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Exploring the Link Between Climate Risk Disclosures, Lending Growth, and Firm Performance in Indian Banks

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ABSTRACT

As climate change concerns grow, companies—especially banks—are adopting climate-risk mitigation strategies and aligning with global frameworks like the IPCC and TCFD to improve transparency and sustainability. This study analyzes the link between climate-risk disclosures, lending growth, and firm performance in 12 Indian Public Sector Banks (PSBs) from 2020–2024. It uses performance indicators (ROA, ROE), lending metrics (Asset Quality, Liquidity, CRAR), firm size, and disclosure scores based on annual reports. The results show that climate-risk disclosures do not significantly affect firm performance (ROA or ROE). However, Capital to Risk-Weighted Assets Ratio (CRAR) positively influences performance, while Asset Quality negatively impacts it. The findings highlight the need for broader studies and suggest that policymakers should strengthen disclosure regulations and sustainability integration in banking.

1. Introduction

Climate change adversely impacts the ecology, social structures, and eventually human lives (Orazalin *et al.*, 2024). Due to changes in the course of catastrophic weather events and their effects on vital ecosystems, climate change is already posing a threat to society. It is crucial to note that climate risk can be categorised into two main categories: (i) Physical risks: this results from the occurrence of frequent natural disaster events, and (ii) transition risks: which result from the shift to a low-carbon economy and all such

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corresponding adjustments to investments and strategies (Bernardini *et al.*, 2021, Le *et al.*, 2023 and Alessi *et al.*, 2024; Carè *et al.*, 2024).

The *Sixth Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC) underlines that mostly through the release of greenhouse gases, the global surface temperature has been on the rise by 1.1 °C (IPCC, 2021). Moreover, climate risk and natural catastrophes severely impair the value of financial assets (Le *et al.*, 2023). Being a widely debated topic, the potential impact of climate-related risks and their disclosures on the financial sector is note worthy (Carè *et al.*, 2024; Adu *et al.*, 2024). Although banks may not directly contribute to pollution and carbon emissions, a banking relationship with such ill-equipped firms may pave the way for setting conditions to adopt green projects. Furthermore, the concept of ‘green banking’ has been gaining momentum on a rapid pace (Mishra, 2013). Banks' exposure to climate change is being evaluated more closely by the regulatory environment. This increases the possibility of litigation and further damages their reputation. For such reasons, an increased caution in public disclosures, which ensures transparency, is notable (Martini *et al.*, 2024).

It is a well-recognised fact that the public sector banks (PSBs) are the providers of stability during economic downturns. As such, their role ranges from offering financial inclusion to supporting economic growth and social welfare. Annadurai (2014) proposes that banks play a critical role in enhancing environmental preservation by funding socially responsible projects. Additionally, climate-related financial disclosures assist investors and other stakeholders in forming perceptions of their sustainability practices. Hence, there is improved accountability, transparency and focus towards long-term strategies.

A quick overview of the existing literature suggests that research concerning the areas of climate risk and their macroeconomic implications is extensive, while comparatively fewer studies have reported on the firm-level influence. In addition, studies exploring the Indian economy are rare. A qualitative study employing content analysis of relevant annual reports and/or sustainability reports of the selected PSBs assists in a better comprehension of variables. This study, therefore, aims to present a refined understanding of the TCFD-recommended climate-risk-related disclosures in the context of the Indian banking scenario.

2. Theoretical Framework

The most common theoretical frameworks underlying the requirement of climate change disclosures are resource-based view, institutional theory, stakeholder theory and legitimacy theory. The theory of resource-based view discloses how a firm can effectively handle climate-related risks as well as gain a competitive benefit over its rivals with its distinct resources (Barney, 1991). The institutional theory by Scott (1995) posits that corporations may adapt their organisational behaviour according to social norms. Henceforth, external influence plays a crucial role in the adaptation and application of specific practices for managing climate risk. Another study by Stanny *et al.* (2008) indicates that investors require appropriate disclosures to

make sound choices. This further suggests that institutions are bound to return to the stakeholders with appropriate climate-related disclosures to base their decisions in the long run. Hence, the legitimacy theory finds ground in establishing an agreement between corporations and society at large. Being perceived as a valuable asset, such disclosures result in increased investors' confidence (TCFD, 2021; Ilhan *et al.*, 2023). Further, the stakeholder theory argues that acknowledging the natural surroundings enables businesses to work sustainably. This also allows for a better comprehension of the impact of environmental operations on their suppliers, customers and peers (Ho *et al.*, 2004; Haigh *et al.*, 2009; Freeman, 2010; Shahrour *et al.*, 2023).

3. Literature Review

3.1 Empirical Evidence: Climate-risk related disclosures & firm performance

Being a subject of global importance, climate change and global warming have been receiving massive attention from diverse fields of study. Likewise, climate-related financial risk has been garnering massive attention in the literature in recent times.

