KOCHI UNIVERSITY OF TECHNOLOGY

Social Design Engineering Series *SDES-2024-6*

How do climate concerns and value orientation among bankers influence agricultural financing?

Khatun Mst Asma
Research Institute for Future Design, Kochi University of Technology, Japan
Department of Agricultural and Applied Statistics, Bangladesh Agricultural University, Bangladesh

Md Rony Masud
College of Business, Rikkyo University, Japan
Bangladesh Bank, Bangladesh

Koji Kotani
Research Institute for Future Design, Kochi University of Technology, Japan
School of Economics and Management, Kochi University of Technology, Japan
College of Business, Rikkyo University, Japan
Urban Institute, Kyushu University, Japan

December 12, 2024

School of Economics and Management
Research Institute for Future Design
Kochi University of Technology

How do climate concerns and value orientation among bankers influence agricultural financing?

Khatun Mst Asma[*,†] Md Rony Masud[‡,§] Koji Kotani[*,¶,‡,‖,**]

December 12, 2024

Abstract

Agricultural financing is crucial for economic development and sustainability. However, little is known about how bankers are concerned about climate change as decision makers for agricultural financing as well as their concerns are related to the possible future performances. This study investigates a research question "how do bankers' climate concerns and value orientation influence agricultural financing?" and the hypotheses "bankers' climate concerns discourage agricultural financing, whereas their value orientations for future generations encourage it." We conduct questionnaire surveys and collect data on concerns toward climate factors, prosocial attitude for future generations and sociodemographic information from 596 bankers at three areas in Bangladesh. The results reveal three main findings. First, bankers who have high climate concerns tend to be less optimistic about agricultural financing. Second, bankers who live in high climate-change areas tend to have more severe climate concerns and darker prospectives in agricultural financing than those in low climate-change areas. Third, bankers who have a high value orientation for future generations are likely to be positive over future agricultural financing. Overall, our findings suggest that agricultural financing shall be discouraged as climate change becomes severe, hitting low-land areas, such as Bangladesh, through the lens of bankers' perceptions, unless the bankers possess high concerns for future generations. To counter such negative possibilities in agricultural financing, a new agricultural financing scheme, such as "agricultural green banking," shall be necessary to implement.

Keywords: Climate concerns; value orientation; agricultural financing; bankers; Bangladesh

[*]Research Institute for Future Design, Kochi University of Technology, Japan
[†]Department of Agricultural and Applied Statistics, Bangladesh Agricultural University, Bangladesh
[‡]College of Business, Rikkyo University, Japan
[§]Bangladesh Bank, Bangladesh
[¶]School of Economics and Management, Kochi University of Technology, Japan
[‖]Urban Institute, Kyushu University, Japan
[**]Corresponding author, E-mail: kojikotani757@gmail.com

Contents

1 Introduction **3**

2 Methods **7**
2.1 Study area, sample and sampling strategy 7
2.2 Key variables 8
2.3 Statistical analysis 9

3 Results **11**

4 Discussion **15**

5 Conclusion **16**

Nomenclature

ADB Asian development bank

BB Bangladesh bank

BDT Taka, Bangladeshi currency

FAF Future agricultural financing

FAD Future agricultural development

FAO Food and agriculture organization

GDP Gross domestic product

IPCC Intergovernmental panel on climate change

1 Introduction

Agriculture and climate are crucial to human existence; however, the ongoing environmental and climate change challenges pose significant threats to ensure global food security in the 21st century (Durán-Sandoval et al., 2023). The effects of climate change are particularly evident in the increasing frequency and intensity of extreme weather events, which have far-reaching consequences for both natural ecosystems and human life (Nicholls and Alexander, 2007, Gumel, 2022). It is reported that the year 2023 has set new records for the highest temperature ever recorded on a warming planet, with extreme floods, storms, droughts, wildfires and outbreaks of pests and diseases increasingly dominating global headlines (FAO, 2023). As a low-lying country, Bangladesh is particularly vulnerable to rising temperatures, floods, droughts, salinity, cyclones and sea levels caused by climate change, creating severe risks for agricultural development and economic stability (Alam et al., 2017, Asma and Kotani, 2021, Chen et al., 2022). In this regard, banking institutions can play a significant role by supporting diverse eco-friendly strategies that promote both agricultural and economic sustainability (Buranatrakul and Swierczek, 2018, Zheng et al., 2021a). To ensure sustainability, it is crucial to understand employees' perceived cognitive efforts, their consciousness of environmental & climate change issues and attitudes toward future generations in banking operations (Hasan et al., 2022, Palmucci and Ferraris, 2023, Syropoulos and Markowitz, 2024). Therefore, this study examines how bankers are concerned about climate change and future generations as decision makers for agricultural financing, and how these concerns and value orientation are related to the possible future performances.

Numerous studies document that current investments and commitments are vastly inadequate to meet the necessary requirements for sustaining agriculture under climate change, particularly in developing countries (Islam, 2011, Huang and Wang, 2014). According to climate change report (2013), the banking industry ranks lowest in climate change performance when compared to other industries (IPCC, 2013). Moreover, banks in Asia receive the lowest scores across all categories of climate change strategies and actions in comparison to other regions worldwide (Buranatrakul and Swierczek, 2018). A global assessment by World Bank reveals that insufficient investment in agriculture has significantly contributed to the decline in agricultural productivity since the 1980s, and this sector is expected to encounter even greater challenges in the future due to climate change (World Bank, 2007). It is also evident that banks and other financial institutions are reluctant to finance in the agricultural sector due to concerns about low returns and high investment risks associated with climate change (Hossain, 2018). While some studies document that access to agricultural credit plays a crucial role in enhancing farming production and reducing the adverse effects of climate change (Chowdhury, 2009, Rahman, 2011, Abraham and Fonta, 2018). Aiello (2009) report that insufficient financial investments restrict farmers' capacity to handle and recover from adverse events, ranging from global events to natural disasters. Thus, it is crucial for banking industry to develop effective strategies and make investments that address the impacts of climate change and contribute to mitigating its effects.

Past studies reveal that employees' climate concerns, especially at the top management level, are linked to organizational decision-making, actions and financial performances (Kuenzi and Schminke, 2009, Norton et al., 2014, 2015, Tian et al., 2020, Hasebrook et al., 2022). For example, Buranatrakul and Swierczek (2018) find that directors and bank executives from North America, Europe and Australia are more proactive in incorporating climate change initiatives into decision-making and risk management due to their heightened concerns about climate change and environmental awareness; however, strategic actions vary across regions. The prior literature presents mixed results when analyzing the relationship between climate concerns and financial performances. For instance, Kartadjumena and Rodgers (2019) document that sustainability concerns, such as environmental and climate issues, have significant effects on the financial health and market performance of banking companies. Farjam et al. (2019) reveal that environmental concerns promote green behaviors when the associated costs are low, but the impact diminishes when encounter significant expenses in protecting the environment. On the other hand, Bătae et al. (2021) assess the relationships of environmental, social and financial performance in the banking sector, demonstrating a positive relationship between emission reduction and banking return on assets and equity. Gangi et al. (2019) show that banks with greater engagement in environmental protection experience lower risk. Overall, the studies reveal inconsistent findings, highlighting the need for further research on the impacts of climate concerns on financial performances.

A group of studies suggests that people's value orientation towards future generations motivates proenvironmental actions, supports environmental policies and influences financial performances (Burhan and Rahmanti, 2012, Barnett et al., 2019, Lagoarde-Segot, 2019, Syropoulos and Markowitz, 2023). For example, Syropoulos and Markowitz (2021) identify a correlation between perceived responsibility towards future generations and decision-making as well as prosocial behaviors within an intergenerational context. Watkins and Goodwin (2019) indicate that people who perceive a moral duty towards future generations tend to be more aware of environmental issues, exhibiting strong motivations and performances in proenvironmental behaviors. Syropoulos and Markowitz (2024) find that those who feel a strong sense of responsibility towards future generations are more likely to take significant measures to address climate change and protect the environment. Abrudan et al. (2021) state that the inclusion of future generations as stakeholders enriches the way of thinking about sustainable financing. Therefore, the value orientation for future generations is a powerful factor in understanding decision-making processes and actions aimed at addressing various environmental and financial issues.

A growing body of research highlights the importance of people's concerns towards climate factors and future generations in decision-making, proenvironmental behaviors and economic performances (Dienes, 2015, Masud et al., 2015, Yilmaz and Can, 2020, Duijndam and Beukering, 2021, Katz et al., 2022). However, there is still limited understanding of employee's climate and future generations concerns for their decisions and potential future performances, particularly in the financial sector. In this paper, we seek to address these issues by exploring the question of "how do bankers' climate concerns and value orientation influence agricultural financing?" and the hypotheses "bankers' climate concerns discourage agricultural financing, whereas their value orientations for future generations encourage it." To this end, we conduct questionnaire surveys and collect data on concerns toward climate factors, prosocial attitude for future generations and sociodemographic information from 596 bankers at three areas in Bangladesh. The aim of this study is to understand how bankers' climate concerns and value orientation influence agricultural financing and to explore potential solutions for improving agricultural financing through the development of new loan designs and risk assessment strategies within banking policies.

