement is supported by Buallay (2018), saying that banks may improve their reputation and stay competitive around the world by using ESG practices. Additionally, Fakhrunnas et al. (2025) find that banks that follow ESG principles do better financially, and Agnese et al. (2024) highlight that adopting ESG will lead to a low cost of capital and helps make money. Furthermore, a growing number of investors see ESG as a sign of good risk management and long-term sustainability, which helps banks to gain trust and attract money (Nataliia, 2025). This past literature demonstrates that ESG performance consists of more than just an ethical or reputational concern but also a strategic determinant of financial and competitive outcomes in the world of banking.

Resource-based view theory posits that an organisation would be able to remain competitive when using the available resources efficiently as introduced by Barney (1991). Meanwhile, Nohria and Gulati (1996) describe slack-resources theory as how behaviour of an organisation is influenced by the accessible resources. This theory demonstrates how having too many resources might result in waste or inefficiencies while having low resources may hinder the opportunity to invest in long-term objectives. Finally, legitimacy theory suggest that business implement ESG measures in order to meet the standards of society, conform to stakeholder's anticipations, and legal requirements in order to remain legitimate (Suchman, 1995).

Liquidity risk refers to possibility of banks unable to meet the financial obligations when it is due (Matey, 2021). Previous studies find the relationship between liquidity risk and ESG integration, concluding that banks with lower liquidity risk have more capable to allocate their resources for ESG-related activities. A study by Gambetta et al. (2021) support this statement by claiming that banks' liquidity would increase its capacity to support green financing while maintaining the operational stability simultaneously. However, according to other researchers, liquidity risk may not be relevant to ESG because the organisation are focusing on clearing off the debt rather than acting and behaving in a socially responsible manner (Hapsoro & Sulistyarini, 2019).

Credit risk is referring to the possibility that creditors would fail to make payments as they were originally scheduled, which will threatening the banks' financial stability and profitability (Khan et al., 2020; Erdas & Ezanoglu, 2022). High credit risk will reduce the ability of the banks to integrate ESG initiatives, since higher loan losses will limit financial resources and constrain long-term investment in sustainability projects. From another opinion, Korzeb et al. (2025) warn that banks may rebalance portfolios by giving ESG-friendly financial resources priority over other assets, will lead to increase in financial risk. This happen when banks extend lending to a greener but riskier industries. A higher credit risk may occasionally coexist with a higher ESG performance.

Capital risk is the potential of banks lack reserves to cover losses and comply with regulations. Lower capital risk shows higher capital buffer that can helps the banks to absorb unexpected losses and gives banks the stability they need to pursue sustainability goals. According to Lamanda and Vőneki (2023), a sufficient capital resources would have a favorable outcomes towards the ESG disclosure. This happens when banks with a lower capital risk have a strong financial position and the flexibility to invest in sustainability initiatives and a strong reporting infrastructure which lead to higher ESG performance. In contrast, an insufficient capital buffer or high capital risks will pressure the banks to priorities other short-term investment rather than ESG-related investment.

One of the aspects of climate risk is physical risk which is referring to a risk that incurred from the direct environmental events such as floods, droughts, or heatwaves that will disrupt the economic and financial stability (Beddow, 2023). It has been stated by Tang et al. (2024) that a higher climate risk exposure led to an increase in ESG performance as businesses received more pressure to integrate ESG investments, implement green innovation, and appoint environmental experts. Similarly, Liu et al. (2025) support that an increased in climate risk would drive improvements in ESG through the innovation and governance mechanisms. In this study, the carbon emissions are used as the proxy for the physical risk, where higher carbon emissions posit higher physical risk.

The second aspect of climate risk in this paper is transition risk, which reflects the economic and financial challenges that arise from the shift towards a low-carbon economy. This includes the new regulations, the evolution of technology, and investor pressures (Beddow, 2023). According to Duan et al. (2025), revealing the risk that associated with climate would considerably increase improve the ESG performance by attracting green investors and promoting innovation. Moreover, Alkurdi et al. (2023) highlight that environmentally conscious governance helps organisations meet Europe's net-zero targets. As a result, transition risk acts as a driver for change, encouraging financial institutions to reduce their holdings or financing of fossil fuels projects and promote ESG-driven sustainable financing projects.