According to the Task Force on Climate-related Financial Disclosures (TCFD), climate-related disclosures ensure informed decisions. This ultimately shapes stakeholder perception for better comprehension of the financial system's exposure to climate-related risks. For instance, if the concerns of the stakeholders are rising, this may damage the firm's reputation, which further leads to reduced revenue (TCFD, 2021). Additionally, a study on French firms implies that institutional investors perceive climate-related disclosures as a valuable asset for decision-making (Ilhan *et al.*, 2023). A study by Haque *et al.* (2020) posits that stakeholders pressurise banks to undertake initiatives for reducing carbon emissions and hence, build investor confidence.

There are abundant studies on the possible macroeconomic effects of climate change and natural disasters. However, empirical studies at the firm level on how it impacts business performance are still lacking (Cevik *et al.*, 2023). An earlier study by Dell *et al.* (2012) pointed out that rising temperatures often have a negative impact on the economic growth of developing countries. Similar to this, Batten *et al.* (2020) suggest that climate changes result in lower GDP and eventually causes macroeconomic decline. Furthermore, a shift from 'macro-economic perspective' to 'firm-level impacts' due to climate change can be observed in comparatively fewer papers. Diverse viewpoints between firm performance, climate-risk and climate-related financial disclosures, suggesting positive, negative and no significant relationships have been revealed so far. This may be because of differences in the sample size, geographical locations and timelines undertaken for the study or other reasons altogether.

3.2 Global Evidence: Climate-risk related disclosures & firm performance

Nonetheless, studies have disclosed how rising temperature and adverse climatic conditions have an adverse impact on a firm's productivity and profitability (Pankratz *et al.*, 2023; Cevik *et al.*, 2023). Another study by Huang *et al.* (2018) proposes a negative correlation between climate risk and the earnings of the firm. Moreover, a study by Dinh *et al.* (2024) on Vietnamese-listed firms reports that climate changes tend to severely affect corporate performance. A country-level study by Ozkan *et al.* (2023) further posits that higher climate risks push companies to pursue an increased level of CSR activities in their operations.

With the rapid rise in global temperatures and carbon emissions, the economic impact of climate change has gained prominence for some sectors, especially the financial sector. A study on the Italian banking sector confirmed that weather catastrophes adversely affect the lending activities of banks (Faiella *et al.*, 2018). Further, Bernardini *et al.* (2021) reported that there exists an unfavourable association between climate risks and the soundness of individual banks. This eventually affects the stability of the financial system as a whole. Another study by Curcio *et al.* (2023) determines the interconnection between climate change and financial stability as well as how the former might have an adverse influence on the latter. Similarly, an inverse relationship can be established between climate change and bank stability using a large sample of 6433 commercial banks from 109 countries (Le *et al.*, 2023). Two prominent studies based on the US financial sector by Apergis (2023) and Noth *et al.* (2023) further presume the adverse impact of climate risk on the financial system. The former purports that weather catastrophes impair financial stability, while the latter underlines that climatic fluctuations weaken the financial position of banks.

Conversely, two studies by Kouloukoui *et al.* (2019) and Adu *et al.* (2024) targeting different geographies over separate timelines suggest a favourable relationship between firm performance and climate-risk disclosures. The former discloses that climate-related risk disclosures have a significant and positive association with firm size, country of origin and ultimately with firm performance. The latter indicates a positive association between climate change initiatives and financial performance for a study based on 220 banks from 16 Sub-Saharan African countries. Alongside firm performance, climate risk also affects the lending decisions of banks in emerging nations (Aslan *et al.*, 2022). With the macro-categorisation of climate risks into physical and transition risks, the former negatively impacts bank performance while the latter has a positive impact on lending activities as well as performance (Chalabi-Jabado *et al.*, 2024). Although several studies highlight the adverse effects of climate risks on bank performance, a prominent study by U-Din *et al.* (2021) indicates no major adverse impact on the selected banks' financial performance due to natural disasters and climate risks. Another recent study by Vestrelli *et al.* (2024) signifies the relevance of climate-risk disclosures for investors. Although the study stresses on the positive association between climate-risk disclosures and firm value, its negative implications in specific situations cannot be undermined.

3.3 Indian Evidence: Climate-risk related disclosures & firm performance

From the Indian perspective, studies exploring the relationship between climate-risk disclosures and firm performance are few. A study by Malarvizhi *et al.* (2016) for a sample of 85 BSE-listed Indian companies indicates that climate-related disclosures have no significant impact on firm performance. However, this was later contradicted by another prominent study that reported a positive association between climate-risk-related financial disclosures and firm performance in the energy sector (Maji *et al.*, 2022). In the same year, Desai *et al.* (2022) propose a negative association between carbon emissions and the firm performance of selected Indian companies from the year 2013-2019, respectively.

4. Research Gap

Several studies on climate risk have been conducted in different geographical locations by distinguished researchers over time. The majority of the articles reviewed for this study have assessed the influence of climate risk on financial performance. Although research surrounding the international banking sector is plentiful, limited studies have been proposed in the context of the Indian economy. Specifically, studies on climate-risk-related financial disclosures in the Indian banking sector are comparatively few. This may be because of India's ever-developing economy as well as the limited attempt to consider climate change as a potential threat. Despite the recent surge in disclosing the physical risks and transition risks affecting firm performance, a lot is yet to be examined. The current study attempts to close the gap left by previous studies on how such disclosures shape the banks' financial performance.