Agriculture and banking system in Bangladesh

Agriculture plays a crucial role in the overall economic performance of Bangladesh, employing a large share of the labor force, generating substantial foreign exchange earnings, supplying food nationwide and making a significant contribution to the gross domestic product (GDP) (Rahman, 2017, Husain and Hossain, 2022). To promote agricultural development and strengthen the national economy, agricultural financing is indispensable, and the involvement of formal banking institutions plays a pivotal role in achieving these goals. (Yeasmin et al., 2024). The Bangladesh Bank (BB), the central regulatory authority, supervises the banking system and regulates all scheduled banks, such as nationalized commercial banks, privately owned commercial banks, foreign commercial banks and specialized banks that provide essential financial services to farmers (Kamal, 2006, Suzuki and Adhikary, 2010). According to agricultural credit policy, all these banks must disburse at least 2 % of their total loans as agricultural credit, offering short-term loans for seasonal farming, intermediate-term loans for equipment and infrastructure and long-term loans for larger projects like land development and the establishment of agro-based industries (BB, 2014, 2023). In line with country's development agenda, BB formulates the "agricultural and rural credit policy" each year to ensure that funds are allocated and distributed effectively, efficiently and promptly to agricultural and rural sectors, reaching farmers at the grassroots level to benefit them (BB, 2023). The amount of agricultural credit is increasing every year, but it is not sufficient to meet the farmers' enormous demand (Azad et al., 2023). At the same time, the credit disbursement, oversight and monitoring services from lender banks, such as nationalized and other commercial banks, are still inadequate for advancing the agricultural sector in Bangladesh (Yeasmin et al., 2024).

2 Methods

2.1 Study area, sample and sampling strategy

A cross-sectional design was applied to collect necessary data from bankers with a predefined questionnaire in three districts, namely Sylhet, Brahmanbaria and Pabana in Bangladesh, during the period between April 2024 to May 2024 (see figure 1). Bangladesh has long been exposed to a range of hazards, including climatological hazards such as droughts and sea-level rise, hydrometeorological hazards like floods and cyclones and geophysical hazards namely landslides and erosion, for centuries (ADB, 2021). The districts of Sylhet and Brahmanbaria are situated in the eastern part of Bangladesh, while Pabna is located in the northwestern part of Bangladesh and all three districts are highly vulnerable to heavy rainfall and flooding during the monsoon and pre-monsoon seasons. However, Brahmanbaria district is additionally vulnerable to climate change as indicated by various indices, such as cyclone hazard and flash flood (ADB, 2021). While, Pabna district is further vulnerable to both surface & ground water droughts and erosion risk (Rahaman et al., 2016). Taking into account the different climatic conditions, we classify Sylhet district as a low climate-change area, while Brahmanbaria is considered a high hazard-prone area and Pabna is regarded a high drought-prone area. The current study randomly identified 596 bankers, more specifically, 181 from low climate-change area, 166 from high hazard-prone area and 249 from high drought-prone area. To implement a random sampling procedure, we collect a lists of all banks with their branches in each selected area. Then we randomly identified selected number of bankers, mainly bank managers, by using the list and random number generator from each area. The second author was the chief administrator of this survey and provided training to the research assistants about data collection and conducting surveys. Trained research assistants contacted each bank and collected necessary information from bankers through a face-to-face interview. All bankers willingly participated in this survey, providing data with written consent signed at the beginning.

2.2 Key variables

Table 1 provides an overview of the key dependent and independent variables along with their definitions. A baseline questionnaire survey was conducted to gather information on bankers' future agricultural performances, their concerns about climate factors as well as prosocial attitude for future generations and sociodemographic & bank characteristics. This paper uses bankers' future agricultural performances, including future agricultural financing (FAF) and future agricultural development (FAD), as dependent variables. Each banker is asked to provide their perception regarding future agricultural financing, stating "How do you perceive that agricultural financing will be profitable from now to the next 30 years?" and the evaluations are made on a 5-point Likert scale from "strongly disagree" to "strongly agree." Likewise, to understand bankers' perceptions related to future agricultural development, we pose the following question "How do you perceive that agriculture in Bangladesh will develop from now to the next 30 years?" and the responses are recorded on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." Later, we categorized bankers' responses into two groups for each question. If bankers do not disagree about future agricultural performance, we assigned a value of 1, otherwise 0.

To assess banker's concerns for climate change, we collect data on temperature and sunlight, precipitation, seasonality and topography factors by asking, "How much consideration do you allocate to each of climate factor when providing loan to the farmers?" and the responses are recorded ranging from 0 (no concern) to 5 (high concern). To incorporate practical experiences of climate change, we include three different climate-change areas: low climate-change, high hazard-prone and high drought-prone areas. The prosocial attitude for future generations is measured by using social generativity scale (see, e.g., Morselli and Passini, 2015, Barnett et al., 2021). This scale has 6 items, including the following statements: (1) "I carry out activities in order to ensure a better world for future generations," (2) "I have a personal responsibility to improve the area in which I live," (3) "I give up part of my daily comforts to foster the development of next generations," (4) "I think that I am responsible for ensuring a state of well-being for future generations," (5) "I commit myself to do things that will survive even after I die" and (6) "I help people to improve themselves." The items are rated from "strongly disagree" to "strongly agree" on a 5-point Likert scale. The score of prosocial attitude for future generations is calculated from the summation of the scores for all 6 items. The information is collected on sociodemographic & bank related variables, such as age, gender, educational background, bank type, bank collateral system and agricultural loan.

2.3 Statistical analysis

A conceptual framework is developed for the relationships among climate concerns, climate-affected areas, prosocial attitude for future generations and future agricultural financing as well as development by referring to cognitive, value-belief-norm and value-orientation theories (see figure 2). Social cognitive theory suggests cognitive and environmental factors influence people's decisions and behaviors (Bandura, 2001, Harris et al., 2021). The cognitive penetration theory posits that cognitive states, such as beliefs, attitudes, desires, intensions and emotions can causally influence how people take actions and perceive the environment in the most adequate manner (Raftopoulos and Zeimbekis, 2015, Newen and Vetter, 2017, Cecchi, 2018, Battich and Deroy, 2022). The value-belief-norm theory postulates that human values, concerns, beliefs and persomal norms play a crucial role in shaping proenvironmental actions and behaviors (Stern et al., 1999, Stren, 2000, Ghazali et al., 2019). In the literature, climate concerns and experiences regarded as cognitive aspects that can influence perceptions and performances, providing insights into organizational issues, such as financing and development, in the context of climate change (Brügger et al., 2021, Van der Linden, 2015). The value-orientation theory suggests that people's decisions and behaviors are guided by their values related to different time, relations, natures and motives (Kluckhohn and Strodtbeck, 1961, Gajanayake et al., 2024). Prosocial attitudes toward future generations reflects people's concern for both future and upcoming generations, influencing their planning for what lies ahead. Based on above theories, the conceptual framework in figure 2 contextualizes the predictions and associations for the purpose of clarifying the machanisms of agricultural financing and development, hypothesizing that certain factors, such as climate concerns and prosocial attitude for future generations matter for future financial performances.

Different non-parametric tests, such as chi-squared, Kruskal-Wallis are applied to compare the differences in the key variables among various climate-change areas. This study applies logit regression to quantitatively identify the effects of banker's climate concerns and value orientation for future generations on future agricultural performances, specifically future agricultural financing (FAF) and future agricultural development (FAD). Banker's each future agricultural performance is expressed as a binary value 0 or 1. Let Y_i^Ks are the dependent variables of FAF and FAD such that $Y_i^K = 1$ if banker i does not disagree about future agricultural financing and future agricultural development, respectively, and $Y_i^K = 0$ otherwise. The probability for banker i to positively perceive future agricultural performances, denoted by $\mathrm{Prob}(Y_i^K = 1)$, is assume to follow the distribution function F evaluated at $\mathbf{X}_i\boldsymbol{\beta}^K$, where $\mathbf{X}_i$ is a $1 \times (m+1)$ vector of explanatory variables for banker i ($\mathbf{X}_i = (1, x_{i1}, \ldots, x_{im})$) and $\boldsymbol{\beta}^K$ is a $(m+1) \times 1$ vector of parameters ($\boldsymbol{\beta}^K = (\beta_0^K, \beta_1^K, \ldots, \beta_m^K)'$). The distribution function of the logit regression model is as follows:

$$\mathrm{Prob}(Y_i^K = 1) = \frac{\exp(\mathbf{X}_i\boldsymbol{\beta}^K)}{1 + \exp(\mathbf{X}_i\boldsymbol{\beta}^K)} \tag{1}$$

A specification of Equation (1) enables us to compute $\boldsymbol{\beta}^K$ via maximum likelihood methods to characterize Y_i^K (Wooldridge, 2010, 2019, Cameron and Trivedi, 2022). A series of logit regression models are applied step by step to check the robustness of our results. First, the relationships of climate concerns with future agricultural financing are examined. Second, the prosocial attitude for future generations and climate-change affected areas are added. Finally, some sociodemographic & bank characteristics are included in the model. The same procedure is applied for future agricultural development. The main results of logit regression analyses are summarized in table 4. Overall, we assess the effects of climate concerns and value orientation for future generations on future agricultural performance by controlling for sociodemographic & bank characteristics through logit regressions.