Bank size is estimated using the total assets (Lamanda & Vőneki, 2023). Larger banks often publish more ESG information because they not only receive more pressure from government authorities, investors, and the general public but also possess more financial and organizational resources to manage the costs of disclosure (Lamanda & Vőneki, 2023; Menicucci & Paolucci, 2022). The resources in larger institutions enables them to finance sustainability projects like community development programs or renewable energy projects, improve governance frameworks, and invest in cutting-edge data systems (Baldini et al., 2016; Gonzalez-Ruiz et al., 2024; Liu & Xie, 2024) which will lead to higher ESG performance.

Profitability represents the return that banks able to generate within a specific period. Banks with good financial position are often expected to provide more information on ESG issues considering their higher ability to absorb expenses and make investments in sustainability (Hapsoro & Sulistyarini, 2019; Rahman & Alsayegh, 2021). In contrast, Khoury et al. (2021) found profitability to be adversely correlated with ESG posits that banks may intentionally employ transparency during lean financial times.

The economy of a country plays a crucial part in determining the direction of the sustainability engagement. Past study by Buallay (2020) highlight the gross domestic product (GDP) as a key macroeconomic determinant influencing the sustainable behaviour among the institutions. Previous studies suggest that the stakeholder demand for ESG reporting is higher in a developed country. This shows that a robust economic condition and societal; awareness drive greater attention on sustainability. Similarly, Khoury et al. (2021) highlight that GDP growth pushes banks to include ESG considerations into the bank’s strategic objectives. Additionally, Crespi and Migliavacca (2020) adds that including GDP will increase the validity and reducing the misleading links within the context of sustainability disclosure and financial performance.

RESEARCH METHODOLOGIES

The study employs unbalanced panel datasets which cover 15 years period from 2010 until 2025. The data for the study are retrieved from the LSEG Data and Analytic and the World Bank Open Data platform. The banks that provide ESG score data for a minimum of three years in row are chosen for the study. The recent report from the International Energy Agency (IEA, 2024) indicates that 51.2% of global CO_2 emissions from the fuel combustion occur in APAC region. Compared to its 47% share of greenhouse gas emissions worldwide in 2019, the APAC region's contribution has increased, further strengthening its status as the top source of emissions in the world. Carbon emissions from fuel combustion in China reached 10,613.171 million tonnes, accounting for about 61% of the total emissions in the APAC area, which total 17,379.238 million tonnes (IEA, 2024) followed by India. Due to this, China and India have been excluded from the study sample to avoid bias result. The remaining thirteen (13) countries in APAC that included in the sample are Australia, Indonesia, Thailand, Hong Kong, South Korea, Malaysia, Pakistan, Japan, Philippines, New Zealand, Taiwan, Vietnam and Singapore. Table 1 depicts the variables name and proxies used in this study.

In the context of the present study, the dependent variable is ESG performance, which is represented by the aggregate scores for environmental, social, and governance factors. This score is utilized on a global scale in order to measure the performance of an institution in terms of sustainability. Liquidity risk reflects the ability of the bank to fulfil short-term commitments and maintain funding stability. This variable is added to assess the reliance of banks on deposit funding and the strength of their liquidity buffers. The liquidity risk is proxied by the proportion of total deposits to total assets (%). A higher ratio demonstrates a stronger liquidity position and lower liquidity risk. Next, credit risk is measured by the reserve for loan losses to total assets (%). This measurement captures the proportion of assets allocated to cover the potential of loan defaults. Higher ratio demonstrates a greater exposure to credit risk. Capital risk represents the capacity of the bank to withstand financial shocks and sustain operations under stress. This variable is measured using the total capital adequacy ratio (%). The value of higher ratio represents a stronger capital buffer and lower capital risk.

Climate-related risks in this study are represented by physical risk and transition risk. In this study, the physical risk is measured using total carbon dioxide emissions expressed in million tonnes. This variable reflects the level of environmental pressure a country faces. Next, transition risk is measured by the portion of fossil fuel energy usage as a percentage of total energy use. It indicates the extent of the dependency of economy on carbon-intensive energy sources and its vulnerability to policy or market changes during the shift to an economy with lower carbon emissions.

