DOI.ORG/10.38156/IMKA.V6I1.735

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Moderating effect of bank size on capital adequacy and sustainable finance: Evidence from Asian banking

Abstract
This study aims to examine the effect of capital adequacy on sustainable finance in Asian banks, with a particular focus on the moderating role of bank size. Using a quantitative approach and panel data drawn from annual and sustainability reports of selected banks, the analysis employs Moderated Regression Analysis (MRA) to test the research hypotheses. The descriptive statistics provide an overview of the key variables, including capital adequacy ratio (CAR), sustainability performance (ESG), and bank size. The results indicate that in the baseline model, CAR and SIZE independently exert a positive and significant impact on ESG. However, when bank size is incorporated as a moderating factor, the direct effects of CAR and SIZE become negative, while the interaction term (CAR × SIZE) emerges as highly positive and statistically significant. These findings highlight that bank size does not function merely as a control variable but as a decisive moderator that strengthens the effect of capital adequacy on sustainability outcomes. Practical implications include recommendations for managers, first that regulators and policymakers should recognize that capital adequacy alone is not sufficient to ensure financial sustainability; institutional attributes such as bank size significantly influence outcomes. The regulatory framework should be designed not only to strengthen capital reserves but also to encourage economies of scale, especially in developing countries where small banks face resource constraints.
Keywords: Bank Size, Banking Sector, Capital Adequacy, Moderation, Sustainable Finance.

Abstrak
Studi ini bertujuan untuk menganalisis pengaruh kecukupan modal terhadap keuangan berkelanjutan di bank-bank Asia, dengan fokus khusus pada peran moderasi ukuran bank. Menggunakan pendekatan kuantitatif dan data panel yang diambil dari laporan tahunan dan laporan keberlanjutan bank-bank terpilih, analisis ini menggunakan Analisis Regresi Moderat (MRA) untuk menguji hipotesis penelitian. Statistik deskriptif memberikan gambaran umum tentang variabel kunci, termasuk rasio kecukupan modal (CAR), kinerja keberlanjutan (ESG), dan ukuran bank. Hasil menunjukkan bahwa dalam model dasar, CAR dan SIZE secara independen memiliki dampak positif dan signifikan terhadap ESG. Namun, ketika ukuran bank dimasukkan sebagai faktor moderasi, efek langsung CAR dan SIZE menjadi negatif, sementara istilah interaksi (CAR × SIZE) muncul sebagai sangat positif dan secara statistik signifikan. Temuan ini menyoroti bahwa ukuran bank tidak berfungsi sekadar sebagai variabel kontrol, melainkan sebagai moderator yang menentukan yang memperkuat dampak kecukupan modal terhadap hasil keberlanjutan. Implikasi praktis mencakup rekomendasi bagi manajer, pertama bahwa regulator dan pembuat kebijakan harus menyadari bahwa kecukupan modal saja tidak cukup untuk memastikan keberlanjutan keuangan; atribut institusional seperti ukuran bank secara signifikan mempengaruhi hasil. Kerangka regulasi harus dirancang tidak hanya untuk memperkuat cadangan modal tetapi juga untuk mendorong skala ekonomi, terutama di negara berkembang di mana bank kecil menghadapi keterbatasan sumber daya.

Implementasi IMKA Manajemen & Kewirausahaan
E-ISSN 2776 – 8554

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Kata Kunci: Kecukupan Modal, Keuangan Berkelanjutan, Moderasi, Sektor Perbankan, Ukuran Bank

1. Introduction

The banking sector plays a pivotal role in the financial system, safeguarding macroeconomic stability while supporting sustainable development through financial intermediation. By channeling funds from surplus to deficit units, banks influence not only economic resilience but also the availability of financing for sustainability-oriented initiatives. In recent years, this dual role has intensified as regulators, investors, and society increasingly expect banks to integrate environmental, social, and governance (ESG) considerations into their core business strategies (Buallay, 2019; Nizam et al., 2019; El Khoury et al., 2023a).

