“Navigating risk: Analyzing the effects of climate change and political connections on bank financing access for the agricultural sector”

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ARTICLE INFO	Silviana Pebruary, Hadi Ismanto, Fatchur Rohman and Dwi Falihaturrohman (2025). Navigating risk: Analyzing the effects of climate change and political connections on bank financing access for the agricultural sector. *Banks and Bank Systems*, *20*(2), 177-188. doi:10.21511/bbs.20(2).2025.15
DOI	http://dx.doi.org/10.21511/bbs.20(2).2025.15
RELEASED ON	Tuesday, 01 July 2025
RECEIVED ON	Wednesday, 02 October 2024
ACCEPTED ON	Wednesday, 19 March 2025

JOURNAL	"Banks and Bank Systems"
ISSN PRINT	1816-7403
ISSN ONLINE	1991-7074
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
40	**0**	**5**

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

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NAVIGATING RISK: ANALYZING THE EFFECTS OF CLIMATE CHANGE AND POLITICAL CONNECTIONS ON BANK FINANCING ACCESS FOR THE AGRICULTURAL SECTOR

Received on: 2nd of October, 2024
Accepted on: 19th of March, 2025
Published on: 1st of July, 2025

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Conflict of interest statement:
Author(s) reported no conflict of interest

Abstract

Climate change has become a major focus of discussion around the world. The impact of climate change has been felt in various sectors, including banking. This study aims to analyze the effect of climate change and political connections on bank financing and financial stability in the Indonesian banking sector. The study used a sample of banks listed on the Indonesia Stock Exchange. The data used in the study were 2,379 observations, taken from 2010 to 2023. Hypothesis testing was performed using the fixed effects regression model (FEM) with robust standard error. The results show that climate change has a significant negative impact on bank financing and indicate that banks should consider the risks associated with climate change when making financing decisions. In addition, political connections have a negative effect on bank financing, implying that banks tend to reduce financing to politically connected firms, possibly due to concerns about poorer risk management. On the other hand, product diversification showed no significant effect in either model. These findings highlight the importance of considering environmental and political factors in banks' financing strategies to enhance financial stability amid the challenges posed by climate change and political dynamics. This study provides new insights for regulators and practitioners in formulating policies.

Keywords environmental, financing, political connections, financial stability, product diversification

JEL Classification G21, Q54

INTRODUCTION

Climate change has become one of the biggest threats to global ecosystem sustainability and economic stability. Its impacts are felt across multiple sectors, including agriculture, industry, and finance. Climate change affects the availability of natural resources and productivity and poses systemic risks that can undermine financial market stability. As a country with geographical diversity and a high dependence on weather-vulnerable sectors, Indonesia is particularly vulnerable to this threat. Extreme weather events such as floods, droughts, and landslides are becoming more frequent, putting additional strain on the national economy and financial sector.

As the backbone of the financial system, the banking industry plays a critical role in channeling funds and supporting the economy. However, climate change adds a new dimension to banking risk management. Indonesia faces major challenges in managing climate change risks due to its dependence on the most vulnerable sectors, such as agriculture. This sector is highly affected by weather variability, which has the potential to disrupt productivity and food availability and affect socio-economic stability in rural areas. Banks with high exposure to agricultural sector financing should consider this risk in their credit assessment. The direct impact of climate change on agriculture could increase the risk of default, thereby reducing the quality of banks' loan portfolios and threatening overall financial stability.

In addition to the direct impact of climate change, internal factors in banking, such as financial stability and product diversification, also play an important role in maintaining the sustainability of banking operations amidst the pressures of climate change. Banks with a high level of stability tend to be better able to withstand economic turmoil caused by climate change and natural disasters. In addition, product diversification can also strengthen a bank's stability. Banks that can offer a wide range of financial products and operate in different sectors tend to have a more stable revenue base, which can help them manage risks arising from climate change. Bank stability is critical in financing the agricultural industry. The sector is one of the most vulnerable to climate change, and banks play a key role in providing financing to ensure national food security. High bank stability can increase customer confidence and encourage more funding for the agricultural sector. However, in the face of climate change challenges, banks need to develop innovative and sustainable financing strategies to support the most affected sectors.

1. LITERATURE REVIEW

This study adopts Climate Risk Theory, which suggests that climate change may lead to increased financial risks for banks and other financial institutions (Shobande, 2023). The study enables banks to identify, measure, and manage risks associated with climate change and develop effective and proactive risk management strategies. In addition, this research also adopts stakeholder theory (Donaldson & Preston, 2016) and systemic risk theory (Battiston et al., 2021) to understand how climate change and political connections affect bank financing and stability. Stakeholder theory emphasizes that banks must consider the interests of various stakeholders, including governments, investors, and communities affected by climate policy and financing decisions (Donaldson & Preston, 2016). Meanwhile, Systemic Risk theory explains how risks arising from climate change can spread in the financial system, threaten bank stability, and influence investment decisions (Battiston et al., 2021).