Three control variables are included to ensure the robustness of the analysis. First, bank size is represented by total asset expressed in trillion US dollars. Next, profitability is represented by pretax return on assets in percentage. Lastly, the economic condition is represented by the GDP deflator, which reflects the overall price stability and macroeconomic performance. To empirically examine the connections between bank risks, climate risks, and banks' ESG performance, the following panel regression model is employed:

$$ESG_{it} = \beta_0 + \beta_1 LIQ_{it} + \beta_2 CR_{Eit} + \beta_3 CAP_{it} + \beta_4 PR_{it} + \beta_5 TR_{it} + \beta_6 BS_{it} + \beta_7 PRO_{it} + \beta_8 ECO_{it} + e_{it} \quad (1)$$

Table 1: List of Variables and Proxies

Variable	Notation	Proxy	Past citation
Dependent Variable: Environmental, Social, and Governance	ESG	ESG score	Khoury, Nasrallah & Alareeni (2021); Batae et al. (2021)
Independent Variables: Liquidity Risk	LIQ	Total deposit of total assets (%)	Islam & Jahan (2018)
Credit Risk	CRE	Reserve for loan losses of total asset (%)	Islam & Jahan (2018)

Capital Risk	CAP	Total capital adequacy ratio (%)	Gambetta et al. (2021); Gonenc & Scholtens (2019)
Physical Risk	PR	Carbon dioxide emissions (total) excluding LULUCF (Mt CO2e)	Oanh et al. (2025)
Transition Risk	TR	Fossil fuel energy consumption (% of total)	Bernardelli et al. (2022)
Control Variables Bank Size	BS	Total asset (trillion US$)	Khoury et al. (2021); Lamanda & Vőneki (2024)
Profitability	PRO	Pretax ROA (%)	Hapsoro & Sulistyarini (2019); Miranda et al. (2023)
Economy	ECO	GDP Deflator	Bozhilova (2024)

Before proceeding with regression, a number of diagnostic tests were conducted to ensure that the findings are trustworthy. From the findings, the unit root test showed that the bank size variable has stationarity issues. Therefore, this variable is log-transformed to obtain a stable series. Next, the Modified Wald test for heteroskedasticity indicates the presence of heteroskedasticity issue with chi-square value of 7447.10 and a p-value less than 0.01. The serial correlation test also shows a significant serial correlation with a chi-square value of 155.074 and significant at one percent (p-value less than 0.01).

Three different panel model selection tests are utilized in the present study in order to determine which estimation approach is the most suitable. The F-Chow test yields a value of 22.20, which indicates that the null hypothesis of a pooled ordinary least squares model (POLS) is rejected. This is proven by the fact that the p-value is less than 0.01, which is the threshold for statistical significance. In light of this data, the fixed effect hypothesis is supported. The random effect model was confirmed to be the suitable panel model by the Breusch and Pagan Lagrangian Multiplier (BPLM) test, which produced a value of 960.36 and a p-value that was less than 0.01. In the final result, the Hausman test produced a value of 51.72, and the p-value was less than 0.01, which shows that the fixed effects model is the estimator that is most suitable for this particular study. It was determined that there was no indication of endogeneity, which supported the trustworthiness of the model specification that was chosen.

RESULTS AND DISCUSSION

This study investigates the connection between bank risks and climate risks with the ESG performance of banks in APAC countries. Bank risk is represented by three dimensions which are liquidity risk, credit risk, and capital risk, while climate risk is captured through physical risk and transition risk. The banks in the sample come from 10 APAC countries, with the initial research design intending to exclude China and India due to their distinct market structures and regulatory environments. New Zealand, Taiwan and Vietnam are excluded because of the data availability issues.

This analysis in this study is based on 715 observations from 75 different banks located throughout the APAC countries over the period 2010 until 2024. Diagnostic testing was conducted prior to final estimations. The unit root testing revealed non-stationarity in bank size and economy where the stationarity issue for bank size was resolved by using the logarithmic transformation of the variable. There is no serious multicollinearity issue detected using the Variance Inflation Factor (VIF) while heteroscedasticity and autocorrelation were detected. These issues were addressed by the cluster-robust standard errors. To improve robustness, the dataset was cleaned up by removing extreme values. The Durbin–Wu–Hausman test revealed the absence of endogeneity, supporting the application of a static model to the unbalanced panel data. The Hausman Test was used to conduct model specification tests, which further determined that the Fixed Effects Model (FEM) was the estimating technique that was the best appropriate for the model.