Within this evolving landscape, capital adequacy has emerged as a central element of banking resilience. International regulatory frameworks, particularly Basel III, emphasize capital adequacy as a mechanism to absorb financial shocks and maintain stability during periods of uncertainty (Basel Committee, 2011; Pyka & Nocoń, 2021). Beyond its prudential role, adequate capitalization provides banks with the financial capacity to engage in long-term financing activities, including sustainable finance initiatives that often involve higher uncertainty and longer investment horizons (Buallay, 2019; Dao & Nguyen, 2020). Empirical evidence generally suggests that well-capitalized banks are better positioned to support sustainability-oriented practices; however, findings across regions remain mixed (Adelopo et al., 2022; Nizam et al., 2019).

One institutional characteristic that may shape how capital adequacy translates into sustainability outcomes is bank size. Asian banking systems are highly heterogeneous, comprising large internationally active banks alongside smaller, regionally focused institutions. Differences in scale imply variations in access to resources, regulatory scrutiny, stakeholder pressure, and organizational capacity. Prior studies indicate that larger banks tend to exhibit stronger ESG performance and disclosure, driven by economies of scale, reputational concerns, and higher regulatory expectations (Al Hawaj & Buallay, 2022; Bolibok, 2024; Soh Young In et al., 2022). Conversely, smaller banks often face resource constraints that limit their ability to fully integrate sustainability initiatives into their operations (Ersoy et al., 2022; Zheng et al., 2021).

Capital adequacy in banks moderated by bank size shows a strong and highly significant positive effect on financial sustainability (Buallay et al., 2020). This indicates that bank size acts as a moderator in the relationship between capital adequacy (CAR) and sustainability (ESG), with bank size having a more dominant influence than CAR itself. From a financial management perspective, this finding reflects the fact that capital adequacy, while crucial as a buffer for risk absorption and financial stability, is not sufficient on its own to drive sustainability outcomes unless supported by organizational scale. Larger banks, with broader resource bases, asset structures, and financial flexibility, are better able to allocate their capital to sustainable investments, innovation, and ESG-related activities (Buallay, 2019).

Despite the growing body of research on capital adequacy and sustainable finance, most existing studies focus on direct relationships or treat bank size merely as a control variable. This approach overlooks the possibility that bank size may fundamentally condition the effectiveness of capital adequacy in promoting sustainability. Consequently, prior findings remain fragmented, particularly in the Asian context, where

banking structures and regulatory environments vary substantially across countries (Elklawy, 2024; Le, 2024).

Addressing this gap, the present study investigates whether bank size moderates the relationship between capital adequacy and sustainable finance in Asian banking systems. Using panel data from commercial banks across multiple Asian countries, this study examines both the direct effect of capital adequacy on ESG performance and the extent to which this effect varies according to bank size. By reframing bank size as an active moderating factor rather than a passive control variable, this research contributes to the sustainable finance literature by offering a more nuanced explanation of why similar levels of capital adequacy may lead to different sustainability outcomes across banks.

2. Literature review

2.1 Capital adequacy and sustainable finance

Capital adequacy represents a bank's financial resilience and its capacity to absorb unexpected losses while maintaining operational stability. From the perspective of Stakeholder Theory, banks with stronger capital positions are better equipped to balance the interests of multiple stakeholders, including regulators, investors, and society, by supporting long-term financing activities rather than focusing solely on short-term profitability (Bhandari et al., 2022; Freeman et al., 2021). Adequate capital provides banks with the flexibility to allocate resources toward sustainable finance initiatives, such as green lending, social responsibility programs, and improvements in governance structures (Platonova et al., 2018; Pyka & Nocoń, 2021).

In addition, *Signaling Theory* suggests that a high capital adequacy ratio serves as a credible signal of financial soundness and risk management quality. Well-capitalized banks are perceived as more stable and trustworthy, which increases reputational incentives to adopt and disclose sustainability practices (El Khoury et al., 2023; Nizam et al., 2019). Prior empirical studies have documented a positive association between capital adequacy and sustainability performance, indicating that financially robust banks are more likely to integrate ESG considerations into their strategic decision-making (Adelopo et al., 2022; Dao & Nguyen, 2020).Based on these theoretical arguments and empirical evidence, the following hypothesis is proposed:

H1: Capital adequacy has a positive effect on sustainable finance (ESG performance) in Asian banks.