Climate change has become a major factor affecting various sectors of the economy, including agriculture and related financing. Climate risks such as floods, droughts, and extreme temperature changes can affect crop yields, impacting farmers' ability to meet their financial obligations. As a result, the banking sector that provides financing for agriculture also faces challenges in assessing credit risk and maintaining its financial stability (Abedifar et al., 2024).

Climate change risks have been shown to affect banks' lending behavior. Studies show that banks are becoming more cautious in lending to sectors vulnerable to climate change (Aslan et al., 2022). This has reduced farmers' access to credit, which may hinder their agricultural productivity and business sustainability (Raifu & Aminu, 2020). Furthermore, climate risks can also increase borrowing costs, especially in developing countries with underdeveloped financial markets (Ho & Wong, 2023).

On the other hand, financial inclusion has been identified as a potential solution to increase farmers' resilience to climate change risks. Greater access to finance enables farmers to adopt more efficient and sustainable agricultural technologies, improving their productivity and economic resilience (Yang et al., 2024). However, limitations in financial infrastructure and low financial literacy among farmers are often barriers to implementing this strategy (Howard & Sylvan, 2015).

Other research also shows that climate risks can destabilize the financial sector as a whole. Climate change risks can create instability in the financial system through risk transmission between sectors (Battiston et al., 2021). This is relevant in banking and agriculture, where fluctuations in crop

http://dx.doi.org/10.21511/bbs.20(2).2025.15

yields can affect the bad loan ratios and liquidity of banks that have large exposures to these sectors (Lee et al., 2022). In more extreme cases, climate change may exacerbate systemic risks and require policy interventions to maintain financial stability (Acharya, 2009).

Environmental policy changes are also a factor affecting agricultural finance. Carbon emission reduction policies and the implementation of sustainable agriculture standards may change the agricultural financing landscape. Banks implementing green lending strategies may be more selective in extending credit to agricultural businesses that do not comply with sustainability standards (Cui et al., 2018). Meanwhile, banks that fail to adopt green policies may face greater regulatory pressure and increased credit risk in the future (Caby et al., 2022). The impact of climate change on agricultural finance is also linked to overall bank performance. Banks with high exposure to the agricultural sector often face challenges in maintaining their profitability amid growing climate risks (Zhang et al., 2024). In addition, pressure from investors and regulators to adopt sustainable finance policies may accelerate changes in banking strategies related to the agricultural sector (Erhemjamts et al., 2024).

In addition, political connections also play an important role in determining access to credit for businesses in the agricultural sector. Banks as financial intermediaries often face uncertainty in lending to the agricultural sector due to the high risk inherent in the variability of agricultural yields and external factors such as climate change and commodity price volatility. Political connections can give companies or individuals an advantage in obtaining bank loans on more favorable terms. These advantages can be lower interest rates, lighter collateral requirements, or higher loan ceilings compared to borrowers without political connections. Previous research shows that politically connected firms are more likely to gain access to credit with certain preferences, reflecting the influence of political connections in the allocation of funds by financial institutions (Claessens et al., 2008). Moreover, political connections not only affect the likelihood of obtaining loans but also significantly lower the cost of credit (Houston et al., 2014).

However, political connections in agricultural financing may also pose a risk of moral hazard and poor credit allocation efficiency. Politically connected firms tend to have lower performance compared to firms without political connections, as they rely more on credit preferences than business efficiency (Faccio, 2006). Another study shows that firms led by executives with political connections often face weak corporate governance issues, which may increase the risk of default in agricultural sector financing (Fan et al., 2007).

On the other hand, political connections in banking can also strengthen the financial resilience of agricultural firms amid market uncertainty. Banks with CEOs with political connections during the financial crisis tend to have more stable performance than banks without political connections (Chen et al., 2018). This stability may contribute to the sustainability of financing in the agricultural sector, which is often vulnerable to economic shocks. Another study found that politically connected banks tend to maintain more stable credit levels during periods of economic uncertainty, which could benefit the agricultural sector that relies heavily on access to financing (Hung et al., 2017).