The conceptual framework in figure 2 illustrates the relationships of cognitive factors with future agricultural financing and development along with some sociodemographic & bank characteristics in various climate-change areas. The relationships among variables in figure 2 represented by solid arrows are examined in this study, while some other relationships, shown by dashed arrows, are documented or tested in other research (Dienes, 2015, Katz et al., 2022, Islam et al., 2024, Syropoulos and Markowitz, 2024). With this framework in mind, our main focus is on estimating the coefficients of $\boldsymbol{\beta}_1^K$, β_2^K, $\boldsymbol{\beta}_3^K$ and $\boldsymbol{\beta}_4^K$ in figure 2. In this framework, a coefficient of each independent variable is considered to represent the effect of that variable on future agricultural financing and development, respectively, after the effect of all other variables have been netted out. Recall our research question "how do bankers' climate concerns and value orientation influence agricultural financing?" and the hypotheses "bankers' climate concerns discourage agricultural financing, whereas their value orientations for future generations encourage it." In this regard, the estimated coefficients of $\boldsymbol{\beta}_1^K$ and β_2^K are the key parameters enabling us to answer not only the research questions but also the hypotheses, respectively. Thus, cognitive factors are expected to significantly influence future agricultural financing and development, even after controlling for sociodemographic & bank characteristics, irrespective of various climate-change areas.

3 Results

Table 2 summarizes the basic statistics of the major independent variables for various climate-change areas and overall bankers in the sample. Bankers residing in high climate-change areas (hazard-prone and drought-prone) are more concerned about temperature and sunlight, precipitation, seasonality and topography than those living in low climate-change areas. The medians of overall bankers' concerns for temperature and sunlight, precipitation, seasonality and topography are 3, 4, 4 and 4, respectively, indicating a high level of concern for climate change. The average values of banker's prosocial attitude for future generations in low climate-change, high hazard-prone and high drought-prone areas are 25.14, 25.16 and 25.73 points, respectively, and these values significantly differ among climate-change areas. The overall average age of bankers is 38 years and the mean age varies according to various climate-change areas. The percentages of male bankers in low climate-change, high hazard-prone and high drought-prone areas are 86 %, 96 % and 95 %, respectively. The educational background of bankers does not vary among climate-change areas, and they are mainly from business related education. Most of the bankers are from private banking institutions, with percentages of 72 %, 68 % and 64 % in low climate-change, high hazard-prone and high drought-prone areas, respectively. The banks follow fixed-asset collateral system and the percentages of this system varies according to climate-change areas. The amount of agricutural loan in high drought-prone area (hazard-prone area) is almost eight times (two times) higher than in low climate-change area. In summary, bankers living in high climate-change areas have higher climate concerns than bankers in low climate-change area and all other factors, such as prosocial attitude for future generations and most of the sociodemographic & bank characteristics vary among climate-change areas.

Table 3 presents the descriptive statistics, such as mean, median, standard deviation, minimum and maximum, of the major dependent variables for various climate-change areas and overall bankers in the sample. Major differences are observed in the mean of future agricultural financing and development across various climate-change areas: low climate-change, high hazard-prone and high drought-prone. The percentages of bankers who do not disagree with future agricultural financing (future agricultural development) are 85 %, 24 % and 39 % (89 %, 22 % and 40 %) in low climate-change, high hazard-prone and high drought-prone areas, respectively. It can be interpreted that bankers in low climate-change area have a more positive outlook on future agricultural financing and development as compared to those in high hazard-prone and high drought-prone areas. Moreover, in figure 3, bankers who have high concerns about temperature and sunlight, precipitation, seasonality and topography tend to disagree with the perceptions of future agricultural financing and development whereas those with low climate concerns tend to agree with these future agricultural performances across all climate-change areas. In most cases, the level of concern for each of temperature and sunlight, precipitation, seasonality and topography is higher in high climate-change areas (hazard-prone and drought-prone) than in low climate-change area, regardless of agreement or disagreement on future agricultural financing and development (see figure 3).

Overall, bankers living in high climate-change areas and having high concerns for climate factors tend to be less optimistic about future agricultural performances.

Logit models in table 4 present the regression results for future agricultural finaning (FAF) and future agricultural development (FAD), respectively. We apply different regression model specifications to check the robustness in our analyses and we confirm that the main results in table 4 remain the same in all models. Models 1-1 and 1-3 (2-1 and 2-3) report the estimated coefficients of the independent variables for FAF (FAD) in the logit models. Models 1-2 and 1-4 (2-2 and 2-4) indicate the estimated marginal effects of each independent variable based on the estimated coefficients in each model, representing a change in the likelihood of bankers' non-disagreement with future agricultural financing and development, respectively, when the independent variable increases by one unit, holding other factor fixed at sample mean. Model 1-4 (2-4) is the full model that includes all independent variables for FAF (FAD). We mainly focus on reporting the marginal effects of climate concerns, climate-change areas and prosocial attitude for future generations because they are identified to remain significant at 1 % to 10 % significance level in all models. However, the estimations also reveal other significant independent variables, for example bank collateral system, that has significant effect on future agricultural financing and development. The results can be interpreted that banks with fixed-asset collateral are 43 % and 28 % less likely to positively perceive future agricultural financing and development than those which has no collateral system, respectively. One plausible explanation for this could be that the banks introduce the collateral system where the loan default rate cases are high.

The likelihoods of bankers' non-disagreement with future agricultural financing and development decrease by 5 % and 9 % with a one-point increase in the concern for temperature and sunlight, respectively. Regarding precipitation, a one-point increase in concern leads to a decrease in the probabilities of bankers' non-disagreement with future agricultural financing and development by 6 % and 8 %, respectively. Similarly, a one-point increase in concern for topography decreases the likelihoods of bankers' non-disagreement with future agricultural financing and development by 12 % and 18 %, respectively. These results suggest that bankers with a high concern for climate factors tend to be less optimistic about future agricultural financing and development. The bankers who live in high hazard-prone and drought-prone areas are 64 % and 49 % less likely to positively perceive future agricultural financing than those who live in low climate-change area. The probabilities of bankers' non-disagreement with future agricultural development decrease by 73 % and 54 % for those in high hazard-prone and drought-prone areas compared to those in low climate-change area. This means that bankers who live in high climate-change areas tend to have a darker outlook on agricultural performances than those who live in low climate-change areas. In terms of value orientation, the probabilities of bankers' non-disagreement with future agricultural financing and development increase by 3 % and 3 % with a one-point increase in value orientation for future generations, respectively. This indicates that bankers with a high value orientation for future generations are more likely to have a positive outlook on future agricultural performances.

Overall, the summary statistics, tests and diagrams indicate that bankers residing in areas vulnerable to climate change and who express heightened concern for climate factors tend to be less optimistic about future agricultural performances. The future agricultural financing and development are characterized by cognitive, climate-chnage areas, prosocial attitude for future generations and sociodemographic & bank characteristics described in the conceptual framework in figure 2, providing insights to our research question "how do bankers' climate concerns and value orientation influence agricultural financing?" and the hypotheses "bankers' climate concerns discourage agricultural financing, whereas their value orientations for future generations encourage it." The regression results show that bankers who have high climate concerns tend to be less optimistic about agricultural financing and development as well as who live in high climate-change areas tend to have more severe climate concerns and darker prospectives in agricultural financing and development than those in low climate-change areas. Moreover, bankers who have a high value orientation for future generations are likely to be positive over future agricultural financing and development. The results suggest that strengthening bankers' value orientation for future generations is essential for reducing negative possibilities in agricultural performances in the financial sector.