2.2 Bank size and sustainable finance

Bank size reflects the scale of operations, asset capacity, and organizational complexity of financial institutions. Within the framework of the Resource-Based View (RBV), size represents a strategic resource that enables banks to mobilize financial, technological, and human capital more effectively, thereby enhancing their ability to implement sustainability-oriented strategies (Bhandari et al., 2022; Freeman et al., 2021). Larger banks generally possess more advanced governance systems, greater exposure to international markets, and higher reputational sensitivity, all of which encourage stronger commitments to sustainability practices (Al Hawaj & Buallay, 2022).

Empirical evidence consistently shows that larger banks tend to exhibit higher levels of ESG disclosure and sustainability performance, driven by economies of scale, regulatory scrutiny, and stakeholder pressure (Bolibok, 2024; Buallay et al., 2020; Menicucci & Paolucci, 2023). Therefore, bank size is not merely an organizational characteristic, but a determinant that directly influences the extent to which banks engage in sustainable finance. Accordingly, the second hypothesis is formulated as follows:
H2: Bank size has a positive effect on sustainable finance (ESG performance) in Asian banks.

2.3 The moderating role of bank size

Although capital adequacy provides the financial foundation for sustainable finance, its effectiveness may vary depending on institutional characteristics. In particular, bank size is expected to condition how capital adequacy translates into sustainability outcomes. From an RBV perspective**,** larger banks are not only better capitalized, but also possess superior organizational capabilities to transform financial strength into strategic initiatives, including ESG-oriented investments (Bhandari et al., 2022; Bolibok, 2024).

Larger banks benefit from economies of scale, diversified risk profiles, and broader access to funding sources, which enhance their ability to deploy capital toward long-term sustainability objectives (Buallay, 2019; Nizam et al., 2019). In contrast, smaller banks may face structural and resource constraints that limit their capacity to convert capital buffers into meaningful sustainability performance (Ersoy et al., 2022; Zheng et al., 2021). As a result, the impact of capital adequacy on ESG outcomes is likely to be stronger for banks with larger asset bases.

Sustainability is not only about how much capital an organization has (RBV - financial capability), but also about how large and structured the organization is (Institutional - pressure & capacity) to manage those resources into positive impacts for stakeholders. This view combines financial resources (capital/RBV) and organizational attributes (size/institutional) as joint determinants of sustainability performance, which means that sustainability strategies cannot be generalized (one size fits all) for all banks (Linggadjaya et al., 2025).This interaction perspective positions bank size not as a passive control variable, but as an active moderator that shapes the strength of the capital–sustainability relationship. Hence, the core hypothesis of this study is proposed as follows:
H3: Bank size positively moderates the relationship between capital adequacy and sustainable finance, such that the positive effect of capital adequacy on ESG performance is stronger for larger banks.

3. Method

This study employs a quantitative research approach with a causal design to examine the effect of capital adequacy on sustainable finance and to assess the moderating role of bank size. A panel data framework is adopted, as it enables the analysis of both cross-sectional differences among banks and time-series variations across periods, thereby improving estimation efficiency and controlling for unobserved heterogeneity (Baltagi, 2021; Wooldridge, 2010).

This research adopts a quantitative approach with a causal design to investigate the influence of capital adequacy on sustainable finance and to assess the moderating role of bank size. The analysis applies Moderated Regression Analysis (MRA), enabling the evaluation of whether the relationship between capital adequacy and sustainability differs according to institutional size (bank size).

The population consists of commercial banks operating in Asia that publish annual financial and sustainability reports. The observation period covers 2014–2024, allowing the study to capture long-term dynamics in capital adequacy and sustainable finance practices.

A purposive sampling technique is applied based on the following criteria:

1. Availability of data on Capital Adequacy Ratio (CAR), total assets, and ESG indicators for at least seven consecutive years;
2. Compliance with Basel III capital regulations;
3. Classification as commercial banks (excluding investment banks, insurance companies, and other non-bank financial institutions).

Based on these criteria, the final sample comprises 97 commercial banks across Asian countries, forming an unbalanced panel, which is common in sustainability-related studies due to differences in disclosure practices (Menicucci & Paolucci, 2023). Secondary data are collected from banks' annual reports, sustainability reports, and reputable financial databases, including Refinitiv (Thomson Reuters Eikon), and official banking disclosures.