Based on the literature review discussed, this study aims to analyze the effect of climate change and political connections on agricultural sector bank financing and financial stability in the Indonesian banking sector:

H_1: *Climate change risk has a negative impact on agricultural financing.*

H_2: *Political connections have a positive effect on agricultural financing.*

H_3: *Bank stability weakens the negative impact of climate change risk on agricultural financing.*

2. METHODOLOGY

The study utilizes a quantitative approach to analyze the effects of climate change, political connections, and product diversification on the stability of banks in Indonesia. The research population is composed of all banks that were listed on the IDX from 2010–2023. This sample consists of 2,379 observations from banks that meet the criteria, ensuring complete data on financing, product diversification, and political connections. The data sources used include bank annual reports, climate data from environmental reports, and information on product diversification and political connections obtained from previous studies. The dependent variables in this study are bank financing (in the form of total loans) and bank stability (measured using Z-Score). In contrast, the independent variables include climate change (measured by the climate change risk index), product diversification (in the proportion of different products), and political connections (based on the presence of board members with political connections). The data analysis was carried out using a fixed-effects regression model, which is useful in reducing the estimation bias. In addition, hypothesis testing was carried out to determine the effects of each variable on the dependent. Policymakers and regulators will use the findings of this study to develop better policies to address climate change and political dynamics. However, due to the limited data and variables analyzed, this study cannot provide a comprehensive analysis.

This study uses a panel data regression equation to analyze the effect of climate change, product diversification, and political connections on bank financing. Equation one (AF_{it}) states that total bank financing on agriculture (*i*) at time t is influenced by climate change ($Climate_t$) and political connections (*Connectit*). δBANK is the vector of bank specification control variables (ROA, Size, Leverage), γMACRO is the vector of macroeconomic control variables (INF and GDP), and ε is the standard error.

$$AF_{it} = \beta_0 + \beta_1 Climate_t + \beta_2 Connect_{it} + \delta BANK_{it} + \gamma MACRO_t + \varepsilon_{it}. \tag{1}$$

2.1. Variable measurement

This study aims to analyze the effects of political connections and climate change on the bank financing access for the agricultural sector. The dependent variable, the number of loans given by banks to the sector, is calculated by taking into account the natural logarithm of total bank credit (Aysan & Disli, 2019; Beck & Demirguc-Kunt, 2006). Climate change is an independent variable; these measurements are used to identify the risks associated with global warming (Aslan et al., 2022; Boungou & Urom, 2023). The political connection of board members is measured using an experimental variable. The variable is one if there are connections between members of the board and political parties and 0 otherwise (Cai, 2023; Hung et al., 2017). The moderating variable is the stability of banks, which is measured by the Z-score system, which considers the return on assets and the capital-to-assets ratio (Albaity et al., 2019; Fu et al., 2014). The control variables are ROA, Size, and Leverage. ROA is calculated as net profit divided by total assets (Tian et al., 2023). The size of a bank is expressed as the institution's total assets (Goddard et al., 2004; Sufian & Habibullah, 2009). On the other hand, leverage is the proportion of debt the bank has to total assets (Dalci, 2018; Hutchison & Cox, 2007). Various macroeconomic variables, such as the annual inflation rate and the difference between the previous year's and the current year's GDP, are used in this study to analyze the factors that affect the stability and financing of banks (Dietrich & Wanzenried, 2014; Nguyen et al., 2022). These variables are then used to better understand the effects of political connections and climate change on the financial sector. The research instruments are also presented in Appendix A.

3. RESULTS AND DISCUSSION

Descriptive statistical results show that there are 2,379 observations (bank-triennium). The Agricultural Financing (AF) variable has an average value of 5,146.639 billion. The average value of agricultural credit financing indicates that the banks involved in this study generally lend to the agricultural sector at a relatively high level. This average reflects the general condition of financing allocated to the agricultural sector among these banks. The Standard Deviation is 1,676.179. The large standard deviation indicates significant variation in the amount of financing banks provide to the agricultural sector. The larger the standard deviation, the greater the difference between the amount of credit financing provided by one bank and another. In this context, some banks

http://dx.doi.org/10.21511/bbs.20(2).2025.15

Table 1. Descriptive statistics

Variable	N	Mean	Std Dev	Min	Max
AF (Billion)	2,379	5146.639	1,676.179	2126	9317
Climate Change	2,379	27.07902	0.151684	26.8	27.4
Connect	2,379	0.728457	0.444849	0	1
ZScore	2,379	2.467549	3.293219	–7.36861	21.65611
ROA	2,379	1.108111	13.4108	–630	100
Size	2,379	1.07E+08	2.45E+08	63637	1.84E+09
LEV	2,379	0.82131	0.207796	0.046237	8.26552
Inflation	2,379	4.266192	1.883235	1.33	8.4
GDP	2,379	5.140652	1.206166	–0.74	7.07