4 Discussion

Environmental issues such as climate change, biodiversity loss, pollution and the misuse of natural resources have long-term impacts that necessitate enduring strategies and actions grounded in conscious thinking and planning (Cadilha and Vaz, 2023). The effects of concerns for climate change and future generations in influencing future financial performances can be explained through prospect and stakeholder theories. Prospect theory states that decisions under uncertainty are driven by the desire to either secure gains or avoid losses (Barberis, 2013, Kahneman and Tversky, 2013, Osberghaus, 2017, Gonzalez-Ramirez et al., 2018). From the theoretical perspective, managers make decisions based on how a problem is framed, which may deviate from economic rationality and instead rely on cognitive processes, leading to potential biases (Godefroid et al., 2023, Palmucci and Ferraris, 2023). In practice, cognitive biases are consistently present in managers' strategic decision-making because they often make decisions in complex situations (Mazutis and Eckardt, 2017, Keh et al., 2002, McFadden, 2022, Enke et al., 2023). Our research finds that high climate concerns and living in high climate-change areas lead to be less optimistic outlook on agricultural financing. We argue that managers make decisions under the condition of uncertainty, where they place greater emphasis on potential losses than on gains. On the other hand, prosocial attitude for future generations motivates managers to take sustainable strategies for improving financial performances in the banking sector. According to stakeholder theory, a responsible bank satisfies societal expectations and promotes environmental values, including sustainability (Sprengel and Busch, 2011, Dixon-Fowler et al., 2013, Bătae et al., 2021, Grosbois and Fennell, 2022). Normative stakeholder theory asserts that managers bear a moral obligation to acknowledge the interests of particular corporate constituent groups (Zakhem and Palmer, 2017, Valentinov and Hajdu, 2021). Thus, it is crucial to uphold the sense of responsibilities towards future and future generations throught different approaches.

Several future-studies approaches such as visioning, backcasting, scenario planning and future design, have been widely used across different fields, demonstrating how individuals' and organizations' prospective thinking and experiences related to future and future generations influence their strategies and decision-making (Bell, 2009, Van der Helm, 2009, Phdungsilp, 2011, Amer et al., 2013, Szpunar et al., 2014, González-Ricoy and Gosseries, 2016, Bibri and Krogstie, 2019, Ziegler and Oliveira, 2022). Studies suggest that some future-studies approaches, such as scenario planning, foresighting, backcasting and future design, can improve the identification of future challenges and promote sustainable decision-making through forward-thinking strategies, cultivating a strong orientation toward future generations and environmental sustainability (Vecchiato, 2012, Cook et al., 2014, Tuominen et al., 2014, Wodak and Neale, 2015, Soria-Lara and Banister, 2018, Lacroix et al., 2019, Timilsina et al., 2020, Pandit et al., 2021, Shahen et al., 2021). Our research indicates that a high value orientation for future generations enhances future agricultural performances. Many financial organizations aim to achieve environmental and economic sustainability by adopting various initiatives, such as green financing, to promote long-term sustainability. Green financing encompasses all forms of investments that take environmental effects into account and promote sustainability (Volz et al., 2015, Haque and Murtaz, 2018, Khairunnessa et al., 2021, Zheng et al., 2021b). Thus, incorporating future-studies approaches into well-structured green financing schemes, specifically agricultural green banking, will enhance the orientation for future generations, encouraging managers to adopt a visionary mindset for sustainable finance by identifying and addressing future challenges.

5 Conclusion

This study examines how bankers are concerned about climate change as decision makers for agricultural financing as well as their concerns that are related to the possible future performances. This research investigates a research question "how do bankers' climate concerns and value orientation influence agricultural financing?" and the hypotheses "bankers' climate concerns discourage agricultural financing, whereas their value orientations for future generations encourage it." To this end, we implement questionnaire surveys for collecting data on concerns for climate factors, prosocial attitude for future generations and sociodemographic & bank related information from

596 bankers at three areas in Bangladesh. The analyses reveal that bankers who have climate concerns tend to be less optimistic about agricultural financing. Moreover, bankers who live in high climate-change areas tend to have more severe climate concerns and darker prospectives in agricultural financing than those in low climate-change areas. The findings also show that bankers who have a high value orientation for future generations are likely to be positive over future agricultural financing. Overall, it is suggested that agricultural financing shall be discouraged as climate change becomes severe, particularly affecting low-laying areas, such as Bangladesh, through the lens of bankers' perceptions, unless the bankers possess high concerns for future generations. To address these challenges in agricultural financing, a new agricultural financing scheme, such as "agricultural green banking," shall be necessary to implement.

We note several limitations of this study and provide directions for future research opportunities. First, this research mainly focuses on bankers' climate concerns for future agricultural financing, however, the perceptions of other stakeholders that might have significant impacts, are not addressed in this study. Second, we do not account for the borrowers' perspectives, specifically how farmers' concerns about climate factors influence their ability to secure and repay loans. Third, our study examines bankers'concerns for climate factors and value orientation for agricultural financing from a short-term perspective, using cross-sectional data. Fourth, we consider concerns for climate factors and prosocial attitude for future generations as cognitive factors influencing future financial performances, however, other cognitive and non-cognitive factors, such as knowledge level of various environmental aspects and prosociality may also impact agricultural financing. Future studies should incorporate detailed data on both stakeholders' and borrowers' perceptions towards climate factors using a panel data structure. Additionally, it is important to consider key cognitive and non-cognitive factors to fully capture the dynamics of future agricultural financing. Despite these limitations, we believe this research provides a clear evidence that bankers' concerns for climate factors are crucial for future agricultural financing as well as the value orientation for future generations plays an important role in financial performances. It is our belief that this research is the first attempt to clarify bankers' concerns for climate change and future generations and assess how these concerns impact on future agricultural financing.

Acknowledgments

We would like to thank the anonymous referees, Mitsuhiko Kataoka, Makoto Kakinaka, Kyohei Yamada and Seunghoo LIM for their helpful comments, advice and supports. We are grateful to the financial support from the Japanese Society of the Promotion of the Science as the Grant-in-Aid for Scientific Research B (19H01485), Kochi University of Technology and JDS program, JICA. We extend our sincere gratitude to the Bangladesh Bank for facilitating access to valuable data from various banks and for their continued support.

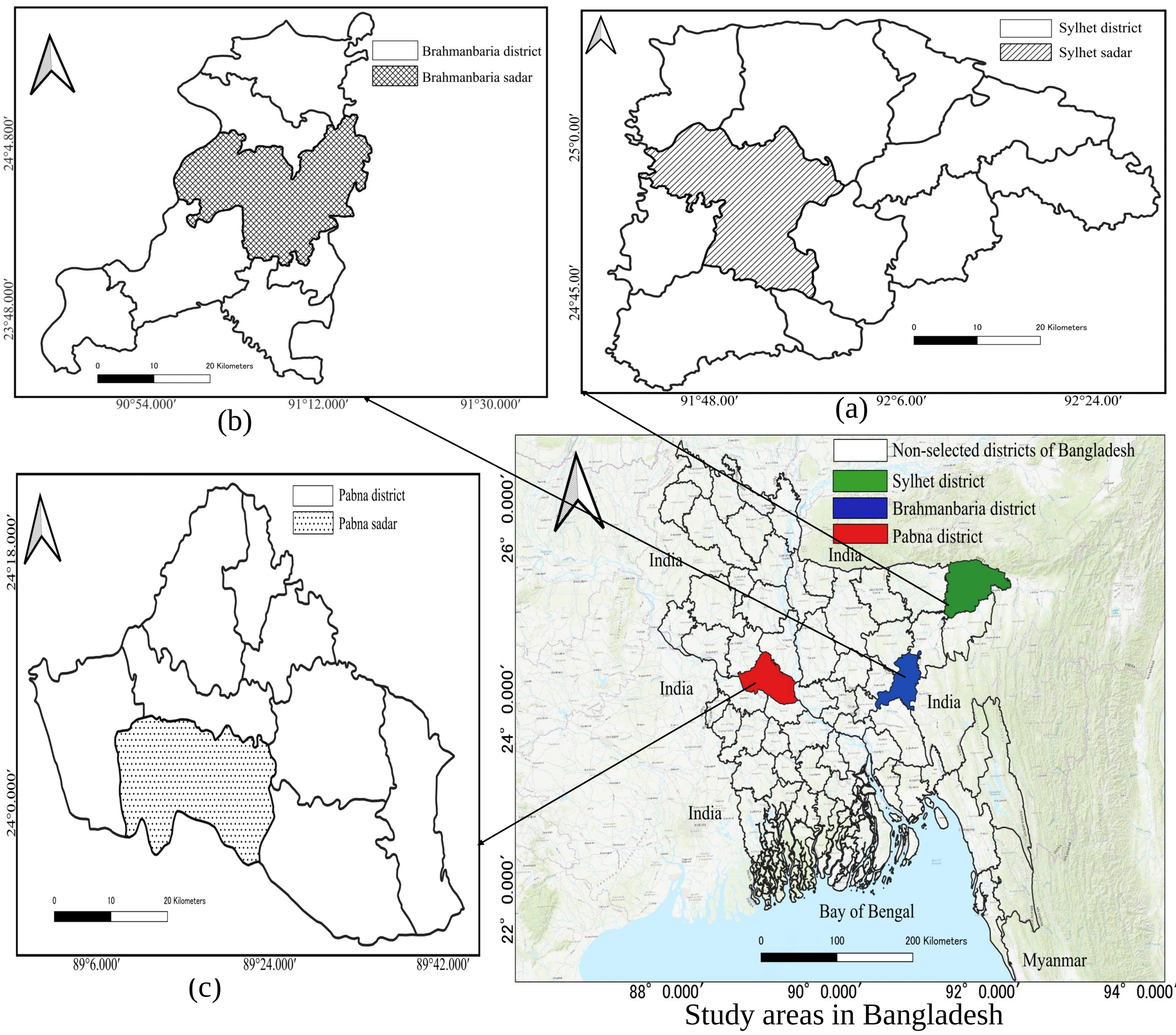


Figure 1: The location of study areas (districts) in Bangladesh: (a) Sylhet (low-climate change area), (b) Brahmanbaria (high hazard-prone area) and (c) Pabna (high drought-prone area). The map also shows the location of sus-districts in the selected districts.