3.1 Variables and measurement

The independent variable (X) in this study is Capital Adequacy (CAR), operationalized through the Capital Adequacy Ratio (%) as reported in banks' annual financial statements. The dependent variable (Y) is Sustainable Finance, which is measured using Environmental, Social, and Governance (ESG) scores or disclosure indices obtained from the Thomson Reuters Eikon Refinitiv database. Furthermore, the moderating variable (Z) is Bank Size, proxied by the natural logarithm of total assets (Ln Total Assets). These variables are employed to examine the relationship between bank capital adequacy and the implementation of sustainable finance, while accounting for the moderating role of bank size in potentially strengthening or weakening this relationship

Control Variabels: To isolate the effects of capital adequacy and bank size on sustainable finance, this study includes control variables capturing bank-specific and macroeconomic conditions. Bank-specific controls comprise liquidity (Loan-to-Deposit Ratio) and solvency (Interest Coverage Ratio), while macroeconomic factors are represented by GDP growth and the interest rate. These controls account for internal financial conditions and external economic environments that may influence ESG performance.

Table 1. Variable Operationalization

Variable	Symbol	Measurement / Indicator	Source
Independent Variable	CAR	Capital Adequacy Ratio (%) as reported in annual financial reports (Platonova et al., 2018)	Annual Reports / Bank Financial Statements
Moderating Variable	SIZE	Natural logarithm of total assets (Ln Total Assets) (Nizam et al., 2019)	Annual Reports / Bank Financial Statements

Dependent Variable	ESG	Sustainability performance proxied by ESG disclosure index / sustainable finance indicators (Bătae et al., 2020)	Sustainability Reports / Bank Annual Reports
Control Variable (Bank-specific)	LDR	Loan-to-Deposit Ratio (%) measuring bank liquidity and intermediation capacity (Adelopo et al., 2022)	Annual Reports / Bank Financial Statements
Control Variable (Bank-specific)	ICR	Interest Coverage Ratio, measuring the ability to meet interest obligations (Adelopo et al., 2022)	Annual Reports / Bank Financial Statements
Control Variable (Macroeconomic)	GDP	Annual GDP growth rate of the country where the bank operates (Nizam et al., 2019)	World Bank / National Statistics
Control Variable (Macroeconomic)	INT	Annual policy interest rate / benchmark interest rat (Bătae et al., 2021)	Central Bank / World Bank

To enhance the robustness of the empirical model and reduce omitted variable bias, this study incorporates several control variables that may influence sustainable finance performance independently of capital adequacy and bank size. These include liquidity, solvency (leverage), GDP growth, and interest rates, capturing both bank-specific financial conditions and macroeconomic environments. The inclusion of these controls follows standard practice in banking and sustainable finance literature (Adelopo et al., 2022; Le, 2024; Pyka & Nocoń, 2021).

The data analysis consists of three main stages:

1. Descriptive Statistics
   To give the research variables' descriptive features, such as their means, standard deviations, minimum and maximum values, and CAR, ESG, and bank size.
2. Assumption Tests
   Including normality, multicollinearity, heteroskedasticity, and autocorrelation tests to ensure the validity of the regression model.
3. Moderated Regression Analysis (MRA)
   The regression model is estimated in three steps:
   a. **Model 1 (Baseline Model):**
   $ESG_{it} = \beta_0 + \beta_1 CAR_{it} + \sum \beta_k Control_{it} + \varepsilon_{it}$
   b. **Model 2 (Direct Effects Model):**
   $ESG_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 SIZE_{it} + \sum \beta_k Control_{it} + \varepsilon_{it}$
   c. **Model 3 (Moderation Model):**
   $ESG_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 SIZEit + \beta_3 (CARit \times SIZEit) + \sum \beta_k Control_{it} + \varepsilon_{it}$

A statistically significant coefficient of the interaction term (CAR×SIZE) indicates that bank size moderates the relationship between capital adequacy and sustainable finance.

Table 2. Explanation of Model Variables and Coefficients

Symbol	Description
β_0	Constant term (intercept).
β_1	Direct effect of capital adequacy (CAR) on sustainable finance (ESG).
β_2	Direct effect of bank size (SIZE) on sustainable finance (ESG).
β_3	Interaction effect of CAR × SIZE. A significant β_3 indicates that bank size moderates the relationship between capital adequacy and sustainable finance.