Table 2 presents the regression results of the Fixed Effects Model with robust standard errors grouped by bank. Noted that the result for the inverse proxy variables which are liquidity risk and capital risk

have been inversed to avoid confusion during discussion. The result for liquidity risk shows a positive but insignificant impact on ESG performance. The result posits that bank with higher risk of liquidity would have higher ESG performance. Align with the legitimacy theory, the insignificant result suggests that banks may not prioritise liquidity to support voluntary sustainability investment. This might be the case when bank focusing on giving ESG-oriented loan to the borrower, to maximise the profit but with tight policy and transparency. Hence, despite having higher liquidity risk, bank still able to improve their ESG performance in APAC countries. As demonstrated by the slack-resources theory, banks should have the freedom to allocate resources for ESG initiatives when they have liquidity. However, high liquidity and lower liquidity risk may lead to lower ESG score if the banks unable to utilise their resources for ESG-oriented activities.

Likewise, the results indicate that credit risk is also positive but insignificant with ESG performance of banks in APAC countries. The positive sign implies that banks with higher credit risk adopt ESG practices. The banks with higher lending activity may have higher risk of default. However, with a good governance, strict monitoring system and transparency, banks would be able to achieve high ESG performance. Vice versa, when the credit risk of the bank lower, the ESG performance of the banks in APAC countries also lower. This happened when the banks play it safe by providing loan with lower default risk without assessing the borrowers' ESG practices properly which led to lower ESG score.

Next, capital risk is found to be negative and significantly affect the ESG performance with 90% confidence level (a p-value lower than 0.1). The direction indicates that weaker capital positions constrain ESG performance, which aligns with the idea that strong capitalization enhances resilience and enables long-term sustainability commitments (Galletta et al., 2022). This conforms with the resource-based view theory where bank with higher capital would be able to improve their ESG performance. Using the available resources, banks would be able to enjoy the flexibility to support the ESG practices. In contrast, banks with higher capital risk are restricted to implement the ESG initiative as they have lower capital buffer and loss the ability to absorb the unexpected losses.

Climate risk results are not entirely consistent. Physical risk, measured by carbon emissions, is negative but not significant for ESG performance. This result is aligned with the past study where a greater emissions often result in lower ESG ratings due to regulatory and reputational issues (Apergis & Apergis, 2022). This situation occurs when banks fail to integrate the ESG initiatives efficiently despite the rise of the physical risk. Higher physical risk will impact the banks' sustainable evaluation which led to a lower ESG performance. This is contradict with the findings by Erhemjamts et al. (2022) where the study demonstrates that banks are more inclined to expand their ESG operations when they are exposed to higher climatic hazards, such as heat, drought, or floods.

Conversely, transition risk which proxied by fossil fuel exposure shows a significant negative effect ESG performance among banks in APAC countries with the degree of confidence is 99% (the p-value is less than 0.01). This implies that when investors and authorities fight for decarbonisation, banks that rely more on funding from fossil fuels are penalised with lower ESG performance. ESG performances are more significantly impacted by the transition risk which is proxied by exposure to fossil fuels since it is simpler to monitor. As the transition risk increase, banks would strengthen their strategy to combat the issue by tightening the lending policy.

As for the control variables, bank size emerges as a highly significant positive determinant of ESG performance with the degree of confidence is 99% (the p-value is less than 0.01). This supports the view that larger banks have greater financial and organizational capacity to pursue sustainability. Larger banks are claimed to have more resources which allow them to respond to stakeholder and regulatory expectations (Lamanda & Vőneki, 2023; Rahman & Alsayegh, 2021) while smaller banks generally operate with more limited financial and human resources, which constrains their ability to invest in ESG initiatives such as sustainable lending frameworks, detailed ESG reporting, or advanced risk management systems.

Profitability is found to be positive but not significant with ESG performance. This suggest that financial returns would guarantee the ESG adoption. The slack-resources theory predicts that profitable banks would have more available resources to be directed toward ESG investment. Rahman and Alsayegh (2021) support this positive relationship where they argue that banks a strong financial position would disclose more ESG information for a legitimization.

Finally, the economy variable is negative and insignificant with ESG performance, suggesting that economic conditions do not consistently shape ESG outcomes across APAC countries. This contrasts with studies suggesting that favourable economic conditions enable ESG adoption. During the economic downturn, due to the pressure from the investors, the banks would be more cautious and try to demonstrate responsibility, and commitment to long-term sustainability. Banks also practice a broader risk management approach during economic downturns which in turn would improve the ESG performance. Vice versa, during the economic upturns, banks focus more on capturing market opportunities, loan expansion, and profit maximization which can harm ESG alignment.