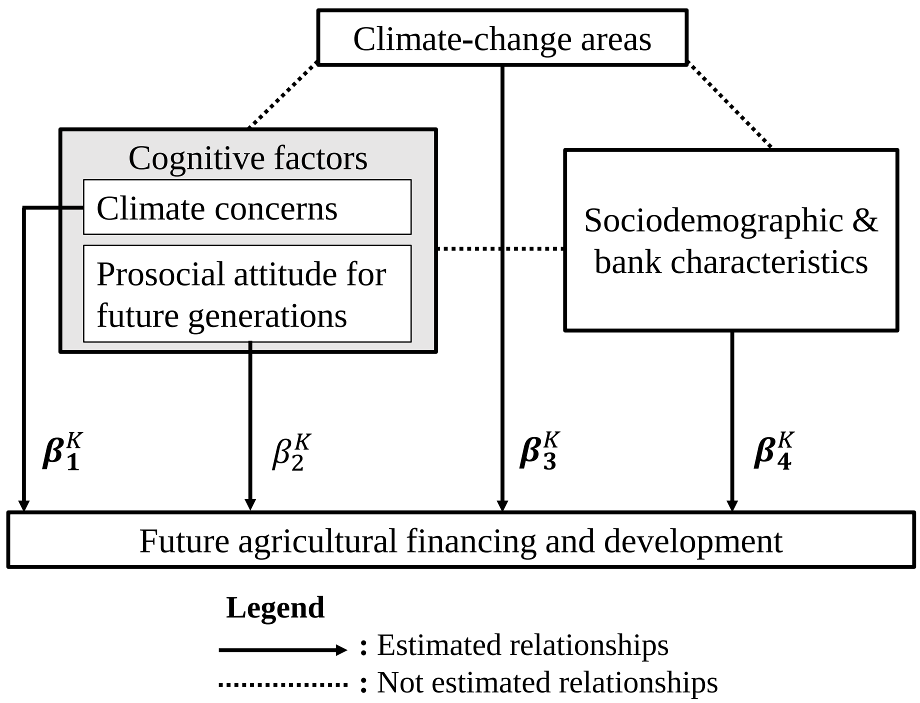
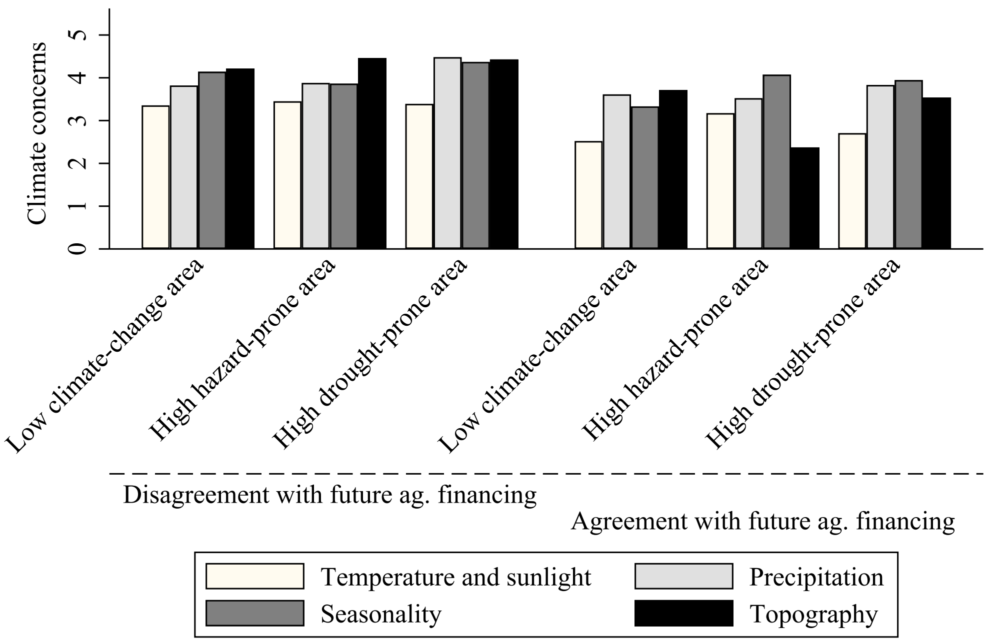
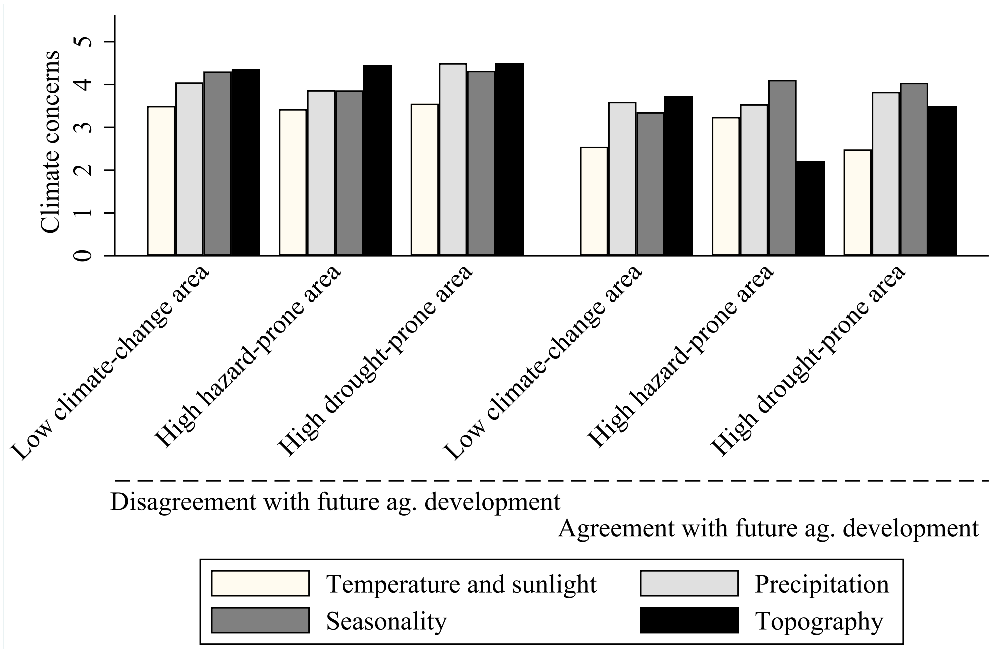


Figure 2: A conceptual framework describing the relationships of cognitive factors, climate-change areas, sociodemographic & bank characteristics, noncognitive factor with banker's future agricultural financing and development, where $\boldsymbol{\beta}_1^K$, $\boldsymbol{\beta}_2^K$, $\boldsymbol{\beta}_4^K$ are vectors of coefficients and β_3^K is a coefficient of corresponding factors; and $K = \{FAF, FAD\}$.