Table 2. Correlation matrix between variables

Variable	AF	Climate Change	Connect	ZScore	ROA	Size	Lev	INF	GDP
AF	10.000	–	–	–	–	–	–	–	–
Climate Change	0.3114	10.000	–	–	–	–	–	–	–
Connect	–0.1792	–0.1055	10.000	–	–	–	–	–	–
ZScore	–0.0790	–0.0643	–0.0614	10.000	–	–	–	–	–
ROA	–0.1133	–0.1005	–0.1239	0.7276	10.000	–	–	–	–
Size	–0.1583	–0.0254	0.1271	–0.0356	–0.0364	10.000	–	–	–
Lev	–0.1398	–0.0410	–0.0459	0.1382	0.0028	0.0492	10.000	–	–
INF	–0.5000	–0.4615	0.1061	0.0864	0.1366	0.1099	0.0855	10.000	–
GDP	–0.5252	–0.5369	0.1172	0.0972	0.1273	0.0315	0.0514	0.3201	10.000

may lend significantly more or less than the average, suggesting that banks' policies and approaches in financing the agricultural sector may vary significantly.

The correlation analysis in Table 2 shows that the relationship between variables has a Pearson correlation coefficient value ranging from –1 to 1. Coefficient values close to 1 indicate a strong positive relationship, while values close to –1 indicate a strong negative relationship. A moderate positive correlation exists between Agriculture Finance (AF) and Climate Change (CC) with a coefficient of 0.3114. The highest correlation value of –0.5252 is between economic growth (GDP) and AF. Overall, Table 2 shows no strong correlation between the variables in the study.

3.1. Effect of climate change on agricultural financing

The results in Table 3 show the effect of Climate Change on Bank Financing. In the first model, climate change has a significant positive impact on bank financing with a coefficient of 0.242 and significant at a 1% level (t-statistic = 13.62). This indicates that an increase follows increased climate change variables in bank financing. This may be due to the increased need for the agricultural sector to adapt to climate change. Hence, they seek more funding from banks for innovation or risk mitigation. However, the second model's coefficient turns negative (–0.109), with significance remaining strong. This could indicate the presence of other impacts, such as broader macroeconomic effects (e.g., GDP or inflation conditions), that are more accounted for in the second model, such that climate change starts to negatively impact financing, perhaps because banks are more concerned about long-term risks.

These findings are relevant in the agricultural sector, where climate change often triggers a greater need for adaptation, whether in the form of technologies, production systems, or infrastructure that are more resilient to environmental change. Banks may see this as a financing opportunity, with agricultural firms increasingly reliant on external funds to finance innovations to mitigate climate risks or improve the resilience of their operations. These results are consistent with previous literature, suggesting that banks consider climate risks in their financing decisions, especially after increasing global awareness of climate change and its impact on the financial sector (Battiston et al., 2017). Increased bank financing in response to climate change may reflect banks' efforts to adapt to the risks posed by global climate shifts, either through investments in sustainability initiatives or more prudent risk management in sectors directly affected by climate change, such as agriculture and energy.

Table 3. Hypotheses testing results of independent variables on Agricultural Financing (FEM robust)

Variable	Agricultural Financing	
	(1)	(2)
Climate Change	0.242***	–0.109***
	(13.62)	(–10.50)
Connect	–1.294**	–0.590
	(–2.50)	(–1.56)
ROA	–	–0.00139**
		(–2.05)
Size	–	–0.000287***
		(–3.53)
Lev	–	–0.0267**
		(–2.24)
INF	–	–0.0390***
		(–16.84)
GDP	–	–0.0617***
		(–24.91)
N	2379	2379
F	263.82	536.28
Prob > F	0.0017	0.0000
R-squared	0.5463	0.4139

Note: ***, **, and * denote statistically significant variables at 1%, 5%, and 10% levels, respectively; t statistics in parentheses.

Scholtens's (2006) study also emphasizes that financial institutions are starting to integrate environmental risks in their credit portfolios to avoid long-term losses caused by climate risks. In the Indonesian context, certain sectors vulnerable to climate change, such as agriculture, fisheries, and forestry, are highly dependent on stable weather conditions. Therefore, banks that provide financing to these sectors need to be more aware of climate risks that may affect the performance of their loan portfolios. While the results show a positive effect, it is important to consider that the increase in financing may not be solely due to a push for investment in climate change mitigation or adaptation. It may also reflect the increased funding needs of sectors affected by natural disasters or changing weather patterns. As Pagnottoni et al. (2022) pointed out, extreme climate events often trigger a surge in credit demand for economic recovery, particularly in sectors that depend on stable environmental conditions.

Furthermore, this finding can also be understood from the perspective of banks increasingly recognizing the importance of sustainability and corporate social responsibility (ESG). Financial institutions that support green or sustainable investments increase financing to these sectors and seek to create portfolios that are more resilient to future climate risks (Cui et al., 2018). However, a study by Aslan et al. (2022) confirms that stronger regulation is still needed to ensure that such increased financing is actually directed towards projects that support climate change mitigation rather than as a temporary response to market pressures or climate disasters.