β_k	Coefficients of the control variables (liquidity, solvency, GDP growth, and interest rate), capturing the effects of bank-specific and macroeconomic factors on sustainable finance (ESG).
ΔR^2	Change in explained variance between Model 1 and Model 2, used to assess the contribution of the interaction effect.
ε_i	Error term.

4. Post-Estimation Analysis
   To interpret the moderating effect, simple slope analysis is conducted by examining the relationship between capital adequacy and ESG at low, medium, and high levels of bank size. This analysis clarifies whether the effect of capital adequacy on sustainable finance is stronger for larger banks compared to smaller banks.

4. Results and discussion

The findings indicate a noteworthy shift when the interaction term between capital adequacy (CAR) and bank size (SIZE) is incorporated into the regression analysis. In Model 1, capital adequacy (CAR) shows a positive and statistically significant effect on ESG performance, indicating that well-capitalized banks are better positioned to engage in sustainability-oriented activities. This finding supports prior studies that emphasize the importance of capital strength in enhancing financial resilience and enabling long-term ESG investment (Buallay, 2019; Nizam et al., 2019; Pyka & Nocoń, 2021). Among the control variables, liquidity (LDR) and GDP growth positively affect ESG, suggesting that stronger intermediation capacity and favorable macroeconomic conditions facilitate sustainable finance. Conversely, the interest coverage ratio (ICR) has a negative and significant effect, indicating that higher debt-servicing pressure constrains banks' ability to allocate resources toward ESG initiatives (Adelopo et al., 2022).

In Model 2, both CAR and SIZE exhibit positive and significant effects on sustainable finance (ESG), supporting theoretical expectations that banks with stronger capital positions and larger operational scales are better positioned to allocate resources toward ESG-related initiatives. These findings are consistent with prior studies emphasizing the role of capital adequacy in promoting stability and sustainability (Buallay, 2019; Nizam et al., 2019). The persistence of significant control variables confirms the robustness of the estimated relationships.

In Model 3, after including bank size as a moderating factor in Model 3, the analysis reveals that the direct effects of CAR and SIZE shift to negative values. Based on the findings in this study, supported by previous research, when bank size is included as a moderating variable, the direct effects of CAR and size on financial sustainability are often negative. This phenomenon can occur for several reasons that occur in the field: Negative Effects Occur When Banks Are Large: When banks grow larger, a high capital adequacy ratio (CAR) is often interpreted as inefficiency. Excessive capital in large banks is considered idle capital and is not optimized to generate profits. Operational Inefficiency: In several studies, an increase in bank size has a negative impact on operational efficiency due to increased operational costs or the inability to manage assets optimally, which ultimately puts pressure on CAR. In short, size moderates the influence

of CAR on sustainable finance, so that the direct effect becomes negative, reflecting the inefficiency of capital management in large asset banks. Whereas, the interaction term (CAR × SIZE) shows a robustly positive and highly significant effect on ESG. This suggests that bank size acts as a moderator in the association between capital adequacy (CAR) and sustainability (ESG), with bank size exerting a more dominant influence than CAR itself. From a financial management perspective, this finding reflects the fact that capital adequacy, although crucial as a buffer for risk absorption and financial stability, is not sufficient on its own to drive sustainability outcomes unless complemented by organizational scale. Larger banks, with broader resource bases, asset structures, and financial flexibility, are better positioned to channel their capital into sustainable investments, innovation, and ESG-related activities (Buallay, 2019; Buallay et al., 2020).