(a) Concerns for climate factors in different climate affected areas by future agricultural financing



(b) Concerns for climate factors in different climate affected areas by future agricultural development

Figure 3: Bar diagrams of bankers' climatic concerns in various climate attected areas by future agricultural performances

Table 1: Definition of the variables

Variables	Description
Dependent variables	
Future agricultural financing (FAF)	If bankers do not disagree about the future profitability of agricultural financing, then the value is 1, otherwise 0.
Future agricultural development (FAD)	If bankers do not disagree about the future development of agriculture, then the value is 1, otherwise 0.
Independent variables	
Cognitive factors	
Concerns for climate factors	
Temperature and sunlight	This is a value for measuring the concern towards temperature and sunlight, ranging from 0 to 5, with a higher value indicating greater concern.
Precipitation	This is a value for measuring the concern towards precipitation, ranging from 0 to 5, with a higher value indicating greater concern.
Seasonality	This is a value for measuring the concern towards seasonality, ranging from 0 to 5, with a higher value indicating greater concern.
Topography	This is a value for measuring the concern towards topography, ranging from 0 to 5, with a higher value indicating greater concern.
Prosocial attitude for future generations	This is a score on 6 questions ranging from 6 to 30, measuring prosocial attitude for future generations.
Climate-change areas (Base group = Low climate-change area)	
High hazard-prone area	This variable takes a value of 1 when bankers live in a high hazard-prone area, otherwise 0.
High drought-prone area	This variable takes a value of 1 when bankers live in a high drought-prone area, otherwise 0.
Sociodemographic & bank characteristics	
Age	Age is defined as years of banker's age.
Gender	Gender is a dummy variable that takes value 1 when the bankers is male, otherwise 0.
Educational background	It is a dummy variable taking a value of 1 if bankers are from business related education, otherwise 0.
Bank type	Bank type represents a dummy variable taking a value of 1 when bankers are from private banks, otherwise 0.
Bank fixed-asset collateral	It is a dummy variable taking a value of 1 if the banks have a fixed-asset collateral system to provide loan, otherwise 0.
Agricultural loan	Total amount of current year loan in BDT[1]

[1] BDT stands for Bangladeshi currency in taka.

Table 2: Summary statistics of the independent variables by areas

	Climate-change areas			Overall	p-value
	Low climate-change	High hazard-prone	High drought-prone		
Cognitive factors					
Concern for climate factors					
Temperature and sunlight					
Average (Median)[1]	2.65 (3.00)	3.39 (4.00)	3.13 (3.00)	3.06 (3.00)	
SD[2]	1.50	1.16	1.40	1.40	0.01[3]
Precipitation					
Average (Median)	3.65 (4.00)	3.80 (4.00)	4.23 (4.00)	3.93 (4.00)	
SD	1.21	1.15	0.80	1.07	0.01[3]
Seasonality					
Average (Median)	3.46 (4.00)	3.92 (4.00)	4.21 (4.00)	3.90 (4.00)	
SD	1.55	0.86	0.77	1.13	0.01[3]
Topography					
Average (Median)	3.79 (4.00)	3.96 (4.00)	4.09 (4.00)	3.96 (4.00)	
SD	1.15	1.51	1.35	1.34	0.01[3]
Prosocial attitude for future generations					
Average (Median)	25.14 (25.00)	25.16 (25.00)	24.73 (25.00)	24.97 (25.00)	
SD	2.73	1.62	1.70	2.05	0.01[3]
Sociodemographic & bank characteristics					
Age					
Average (Median)	39.14 (39.00)	37.17 (37.00)	38.87 (39.00)	38.48 (39.00)	
SD	7.25	6.05	6.02	6.47	0.02[3]
Gender (Base group = Female)					
Average (Median)	0.86 (1.00)	0.96 (1.00)	0.95 (1.00)	0.93 (1.00)	
SD	0.35	0.19	0.22	0.26	0.01[4]
Educational background (Base group = Others)					
Average (Median)	0.46 (0.00)	0.49 (0.00)	0.44 (0.00)	0.46 (0.00)	
SD	0.50	0.50	0.50	0.50	0.60[4]
Bank type (Base group = Others)					
Average (Median)	0.72 (1.00)	0.68 (1.00)	0.64 (1.00)	0.68 (1.00)	
SD	0.45	0.47	0.48	0.47	0.21[4]
Bank fixed-asset collateral (Base group = No collateral)					
Average (Median)	0.73 (1.00)	0.84 (1.00)	0.80 (1.00)	0.79 (1.00)	
SD	0.45	0.36	0.40	0.41	0.03[4]
Agricultural loan					
Average (Median)	5259093 (2000000)	10800000 (2800000)	44100000 (5603289)	23000000 (3500000)	
SD	8237631	32300000	144000000	96400000	0.01[3]
Sample size	181	166	249	596	

[1] Median in parentheses.
[2] SD stands for standard deviation.
[3] Kruskal-Wallis test is applied to check a distributional differences of the variables by climate-change areas.
[4] Chi-squared test is applied to examine whether or not the frequencies of the variables are independent among climate-change areas.

Table 3: Summary statistics of the dependent variable by climate-change areas

	Climate-change areas			Overall
	Low climate-change area	High hazard-prone area	High drought-prone area	
Future agricultural financing (FAF)				
Average	0.85	0.24	0.39	0.48
Median	1.00	0.00	0.00	0.00
SD	0.36	0.43	0.49	0.50
Min	0.00	0.00	0.00	0.00
Max	1.00	1.00	1.00	1.00
Future agricultural development (FAD)				
Average	0.89	0.22	0.40	0.49
Median	1.00	0.00	0.00	0.00
SD[1]	0.31	0.42	0.49	0.50
Min	0.00	0.00	0.00	0.00
Max	1.00	1.00	1.00	1.00
Sample size	181	166	249	596

[1] SD stands for standard deviation.

Table 4: Regression coefficients and marginal effects of the independent variables for future agricultural financing (FAF) and future agricultural development (FAD) in the logit regressions

	Future agricultural financing (FAF)				Future agricultural development (FAD)			
	Coefficient	ME[a]	Coefficient	ME	Coefficient	ME	Coefficient	ME
	Model 1-1	Model 1-2	Model 1-3	Model 1-4	Model 2-1	Model 2-2	Model 2-3	Model 2-4
Cognitive factors								
Concern for climate factors								
Temperature and sunlight	−0.19**	−0.05**	−0.20**	−0.05**	−0.37***	−0.09***	−0.37***	−0.09***
Precipitation	−0.31**	−0.08**	−0.23*	−0.06*	−0.40***	−0.10***	−0.34***	−0.08***
Seasonality	−0.14	−0.03	−0.16	−0.04	0.01	0.002	0.0003	0.0001
Topography	−0.68***	−0.17***	−0.47***	−0.12***	−0.87***	−0.21***	−0.73***	−0.18***
Prosocial attitude for future generations	0.17***	0.04***	0.14**	0.03**	0.14**	0.03**	0.11*	0.03*
Climate-change areas (r[b]= Low climate-change area)								
High hazard-prone area	−3.18***	−0.63***	−3.29***	−0.64***	−3.96***	−0.73***	−3.93***	−0.73***
High drought-prone area	−1.92***	−0.45***	−2.16***	−0.49***	−2.35***	−0.53***	−2.41***	−0.54***
Sociodemographic & bank characteristics								
Age			−0.01	−0.003			−0.02	−0.004
Gender (r = Male)			0.27	0.07			−0.18	−0.04
Educational background (r = Others)			0.18	0.04			0.07	0.02
Bank type (r = Others)			0.22	0.05			0.29	0.07
Bank fixed-asset collateral (r = No collateral)			−2.09***	−0.43***			−1.28***	−0.28***
Agricultural loan[c]			0.04	0.01			0.03	0.01

***significant at the 1 percent level, **at the 5 percent level and *at the 10 percent level.

[a] ME stands for a marginal effect to indicate a change in the likelihood of bankers' non-disagreement with perceptions of future agricultural financing or development when the independent variable increases by one unit, holding other factor fixed at sample mean.

[b] r stands for base group.

[c] The logit regressions are computed with the natural logarithm of agricultural loan.

References

Abraham, T. and Fonta, W. (2018). Climate change and financing adaptation by farmers in northern Nigeria. *Financial innovation*, 4:1–17.

Abrudan, L., Matei, M., and Abrudan, M. (2021). Towards sustainable finance: Conceptualizing future generations as stakeholders. *Sustainability*, 13:13717.

ADB (2021). Bangladesh climate and disaster risk atlas: Hazards – volume 1. Technical report, Planning Commission, Ministry of Planning and Asian Development Bank, Dhaka, Bangladesh and Manila, Philippines.

Aiello, F. (2009). Experiences with traditional compensatory finance schemes and lessons from FLEX. Technical report, Working paper no. 12, Department of Economics and Statistics, University of Calabria, Calabria.

Alam, G., Alam, K., and Mushtaq, S. (2017). Climate change perceptions and local adaptation strategies of hazard-prone rural households in Bangladesh. *Climate risk management*, 17:52–63.

Amer, M., Daim, T., and Jetter, A. (2013). A review of scenario planning. *Futures*, 46:23–40.

Asma, K. and Kotani, K. (2021). Salinity and water-related disease risk in coastal Bangladesh. *EcoHealth*, 18:61–75.

Azad, A., Choudhury, N., and Wadood, S. (2023). Impact of agricultural credit on agricultural production: Evidence from Bangladesh. *Social science review*, 40:109–128.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual review of psychology*, 52:1–26.