3.2. Effect of political connections on agricultural financing

The results in Table 3 show in the first model that political connections have a significant negative effect on bank financing with a coefficient of –1.294 and a significance level of 5% (t-statistic = –2.50). This finding indicates that companies with political connections tend to get lower financing from banks compared to companies without political connections. Banks may see politically connected firms as riskier entities. Political connections are often associated with less disciplined decision-making due to outside influences that are not always based on rational business considerations (John & Lawton, 2018). Companies with political connections may get preferences or special treatment from regulators or governments, but this can also raise concerns on the part of banks regarding the long-term stability and ability of the company to survive competitively without political support. The risk of moral hazard also increases when politically connected firms take advantage of the relationship to gain benefits that may not be sustainable in the long run. This result is consistent with previous research showing that political connections are often associated with increased risk for financial institutions, as they can encourage less disciplined behavior and business decisions based on non-economic considerations (Faccio, 2006; Houston et al., 2014).

http://dx.doi.org/10.21511/bbs.20(2).2025.15

Banks may feel that firms with political connections have lower incentives to improve efficiency and good corporate governance. Previous research has often shown that firms with close ties to politicians tend to focus less on operational efficiency as they rely more on profits gained from favorable policies, subsidies, or government contracts (Hung et al., 2017). This can create an unhealthy reliance on political connections rather than innovation or good risk management, increasing the risk of firm failure when such political support weakens or disappears. There is potential that political connections can obscure corporate transparency in terms of financial reporting and governance (Leuz & Oberholzer-Gee, 2006). Banks rely heavily on accurate and transparent information to assess credit risk. If companies with political connections tend to be less transparent or have poor governance, banks may be more reluctant to provide financing due to difficulties in assessing the true risk.

A bank's decision to reduce financing to companies with political connections can also be seen as part of a risk mitigation strategy. In the context of an agricultural sector that is vulnerable to market uncertainty and external risks such as climate change, banks seem to prefer to avoid companies that may present additional risks associated with unpredictable political connections. While political connections may provide short-term benefits, banks may consider the potential long-term costs arising from reliance on political power (Houston et al., 2014). In addition, these results also suggest that banks do not always give preference to politically connected firms, which is an important finding in the context of good banking governance. The decline in financing to politically connected companies reflects that banks are increasingly paying attention to corporate governance and long-term risks in their financing decisions.

Banks involved in financing politically connected companies may also face additional challenges related to financial stability. The study by Houston et al. (2014) shows that politically connected companies often obtain larger loans with more lenient terms, but this increases the risk for banks, especially in less stable market conditions or during political changes. In this context, the results of this study reinforce the argument that banks are more likely to limit financing to politically connected firms to reduce their exposure to unpredictable risks. This finding can also be explained through a moral hazard lens, where firms with political connections feel more protected from the risk of failure due to their proximity to regulators or the government. In this situation, banks may judge that such firms are likely to take higher risks, as they operate under the assumption that they will get favors or preferential treatment if they face difficulties. However, for banks, this increases uncertainty, as political support is often temporary and can be lost when political changes occur. Research by Fan et al. (2007) shows that firms with political connections tend to have weaker corporate governance, which may trigger concerns about the firm's ability to survive in the long run without external support.

3.3. Role of bank stability in moderating climate change on agricultural financing

Table 4 shows the results of the moderation test of bank stability (ZScore) on the effect of climate change on agricultural financing. Model (1) shows the moderating effect of bank stability on the relationship between climate change and agricultural financing with a coefficient of 0.0000727 and a t-statistic of 2.50. This coefficient is significant at the 5% significance level, indicating that bank stability acts as a moderating variable that weakens the negative effect of climate change on agricultural credit financing. That is, the more stable the bank's financial condition (measured through ZScore), the smaller the negative impact of climate change on the bank's decision to provide agricultural credit financing.

In other words, when banks have stronger financial stability, they are more likely to be able to withstand the negative impact of climate change risks on the agricultural sector and maintain financing levels. This result is in line with previous research, which shows that banks with high levels of stability tend to have a better capacity to bear the risks associated with financing high-risk sectors, such as agriculture (Dunz et al., 2023). Banks' higher financial stability allows them to be more flexible in dealing with fluctuations in climate risk.