Table 3. Regression Results of MRA (Dependent Variable: ESG)

Model	Predictor	Coeff.	SE	Beta (Std)	t-value	p-value.
Model 1	Constant	13.814	3.547	—	3.895	<0.001
	CAR	147.992	13.816	0.355	10.712	<0.001
	LDR	13.447	2.920	0.142	4.6150	<0.001
	ICR	-1.044	0.117	-0.300	-8.910	<0.001
	GDP	0.848	0.174	0.138	4.8755	<0.001
	Interest Rate	1.782	0.778	0.066	2.2910	0.002
Model 2	Constant	-100.901	14.205	—	-7.103	<0.001
	CAR	150.400	13.195	0.360	11.398	<0.001
	SIZE	3.155	0.376	0.236	8.400	<0.001
	LDR	19.162	2.879	0.202	6.655	<0.001
	ICR	-0.859	0.115	-0.247	-7.482	<0.001
	GDP	0.696	0.169	0.113	4.114	<0.001
	Interest Rate	1.901	0.754	0.070	2.521	0.012
Model 3	Constant	208.621	48.318	—	4.318	<0.001
	CAR	-1841.201	298.007	-4.413	-6.178	<0.001
	SIZE	-5.962	1.412	-0.447	-4.223	<0.001
	CAR × SIZE	59.050	8.827	4.709	6.689	<0.001
	LDR	16.331	2.853	0.172	5.725	<0.001
	ICR	-0.563	0.121	-0.162	-4.657	<0.001
	GDP	0.703	0.166	0.114	4.245	<0.001
	Interest Rate	1.525	0.741	0.056	2.059	0.040

Source: Table generated by the author

Table 4. Model Fit Statistics

Model	R^2	ΔR^2	F-change	Sig. F-change
Model 1 (CAR, ESG, Controls)	0.184	0.179	39.326	<0.001
Model 2 (CAR, SIZE, Controls)	0.088	0.086	50.816	<0.001
Model 3 (CAR, SIZE, CAR×SIZE, Controls)	0.264	0.259	53.702	<0.001

Source: Table generated by the author

Supported by research by Huang et al. (2019), a significant negative relationship was found, indicating that larger companies tend to have lower sustainable growth. The expansion of bank size results in higher costs, thus forming a negative relationship between profits and size (Singh & Sharma, 2016). Size has a positive impact on sustainable growth (Ramli et al., 2022; Zheng & Escalante, 2020). On the other hand, size does not show a significant impact on sustainable growth (Z. Ahmad et al., 2017).

These results support the Resource-Based View (RBV) perspective, which maintains that long-term competitiveness originates from the unique integration and application of organizational resources and capabilities, rather than reliance on any single resource (Freeman et al., 2021). In this context, capital adequacy functions as a financial safeguard, while bank size enhances the capacity to transform capital into impactful sustainability initiatives (Bhandari et al., 2022; Menicucci & Paolucci, 2023). Hence, the synergy between strong capital buffers and large organizational scale creates greater leverage in achieving sustainable finance objectives.

The significantly positive interaction indicates a synergistic effect: when combined, high capital adequacy and substantial bank size enable institutions to overcome internal constraints and channel resources effectively into ESG activities. This interpretation aligns with institutional theory, which posits that larger banks face stronger regulatory pressures, greater legitimacy concerns, and possess more advanced governance mechanisms, all of which enhance their ability to transform financial strength into sustainability practices (Al Hawaj & Buallay, 2022; El Khoury et al., 2023b). Conversely, smaller banks, despite holding adequate capital, may lack the infrastructure, incentives, or stakeholder pressures to translate financial strength into meaningful ESG outcomes, thereby explaining the attenuated or even negative direct effects (Zheng et al., 2021).

Comparative evidence from Asian markets further supports this interpretation. For instance, studies in China (Mengdi Yue & Christoph Nedopil, 2025) and South Korea (Oh & Kim, 2018) indicate that larger banks with stronger capital bases consistently outperform smaller counterparts in sustainability outcomes due to enhanced access to green financing and more intense stakeholder expectations. Similarly, regional findings in Southeast Asia confirm the positive linkage between ESG practices and financial performance among larger listed institutions (Le, 2024). On a global scale, Nizam et al. (2019) highlight that bank size exerts a significant moderating role in the capital adequacy–sustainability nexus, underlining the pivotal influence of institutional characteristics in shaping ESG trajectories.

In sum, these results contribute theoretically by demonstrating that the relationship between capital adequacy and sustainability is conditional rather than universal, significantly moderated by bank size. This enriches both RBV and institutional theory by illustrating how financial resources and organizational attributes jointly determine sustainability performance (Elklawy, 2024; Soh Young In et al., 2022). From a policy perspective, the findings suggest that a "one-size-fits-all" regulatory approach may be ineffective. While stricter capital adequacy frameworks can reinforce sustainability among large banks, small and medium-sized institutions require tailored interventions—such as regulatory incentives, capacity-building programs, or specialized sustainability frameworks—to ensure that capital adequacy translates into tangible ESG performance (Basel Committee, 2011).