Barberis, N. (2013). Thirty years of prospect theory in economics: A review and assessment. *Journal of economic perspectives*, 27:173–196.

Barnett, M., Archuleta, W., and Cantu, C. (2019). Politics, concern for future generations, and the environment: Generativity mediates political conservatism and environmental attitudes. *Journal of applied social psychology*, 49:647–654.

Barnett, M., Vleet, S., and Cantu, C. (2021). Gratitude mediates perceptions of previous generations' prosocial behaviors and prosocial attitudes toward future generations. *Journal of positive psychology*, 16:54–59.

Bătae, O., Dragomir, V., and Feleagă, L. (2021). The relationship between environmental, social, and financial performance in the banking sector: A European study. *Journal of environmental psychology*, 290:125791.

Battich, L. and Deroy, O. (2022). Cognitive penetration and implicit cognition. In *The Routledge handbook of philosophy and implicit cognition*, pages 144–152. Routledge.

BB (2014). Agricultural & rural credit policy and programme for the FY 2013-2014. Technical report, Bangladesh Bank, Dhaka, Bangladesh.

BB (2023). Annual report 2022-2023. Technical report, Bangladesh Bank, Dhaka, Bangladesh.

Bell, W. (2009). *Foundations of futures studies: Human science for a new era*, volume 1. Transaction publishers.

Bibri, S. and Krogstie, J. (2019). Generating a vision for smart sustainable cities of the future: A scholarly backcasting approach. *European Journal of futures research*, 7:1–20.

Brügger, A., Demski, C., and Capstick, S. (2021). How personal experience affects perception of and decisions related to climate change: A psychological view. *Weather, climate and society*, 13:397–408.

Buranatrakul, T. and Swierczek, F. (2018). Climate change strategic actions in the international banking industry. *Global business review*, 19:32–47.

Burhan, A. and Rahmanti, W. (2012). The impact of sustainability reporting on company performance. *Journal of economics, business and accountancy ventura*, 15:257–272.

Cadilha, S. and Vaz, S. (2023). Prospection as a sustainability virtue: Imagining futures for intergenerational ethics. *Zeitschrift für Ethik und Moralphilosophie*, 6:293–309.

Cameron, A. and Trivedi, P. (2022). *Microeconometrics using Stata: Cross-sectional and panel regression methods*, volume I. Stata Press.

Cecchi, A. (2018). Cognitive penetration of early vision in face perception. *Consciousness and cognition*, 63:254–266.

Chen, J., Siddik, A., Zheng, G., Masukujjaman, M., and Bekhzod, S. (2022). The effect of green banking practices on banks' environmental performance and green financing: An empirical study. *Energies*, 15:1292.

Chowdhury, M. (2009). Agrarian transition and livelihoods of the rural poor: Agricultural credit market. Technical report, Unnayan Onneshan – the Innovators, Dhaka, Bangladesh.

Cook, C., Inayatullah, S., Burgman, M., Sutherland, W., and Wintle, B. (2014). Strategic foresight: How planning for the unpredictable can improve environmental decision-making. *Trends in ecology and evolution*, 29:531–541.

Dienes, C. (2015). Actions and intentions to pay for climate change mitigation: Environmental concern and the role of economic factors. *Ecological economics*, 109:122–129.

Dixon-Fowler, H., Slater, D., Johnson, J., Ellstrand, A., and Romi, A. (2013). Beyond "does it pay to be green?" A meta-analysis of moderators of the CEP – CFP relationship. *Journal of business ethics*, 112:353–366.

Duijndam, S. and Beukering, P. (2021). Understanding public concern about climate change in Europe, 2008–2017: The influence of economic factors and right-wing populism. *Climate policy*, 21:353–367.

Durán-Sandoval, D., Uleri, F., Durán-Romero, G., and López, A. (2023). Food, climate change, and the challenge of innovation. *Encyclopedia*, 3:839–852.

Enke, B., Gneezy, U., Hall, B., Martin, D., Nelidov, V., Offerman, T., and Van, J. (2023). Cognitive biases: Mistakes or missing stakes? *Review of economics and statistics*, 105:818–832.

FAO (2023). The impact of disasters on agriculture and food security 2023 – Avoiding and reducing losses through investment in resilience. Technical report, Food and Agriculture Organization, Rome, Italy.

Farjam, M., Nikolaychuk, O., and Bravo, G. (2019). Experimental evidence of an environmental attitude-behavior gap in high-cost situations. *Ecological economics*, 166:106434.

Gajanayake, R., Johnson, L., Daronkola, H., and Perera, C. (2024). Impact of households' future orientation and values on their willingness to install solar photovoltaic systems. *Sustainability*, 16:8143.

Gangi, F., Meles, A., D'Angelo, E., and Daniele, L. (2019). Sustainable development and corporate governance in the financial system: Are environmentally friendly banks less risky? *Corporate social responsibility and environmental management*, 26:529–547.

Ghazali, E., Nguyen, B., Mutum, D., and Yap, S. (2019). Pro-environmental behaviours and value-belief-norm theory: Assessing unobserved heterogeneity of two ethnic groups. *Sustainability*, 11:3237.

Godefroid, M., Plattfaut, R., and Niehaves, B. (2023). How to measure the status quo bias? A review of current literature. *Management review quarterly*, 73:1667–1711.

Gonzalez-Ramirez, J., Arora, P., and Podesta, G. (2018). Using insights from prospect theory to enhance sustainable decision making by agribusinesses in Argentina. *Sustainability*, 10:2693.

González-Ricoy, I. and Gosseries, A. (2016). *Institutions for future generations*. Oxford University Press.

Grosbois, D. and Fennell, D. (2022). Determinants of climate change disclosure practices of global hotel companies: Application of institutional and stakeholder theories. *Tourism management*, 88:104404.

Gumel, D. (2022). Assessing climate change vulnerability: A conceptual and theoretical review. *Journal of sustainability and environmental management*, 1:22–31.

Haque, M. and Murtaz, M. (2018). Green financing in Bangladesh. In Jahur, M. and Uddin, S., editors, *Proceedings of the international conference on finance for sustainable growth and development*, pages 82–89. Department of Finance, Faculty of Business Administration, University of Chittagong, Bangladesh.

Harris, J., Carins, J., and Rundle-Thiele, S. (2021). Can social cognitive theory influence breakfast frequency in an institutional context: A qualitative study. *International journal of environmental research and public health*, 18:11270.

Hasan, M., Al Amin, M., Moon, Z., and Afrin, F. (2022). Role of environmental sustainability, psychological and managerial supports for determining bankers' green banking usage behavior: An integrated framework. *Psychology research and behavior management*, 15:3751–3773.

Hasebrook, J., Michalak, L., Wessels, A., Koenig, S., Spierling, S., and Kirmsse, S. (2022). Green behavior: Factors influencing behavioral intention and actual environmental behavior of employees in the financial service sector. *Sustainability*, 14:10814.

Hossain, M. (2018). Green finance in Bangladesh: Policies, institutions, and challenges. Technical report, Working paper no. 892, Asian Development Bank Institute, Tokyo.

Huang, J. and Wang, Y. (2014). Financing sustainable agriculture under climate change. *Journal of integrative agriculture*, 13:698–712.

Husain, A. and Hossain, M. (2022). Bangladesh's agricultural growth and development over fifty years. In Hossain, M., Ahmad, Q., and Islam, M., editors, *Towards a sustainable economy: The case of Bangladesh*, pages 171–190. Routledge, London.

IPCC (2013). Climate change 2013: The physical science basis. Technical report, Working Group I Contribution to the Fifth Assessement Report, Intergovernmental Panel on Climate Change.

Islam, M., Kotani, K., and Managi, S. (2024). Nature dependence and seasonality change perceptions for climate adaptation and mitigation. *Economic analysis and policy*, 81:34–44.

Islam, N. (2011). Foreign aid to agriculture: Review of facts and analysis. Technical report, IFPRI discussion paper no. 01053, International Food Policy Research Institute, Washington, D. C., USA.

Kahneman, D. and Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In *Handbook of the fundamentals of financial decision making: Part I*, pages 99–127. World Scientific.

Kamal, Y. (2006). The development of banking sector in Bangladesh. *Southeast university journal of business studies*, 2:241–251.

Kartadjumena, E. and Rodgers, W. (2019). Executive compensation, sustainability, climate, environmental concerns, and company financial performance: Evidence from Indonesian commercial banks. *Sustainability*, 11:1673.

Katz, I., Rauvola, R., Rudolph, C., and Zacher, H. (2022). Employee green behavior: A meta-analysis. *Corporate social responsibility and environmental management*, 29:1146–1157.

Keh, H., Foo, M., and Lim, B. (2002). Opportunity evaluation under risky conditions: The cognitive processes of entrepreneurs. *Entrepreneurship theory and practice*, 27:125–148.