Table 4. Moderation test results of bank stability on Agricultural Financing (FEM robust)

Variable	Agricultural Financing	
	(1)	(2)
Climate Change	−0.135***	−0.108***
	(−6.59)	(−11.07)
ZScore	−0.00163*	−0.00133
	(−2.04)	(−1.08)
Connect	−0.572	−0.543
	(−1.52)	(−0.89)
ROA	−0.000498	−0.000467
	(−0.64)	(−0.62)
Size	−0.000279**	−0.000284**
	(−3.42)	(−3.20)
Lev	−0.0285*	−0.0287*
	(−2.43)	(−2.45)
INF	−0.0388***	−0.0387***
	(−16.15)	(−16.23)
GDP	−0.0607***	−0.0607***
	(−23.53)	(−23.37)
CZ	0.0000727**	–
	(2.50)	
CoZ	–	−0.0000528
		(−0.04)
N	2379	2379
F	490.03	504.51
Prob > F	0.0000	0.0000
R-squared	0.3879	0.3866

Note: ***, **, and * denote statistically significant variables at 1%, 5%, and 10% levels, respectively; t statistics in parentheses.

In model (2), the moderation test of political connection (CoZ) did not provide significant results, with a coefficient of −0.0000528 and a t-statistic of −0.04. This indicates that political connections do not significantly moderate the relationship between climate change and agricultural credit financing. While political connections are often associated with an advantage in access to financial or regulatory resources, in the context of agricultural sector financing affected by climate change risks, their impact does not seem strong enough to influence banks' decisions significantly. This may be due to the highly climatic nature of agriculture, which political advantages cannot fully offset.

CONCLUSION

This study analyzes the effect of climate change and political connections on bank financing access for the agricultural sector in Indonesia. The regression analysis results show that climate change significantly affects agricultural sector financing, but the effect is the opposite in the two models used. Climate change is positively associated with agricultural sector financing, which suggests that banks may increase financing in an effort to adapt to climate change risks. In addition, political connections have a significant negative impact on financing, indicating that banks are likely to reduce financing to politically connected entities. This may be due to the risk of poor management or low transparency in politically connected firms, as supported by previous literature.

http://dx.doi.org/10.21511/bbs.20(2).2025.15

The findings suggest that banks need to better consider the risks associated with climate change and political connections in their credit decision-making. This study makes several important contributions, both academically and practically. First, this study fills a gap in the literature regarding the influence of climate change and political connections on agricultural sector financing, which is still rarely studied in the context of developing countries such as Indonesia. This study emphasizes the importance of considering climate and political risks in financing decisions, especially in vulnerable sectors such as agriculture. Second, the findings also contribute to policy development by showing that banks need to be more prudent in managing risks arising from climate change and political connections to maintain their financial stability. Third, the results of this study are relevant for regulators in formulating policies that encourage banks to integrate environmental and political risks in the credit decision-making framework. Thus, this study contributes to formulating more sustainable and resilient banking policy strategies in the future.

AUTHOR CONTRIBUTIONS

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ACKNOWLEDGMENTS

The greatest appreciation is conveyed to the Directorate General of Higher Education, Research, and Technology, Ministry of Education, Culture, Research, and Technology, which has provided funding support for this research through a principal research grant with contract number 108/E5/PG.02.00.PL/2024. Thanks are also expressed to the Higher Education Service Institute (LLDIKTI) Region 6 and the Institute for Research and Community Service (LPPM) Unisnu Jepara, Indonesia, for their continuous support and facilitation during the research process.

REFERENCES

1. Abedifar, P., Kashizadeh, S. J., & Ongena, S. (2024). Flood, farms and credit: The role of branch banking in the era of climate change. *Journal of Corporate Finance, 85,* 102544. https://doi.org/10.1016/j.jcorpfin.2024.102544
2. Acharya, V. V. (2009). A theory of systemic risk and design of prudential bank regulation. *Journal of Financial Stability, 5*(3), 224-255. https://doi.org/10.1016/j.jfs.2009.02.001
3. Albaity, M., Mallek, R. S., & Noman, A. H. M. (2019). Competition and Bank Stability in the MENA Region: The Moderating Effect of Islamic versus Conventional Banks. *Emerging Markets Review, 38(March),* 310-325. https://doi.org/10.1016/j.ememar.2019.01.003
4. Aslan, C., Bulut, E., Cepni, O., & Yilmaz, M. H. (2022). Does climate change affect bank lending behavior? *Economics Letters, 220,* 110859. https://doi.org/10.1016/j.econlet.2022.110859
5. Aysan, A. F., & Disli, M. (2019). Small Business Lending and

Credit Risk: Granger Causality Evidence. *Economic Modelling, 83,* 245-255. https://doi.org/10.1016/j.econmod.2019.02.014

6. Battiston, S., Dafermos, Y., & Monasterolo, I. (2021). Climate risks and financial stability. *Journal of Financial Stability, 54.* https://doi.org/10.1016/j.jfs.2021.100867

7. Battiston, S., Mandel, A., Monasterolo, I., Schütze, F., & Visentin, G. (2017). A climate stress-test of the financial system. *Nature Climate Change, 7*(4), 283-288. https://doi.org/10.1038/nclimate3255

8. Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking and Finance, 30*(11), 2931-2943. https://doi.org/10.1016/j.jbankfin.2006.05.009