Table 2: Fixed Effects Model (FEM) with Cluster Standard Errors

Variable	Coefficient	Std. Err.	t	P>|t|	[95% Conf. Interval]	
Liquidity Risk	0.090	0.158	0.57	0.572	-0.225	0.404
Credit Risk	1.698	1.366	1.24	0.218	-1.023	4.419
Capital Risk	-0.655	0.377	-1.74	0.086*	-1.406	0.095
Physical Risk	-0.002	0.007	-0.34	0.732	-0.016	0.011
Transition Risk	-0.468	0.176	-2.66	0.009***	-0.818	-0.118
Log Bank Size	24.726	3.452	7.16	0.000***	17.849	31.603
Profitability	2.021	1.332	1.52	0.133	-0.633	4.674
Economy	-0.017	0.092	-0.19	0.849	-0.200	0.165
Cons	47.632	20.60	2.30	0.024	6.407	88.857

Note: *** is significant at 1% level, * is significant at 10% level

CONCLUSION AND RECOMMENDATION

This study examines the connection between bank risks and climate risks with ESG performance among the banking institutions in ten APAC countries over the period from 2010 to 2024. By employing the fixed effects model with cluster-robust standard errors, the findings reveal that capital risk has a significant and negative association with the ESG performance. Meanwhile, the other two dimensions of bank risk, which are liquidity risk and credit risk are positive but insignificant with ESG performance. Based on these findings, it is clear that financial institutions that deal with lower levels of capital risk are more prepared to direct resources toward activities that promote sustainability. In contrast, the higher liquidity risk and credit risk conditions may lead to a higher ESG performance, showing that banks would strengthen their ESG initiatives despite having low flexibility to control the resources.

Next, the findings show that physical risk has an insignificant negative relationship with ESG performance in APAC countries. This result implies that banks are not fully integrating ESG initiative efficiently to combat the climate issue despite increase in physical emissions. In contrast, the result for transition risk shows a significant negative effect towards ESG performance in APAC countries. This highlights that banks that are more reliant on carbon-intensive sectors face greater pressure from the regulators and investors, which led to lower ESG performance.

Among the control variables, bank size emerges as a strong positive determinant of ESG performance in APAC countries. This result confirms that larger banks have more financial and organizational capacity to adopt and disclose sustainable practices. Meanwhile, profitability and economic conditions are not significant with ESG performance in APAC countries, illustrating that short-term financial performance and macroeconomic fluctuations have limited influence on banks' ESG commitments.

In summary, this study provides evidence that capital risk, transition risk, and the size of the banks provide a significant function in determining the ESG performance among the banking institutions in APAC countries. Banks should continue to lower their capital risk by strengthening their capital position to form a sustainable banking. This can be done by diversifying the funding resources and reducing reliance on carbon-extensive sectors. Moreover, policymakers and regulators are encouraged to develop frameworks that promote green financing and integrate climate risk management into supervisory practices. A consistent ESG disclosure standard would also improve transparency, accountability, and comparability across the region.

LIMITATIONS OF THE STUDY

There are a few limitations incurred from this study. First, the analysis excludes some APAC countries, including China, India, New Zealand, Taiwan, and Vietnam, due to differences in market structure and data availability. This may limit the extent to which the findings can be generalized to the entire region. Next, the study focuses on quantitative indicators and does not consider qualitative dimensions of ESG implementation such as governance culture or internal sustainability policies that may affect the ESG performance of the banking institutions. The exclusion of qualitative measurement may limit the understanding of how organizational behavior contributes to ESG performance. In addition, the proxies used for climate risk, which are carbon emissions and fossil fuel energy consumption are measured at the national level rather than at the bank level. This may not accurately reflect the actual exposure of individual banks to climate-related risks. Future researchers could expand the analysis by including more countries, including organizational behavior aspects, and using bank level climate exposure data models to better understand how financial and behavioral factors influence the ESG performance towards a sustainable banking.

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AUTHORS' CONTRIBUTION

Mohamad-Shukri, N. H. was responsible for data collection, formal analysis, and the preparation of the discussion and results. Ahmad, W. and Amran, N. H. supervised the research process, ensured the validity of the findings, and contributed to the overall structure and conclusion of the article. Rokeman, N. S. prepared the introduction and assisted in the development of the manuscript. All authors contributed to the conceptualization and design of the study, provided critical feedback throughout the research process, and participated in reviewing and editing the final manuscript.

CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify

to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

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