Khairunnessa, F., Vazquez-Brust, D., and Yakovleva, N. (2021). A review of the recent developments of green banking in Bangladesh. *Sustainability*, 13:1904.

Kluckhohn, F. and Strodtbeck, F. (1961). *Variations in value orientations*. Row, Peterson.

Kuenzi, M. and Schminke, M. (2009). Assembling fragments into a lens: A review, critique, and proposed research agenda for the organizational work climate literature. *Journal of management*, 35:634–717.

Lacroix, D., Laurent, L., Menthière, N., Schmitt, B., Béthinger, A., David, B., Didier, C., and Châtelet, J. (2019). Multiple visions of the future and major environmental scenarios. *Technological forecasting and social change*, 144:93–102.

Lagoarde-Segot, T. (2019). Sustainable finance. A critical realist perspective. *Research in international business and finance*, 47:1–9.

Masud, M., Akhtar, R., Afroz, R., Al-Amin, A., and Kari, F. (2015). Pro-environmental behavior and public understanding of climate change. *Mitigation and adaptation strategies for global change*, 20:591–600.

Mazutis, D. and Eckardt, A. (2017). Sleepwalking into catastrophe: Cognitive biases and corporate climate change inertia. *California management review*, 59:74–108.

McFadden, C. (2022). Implicit bias training is dead, long live implicit bias training: The evolving role of human resource development in combatting implicit bias within organisations. In *The Emerald handbook of work, Workplaces and disruptive issues in HRM*, pages 381–396. Emerald Publishing Limited.

Morselli, D. and Passini, S. (2015). Measuring prosocial attitudes for future generations: The social generativity scale. *Journal of adult development*, 22:173–182.

Newen, A. and Vetter, P. (2017). Why cognitive penetration of our perceptual experience is still the most plausible account. *Consciousness and cognition*, 47:26–37.

Nicholls, N. and Alexander, L. (2007). Has the climate become more variable or extreme? Progress 1992-2006. *Progress in physical geography*, 31:77–87.

Norton, T., Parker, S., Zacher, H., and Ashkanasy, N. (2015). Employee green behavior: A theoretical framework, multilevel review, and future research agenda. *Organization and environment*, 28:103–125.

Norton, T., Zacher, H., and Ashkanasy, N. (2014). Organisational sustainability policies and employee green behaviour: The mediating role of work climate perceptions. *Journal of environmental psychology*, 38:49–54.

Osberghaus, D. (2017). Prospect theory, mitigation and adaptation to climate change. *Journal of risk research*, 20:909–930.

Palmucci, D. and Ferraris, A. (2023). Climate change inaction: Cognitive bias influencing managers' decision making on environmental sustainability choices. The role of empathy and morality with the need of an integrated and comprehensive perspective. *Frontiers in psychology*, 14:1130059.

Pandit, A., Nakagawa, Y., Timilsina, R., Kotani, K., and Saijo, T. (2021). Taking the perspectives of future generations as an effective method for achieving sustainable waste management. *Sustainable production and consumption*, 27:1526–1536.

Phdungsilp, A. (2011). Futures studies' backcasting method used for strategic sustainable city planning. *Futures*, 43:707–714.

Raftopoulos, A. and Zeimbekis, J. (2015). The cognitive penetrability of perception: An overview. In Zeimbekis, J. and Raftopoulos, A., editors, *The cognitive penetrability of perception: New philosophical perspectives*, pages 1–56. Oxford University Press.

Rahaman, K., Ahmed, F., and Nazrul, I. (2016). Modeling on climate induced drought of northwestern region, Bangladesh. *Modeling earth systems and environment*, 2:1–21.

Rahman, M. (2011). Policies and performances of agricultural/rural credit in Bangladesh: What is the influence on agricultural production? *African journal of agricultural research*, 6:6440–6452.

Rahman, M. (2017). Role of agriculture in Bangladesh economy: Uncovering the problems and challenges. *International journal of business and management invention*, 6:36–46.

Shahen, M., Kotani, K., and Saijo, T. (2021). Intergenerational sustainability is enhanced by taking the perspective of future generations. *Scientific reports*, 11:2437.

Soria-Lara, J. and Banister, D. (2018). Collaborative backcasting for transport policy scenario building. *Futures*, 95:11–21.

Sprengel, D. and Busch, T. (2011). Stakeholder engagement and environmental strategy – The case of climate change. *Business strategy and the environment*, 20:351–364.

Stern, P., Dietz, T., Abel, T., Guagnano, G., and Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 6:81–97.

Stren, P. (2000). Toward a coherent theory of environmentally significant behaviour. *Journal of social issues*, 56:407–424.

Suzuki, Y. and Adhikary, B. (2010). A 'bank rent' approach to understanding the development of the banking system in Bangladesh. *Contemporary south Asia*, 18:155–173.

Syropoulos, S. and Markowitz, E. (2021). Perceived responsibility towards future generations and environmental concern: Convergent evidence across multiple outcomes in a large, nationally representative sample. *Journal of environmental psychology*, 76:101651.

Syropoulos, S. and Markowitz, E. (2023). Our responsibility to future generations: The case for intergenerational approaches to the study of climate change. *Journal of environmental psychology*, 87:102006.

Syropoulos, S. and Markowitz, E. (2024). Responsibility towards future generations is a strong predictor of proenvironmental engagement. *Journal of environmental psychology*, 93:102218.

Szpunar, K., Spreng, R., and Schacter, D. (2014). A taxonomy of prospection: Introducing an organizational framework for future-oriented cognition. *Proceedings of the National Academy of Sciences of the United States of America*, 111:18414–18421.

Tian, H., Zhang, J., and Li, J. (2020). The relationship between pro-environmental attitude and employee green behavior: The role of motivational states and green work climate perceptions. *Environmental science and pollution research*, 27:7341–7352.

Timilsina, R., Nakagawa, Y., and Kotani, K. (2020). Exploring the possibility of linking and incorporating future design in backcasting and scenario planning. *Sustainability*, 12:9907.

Tuominen, A., Tapio, P., Varho, V., Järvi, T., and Banister, D. (2014). Pluralistic backcasting: Integrating multiple visions with policy packages for transport climate policy. *Futures*, 60:41–58.

Valentinov, V. and Hajdu, A. (2021). Integrating instrumental and normative stakeholder theories: A systems theory approach. *Journal of organizational change management*, 34:699–712.

Van der Helm, R. (2009). The vision phenomenon: Towards a theoretical underpinning of visions of the future and the process of envisioning. *Futures*, 41:96–104.

Van der Linden, S. (2015). The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model. *Journal of environmental psychology*, 41:112–124.

Vecchiato, R. (2012). Environmental uncertainty, foresight and strategic decision making: An integrated study. *Technological forecasting and social change*, 79:436–447.

Volz, U., Böhnke, J., Knierim, L., Richert, K., Roeber, G., and Eidt, V. (2015). *Financing the green transformation: How to make green finance work in Indonesia*. Springer.

Watkins, H. and Goodwin, G. (2019). Reflecting on sacrifices made by past generations increases a sense of obligation towards future generations. *Personality and social psychology bulletin*, 46:995–1012.

Wodak, J. and Neale, T. (2015). A critical review of the application of environmental scenario exercises. *Futures*, 73:176–186.

Wooldridge, J. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Wooldridge, J. (2019). *Introductory econometrics: A modern approach*. Cengage learning.

World Bank (2007). World development report 2008: Agriculture for development. Technical report, World Bank, Washington, D. C., USA.

Yeasmin, S., Haque, S., Adnan, K., Parvin, M., Rahman, M., Rahman, K., Salman, M., and Hossain, M. (2024). Factors influencing demand for, and supply of, agricultural credit: A study from Bangladesh. *Journal of agriculture and food research*, 16:101173.

Yilmaz, V. and Can, Y. (2020). Impact of knowledge, concern and awareness about global warming and global climatic change on environmental behavior. *Environment, development and sustainability*, 22:6245–6260.

Zakhem, A. and Palmer, D. (2017). Normative stakeholder theory. In *Stakeholder management (Business and society 360)*, volume 1, chapter 3, pages 49–73. Emerald Publishing Limited.

Zheng, G., Siddik, A., Masukujjaman, M., Fatema, N., and Alam, S. (2021a). Green finance development in Bangladesh: The role of private commercial banks (PCBs). *Sustainability*, 13:795.

Zheng, G., Siddik, A. B., Masukujjaman, M., and Fatema, N. (2021b). Factors affecting the sustainability performance of financial institutions in Bangladesh: The role of green finance. *Sustainability*, 13:10165.

Ziegler, R. and Oliveira, L. (2022). Backcasting for sustainability – An approach to education for sustainable development in management. *International journal of management education*, 20:100701.