9. Boungou, W., & Urom, C. (2023). Climate change-related risks and bank stock returns. *Economics Letters, 224,* 111011. https://doi.org/10.1016/j.econlet.2023.111011

10. Caby, J., Ziane, Y., & Lamarque, E. (2022). The impact of climate change management on banks profitability. *Journal of Business Research, 142,* 412-422. https://doi.org/10.1016/j.jbusres.2021.12.078

11. Cai, L. (2023). Equity incentive, political connection and bank loan in private enterprises. *Finance Research Letters, 56,* 104042. https://doi.org/10.1016/j.frl.2023.104042

12. Chen, H. K., Liao, Y. C., Lin, C. Y., & Yen, J. F. (2018). The effect of the political connections of government bank CEOs on bank performance during the financial crisis. *Journal of Financial Stability, 36,* 130-143. https://doi.org/10.1016/j.jfs.2018.02.010

13. Claessens, S., Feijen, E., & Laeven, L. (2008). Political connections and preferential access to finance: The role of campaign contributions. *Journal of Financial Economics, 88*(3), 554-580. https://doi.org/10.1016/j.jfineco.2006.11.003

14. Cui, Y., Geobey, S., Weber, O., & Lin, H. (2018). The impact of green lending on credit risk in China. *Sustainability (Switzerland), 10*(6), 1-16. https://doi.org/10.3390/su10062008

15. Dalci, I. (2018). Impact of Financial Leverage on Profitability of Listed Manufacturing Firms in China. *Pacific Accounting Review, 30*(4), 410-432. https://doi.org/10.1108/PAR-01-2018-0008

16. Dietrich, A., & Wanzenried, G. (2014). The Determinants of Commercial Banking Profitability in Low-, Middle-, and High-income Countries. *The Quarterly Review of Economics and Finance, 54*(3), 337-354. https://doi.org/10.1016/j.qref.2014.03.001

17. Donaldson, T., & Preston, L. E. (2016). The Stakeholder Theory of the Corporation: Concepts, Evidence and Implications. *The Corporation and Its Stakeholders, 1,* 173-204. https://doi.org/10.3138/9781442673496-011

18. Dunz, N., Hrast Essenfelder, A., Mazzocchetti, A., Monasterolo, I., & Raberto, M. (2023). Compounding COVID-19 and climate risks: The interplay of banks' lending and government's policy in the shock recovery. *Journal of Banking and Finance, 152,* 106306. https://doi.org/10.1016/j.jbankfin.2021.106306

19. Erhemjamts, O., Huang, K., & Tehranian, H. (2024). Climate risk, ESG performance, and ESG sentiment in US commercial banks. *Global Finance Journal, 59,* 100924. https://doi.org/10.1016/j.gfj.2023.100924

20. Faccio, M. (2006). Politically Connected Firms. *American Economic Review, 96*(1), 369-386. https://doi.org/10.1257/000282806776157704

21. Fan, J., Wong, T., & Zhang, T. (2007). Politically connected CEOs, corporate governance, and Post-IPO performance of China's newly partially privatized firms. *Journal of Financial Economics, 84*(2), 330-357. https://doi.org/10.1016/j.jfineco.2006.03.008

22. Fu, X. (Maggie), Lin, Y. (Rebecca), & Molyneux, P. (2014). Bank Competition and Financial Stability in Asia Pacific. *Journal of Banking & Finance, 38,* 64-77. https://doi.org/10.1016/j.jbankfin.2013.09.012

23. Goddard, J., Molyneux, P., & Wilson, J. O. (2004). The Profitability of European Banks: A Cross-sectional and Dynamic Panel Analysis. *The Manchester School, 72*(3), 363-381. https://doi.org/10.1111/j.1467-9957.2004.00397.x

24. Ho, K., & Wong, A. (2023). Effect of climate-related risk on the costs of bank loans: Evidence from syndicated loan markets in emerging economies. *Emerging Markets Review, 55,* 100977. https://doi.org/10.1016/j.ememar.2022.100977

25. Houston, J. F., Jiang, L., Lin, C., & Ma, Y. (2014). Political Connections and the Cost of Bank Loans. *Journal of Accounting Research, 52*(1), 193-243. https://doi.org/10.1111/1475-679X.12038

26. Howard, P. H., & Sylvan, D. (2015). The Economic Climate: Establishing Consensus on the Economics of Climate Change. *2015 AAEA & WAEA Joint Annual Meeting*. San Francisco, California. https://doi.org/10.22004/ag.econ.205761

27. Hung, C. H. D., Jiang, Y., Liu, F. H., Tu, H., & Wang, S. (2017). Bank political connections and performance in China. *Journal of Financial Stability, 32,* 57-69. https://doi.org/10.1016/j.jfs.2017.09.003