The size of a bank (usually measured by total assets) determines how capital adequacy affects sustainability performance. Large banks generally have more resources to manage risk (strong capital) than small banks. In this case, it has a conditional effect in that high capital adequacy in large banks may be more effective in promoting sustainable initiatives (such as green financing) because they have more stable financial capacity, while in small banks, capital is more focused on survival or meeting minimum compliance requirements. Empirical Findings: Research shows that company size moderates the relationship between CAR and sustainable finance, where bank size strengthens or weakens the influence of financial variables on sustainability.

Furthermore, banks achieve competitive advantage through ownership of valuable, scarce, and difficult-to-imitate resources (tangible and intangible assets). In this context, capital adequacy is a financial resource that enables banks to invest in sustainable projects. The size of a bank (as an organizational attribute) modulates how effectively capital is converted into competitive advantage (sustainability performance). Large banks with strong capital can more effectively implement sustainability strategies. Organizations operate under environmental pressures (regulations, social norms, and market pressures) to gain legitimacy. This shows that banks are forced (regulatory pressures such as POJK) to adopt sustainable principles (KKUB - Environmentally Friendly Business Activities). The size of the bank determines how quickly and strongly they respond to these pressures. Large banks are often more in the public and regulatory spotlight, so sustainability becomes a strategy for institutional legitimacy.

The combination of these two theories explains that sustainability is not only about how much capital is owned (RBV - financial capability), but also about how large and structured the organization is (Institutional - pressure & capacity) to manage these resources into a positive impact for stakeholders. This view combines financial resources (capital/RBV) and organizational attributes (size/institutional) as joint determinants of sustainability performance, which means that sustainability strategies cannot be generalized (one size fits all) for all banks (Linggadjaya et al., 2025).

5. Conclusion

The empirical findings demonstrate that both capital adequacy and bank size significantly influence sustainable finance. In the baseline model, CAR and SIZE each show positive effects on ESG performance, indicating that stronger capitalization and larger institutional scale independently contribute to sustainability initiatives. However, when bank size is introduced as a moderating factor, the direct effects of CAR and SIZE become negative, while the interaction effect (CAR × SIZE) turns strongly positive and highly significant. This outcome suggests that bank size is not merely an independent determinant but functions as a crucial moderator that amplifies the influence of capital adequacy on sustainability. The novelty of this study lies in positioning bank size as a moderating variable, thereby offering fresh empirical evidence that the effectiveness of capital adequacy in driving sustainable finance is contingent upon institutional scale.

6. Theoretical and practical implication

Practical implications include recommendations for managers, first that regulators and policymakers should recognize that capital adequacy alone is not sufficient to ensure financial sustainability; institutional attributes such as bank size significantly influence outcomes. The regulatory framework should be designed not only to strengthen capital reserves but also to encourage economies of scale, especially in developing countries where small banks face resource constraints

7. Limitations and suggestions for further research

This study is limited to Asian banks and the variables of capital adequacy and bank size moderation. Future studies should expand the scope by including additional variables such as governance quality, risk management, and ownership structure, and test the model

in different regions to build a more comprehensive understanding of how capital adequacy and bank size interact in promoting sustainable finance.

Based on these conclusions, several practical and policy recommendations can be drawn. First, regulators and policymakers should acknowledge that capital adequacy alone is insufficient to guarantee sustainable finance; institutional attributes such as bank size substantially shape the outcome. Regulatory frameworks should therefore be designed not only to strengthen capital buffers but also to encourage scale efficiencies, particularly in emerging economies where smaller banks face resource limitations. Second, bank management is advised to strategically align capital resources with ESG objectives, ensuring that sustainability initiatives are embedded into long-term corporate strategies. Finally, future research should expand the scope by incorporating additional variables such as governance quality, risk management, and ownership structure, as well as testing the model across different regions, to build a more comprehensive understanding of how capital adequacy and bank size interact to foster sustainable finance.

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