28. Hutchison, D. E., & Cox, R. A. (2007). The Causal Relationship between Bank Capital and Profitability. *Annals of Financial Economics, 3*(1), 0750002. https://doi.org/10.1142/S2010495207500029

29. John, A., & Lawton, T. C. (2018). International Political Risk Management: Perspectives, Approaches and Emerging Agendas. *International Journal of Management Reviews, 20*(4), 847-879. https://doi.org/10.1111/ijmr.12166

30. Lee, C. C., Wang, C. W., Thinh, B. T., & Xu, Z. T. (2022). Climate risk and bank liquidity creation: International evidence. *International Review of Financial Analysis, 82,* 102198. https://doi.org/10.1016/j.irfa.2022.102198

http://dx.doi.org/10.21511/bbs.20(2).2025.15

31. Leuz, C., & Oberholzer-Gee, F. (2006). Political relationships, global financing, and corporate transparency: Evidence from Indonesia. *Journal of Financial Economics, 81*(2), 411-439. https://doi.org/10.1016/j.jfineco.2005.06.006

32. Nguyen, L., Tran, S., & Ho, T. (2022). Fintech credit, bank regulations and bank performance: a cross-country analysis. *Asia-Pacific Journal of Business Administration, 14*(4), 445-466. https://doi.org/10.1108/APJBA-05-2021-0196

33. Pagnottoni, P., Spelta, A., Flori, A., & Pammolli, F. (2022). Climate change and financial stability: Natural disaster impacts on global stock markets. *Physica A: Statistical Mechanics and Its Applications, 599,* 127514. https://doi.org/10.1016/j.physa.2022.127514

34. Raifu, I. A., & Aminu, A. (2020). Financial development and agricultural performance in Nigeria: what role do institutions play? *Agricultural Finance Review, 80*(2), 231-254. https://doi.org/10.1108/AFR-06-2018-0045

35. Scholtens, B. (2006). Finance as a Driver of Corporate Social Responsibility. *Journal of Business Ethics, 68*(1), 19-33. https://doi.org/10.1007/s10551-006-9037-1

36. Shobande, O. A. (2023). Macroeconomic dynamics of climate financial risks: Theory and practical implications. In *Reference Module in Social Sciences*. Elsevier. https://doi.org/10.1016/B978-0-44-313776-1.00130-6

37. Sufian, F., & Habibullah, M. S. (2009). Determinants of Bank Profitability in a Developing Economy: Empirical Evidence from Bangladesh. *Journal of Business Economics and Management, 10*(3), 207-217. https://doi.org/10.3846/1611-1699.2009.10.207-217

38. Tian, G., Wang, K. T., & Wu, Y. (2023). Does the market value the green credit performance of banks? Evidence from bank loan announcements. *British Accounting Review, September 2022,* 101282. https://doi.org/10.1016/j.bar.2023.101282

39. Yang, C., Liu, W., & Zhou, J. (2024). The Role of Digital Finance in Shaping Agricultural Economic Resilience: Evidence from Machine Learning. *Agriculture (Switzerland), 14*(10), 1-15. https://doi.org/10.3390/agriculture14101834

40. Zhang, D., Wu, Y., Ji, Q., Guo, K., & Lucey, B. (2024). Climate impacts on the loan quality of Chinese regional commercial banks. *Journal of International Money and Finance, 140,* 102975. https://doi.org/10.1016/j.jimonfin.2023.102975

APPENDIX A

Table A1. Variable description and measurement

Variable	Description	Proxy
Agriculture Finance (AF)	A number of loans provided by banks to the Agriculture sector	Natural logarithm of total bank credit to the Agriculture sector
Climate Change	Climate change as measured by temperature change	Air temperature change
Political Connection (*Connect*)	Members of the board of commissioners and directors who have political ties	Dummy = 1 if board members have political connections Dummy = 0 if the board member does not have political connections
Bank Stability (ZSCORE)	A bank's financial condition	Z-score is the ratio of the sum of the return on assets (ROA) and capital to assets (CA) ratios to the standard deviation of the return on assets ratio
Return on Asset (ROA)	The level of profit on total assets owned by the company	Net $Profit_t$ / Total $Assets_t$
Bank Size (SIZE)	The value of the bank's assets	Natural logarithm of total bank assets
Leverage (LEV)	The proportion of debt borne by the bank over its total assets	Debt-to-asset ratio
Inflation (INF)	Annual inflation rate	Inflation rate per year
Gross domestic product (GDP)	Annual real GDP growth rate	Comparison of the difference between the GDP of the current year (t) and the previous year ($t-1$) with the GDP of the previous year ($t-1$)

http://dx.doi.org/10.21511/bbs.20(2).2025.15