5. Objectives of the study

As per the literature review, fewer studies have been carried out in the context of the Indian banking industry. Hence, given India's diverse geography, the objectives of the present study are based on the limited research conducted in the Indian banking sector. By way of investigating the degree of association between climate-risk-related disclosures and banks' financial performance, an accurate and comprehensive picture has been presented. Accordingly, the following objectives have been identified:

- i. To analyse climate-risk related disclosures of the select Public Sector Banks (PSBs)
- ii. To examine the relationship between climate-risk related disclosures and lending growth with firm performance in the banking sector.

6. Research Methodology

6.1 . Population and Sample

The present sample is based on secondary data of twelve (12) PSBs operating in the Indian banking sector. The relevant data has been collected from the annual reports and/or sustainability reports for a period of 5 years viz., from 2020-2024. The report of TCFD (2021) further discloses that although not directly, but

banks' customers, borrowers, suppliers, etc. subject the financial system to adverse climate-related risk. Accordingly, in order to avoid legal recourse and facilitate informed financial decisions, TCFD has mandated disclosures relating to banks' governance, risk management, strategy and metrics & targets. The selected 12 PSBs are presented below. Hence, the above-mentioned reports (annual reports/sustainability reports) underline such relevant climate-risk disclosures for calculating disclosure score with a range of 0, 1 and 2, subject to the best of our understanding.

Table 1 List of all 12 PSBs with acronyms

SL No.	Acronyms	PSBs
1	SBI	State Bank of India
2	PNB	Punjab National Bank
3	PSB	Punjab and Sind Bank
4	CBI	Central Bank of India
5	BoM	Bank of Maharashtra
6	BoB	Bank of Baroda
7	IB	Indian Bank
8	IOB	Indian Overseas Bank
9	UBI	Union Bank of India
10	UCO	UCO Bank
11	BoI	Bank of India
12	CAN	Canara Bank

Source: Authors' Compilation

6.2 Variables used

A number of dependent and independent variables have been used to clarify the degree of association between a bank's financial performance and climate-risk related financial disclosures. Also, one control variable has been used to enhance internal validity.

6.2.1 Dependent variables

In line with Esteban-Sanchez *et al.* (2017), Bătae *et al.* (2021) and Adu *et al.* (2024), ROA (net income over total assets) and ROE (net income over shareholders' equity) have also been employed in the current study with the motive of measuring firm performance.

6.2.2 Independent variables

Climate-risk related financial disclosures variables:

The Task Force on Climate-related Financial Disclosures (TCFD) offered recommendations on climate-risk-related financial disclosures. They are categorised into four vital elements: Governance, Strategy, Risk Management and Metrics & Targets. These have been employed as the first set of independent variables and

grouped under DS indicating disclosures. The study applies content analysis technique by identifying such variables to capture the volume and scope of such disclosures, particularly in the banking sector.

Bank-specific financial variables:

Consistent with previous studies (Hoffmann *et al.*, 2011, Chalabi-Jabado *et al.*, 2024), three bank-specific variables have been identified in the present study. Capital-to-Risk Weighted Assets Ratio (CRAR) which measures total capital to risk-adjusted assets and signify bank's financial health. Meanwhile Liquidity (LQ) gauges the overall advances over total assets. Lastly, Asset Quality (AQ) defines gross NPA over gross advance. All these variables can be headed under 'lending growth' displaying the capital level, liquidity position and credit risk for banks.

6.2.3 Control variables

The present study also employs Firm size (LnFS) as the control variable. It considers the natural log of total assets (Maji *et al.*, 2022; Adu *et al.*, 2024).

6.3 Hypothesis development

Regardless of countless studies on climate change disclosures and firm performance, almost every other study points to a significant association between the two. As such, the considerable spike in climate-related disclosures in recent times cannot be disregarded. Accordingly, two arguments in favour of climate-risk related disclosures can be introduced. H_1 suggests that climate-risk disclosures affect ROA while H_2 presents the relationship between climate-risk disclosures and ROE.

H_1 : There exists a significant relationship between climate-risk related disclosures and ROA

H_2 : There exists a significant relationship between climate-risk related disclosures and ROE

6.4 Tools and Techniques

In order to display the average climate-risk related disclosure scores for the four core elements of TCFD recommendations, graphical presentation has been employed initially. A bank-wise comparison as well as an overall comparison for the past five years indicates the relevant disclosure pattern. Moreover, various economic and statistical techniques have been used to examine how climate-risk-related financial disclosures affect firm performance. To examine the data as obtained from annual reports and sustainability reports, descriptive statistics and correlation analysis were performed. Lastly, panel data regression analysis was also carried out. In line with the Hausman test, Fixed Effect (FE) and Random Effect (RE) models have been applied.

7. Data Analysis

7.1 Graphical analysis of climate-risk related disclosures on firm performance of the select PSBs

7.1.1 TCFD recommended climate-risk related disclosure patterns (bank-wise)

With the motive of ascertaining the trend of climate-related risks disclosures over the past 5 years, the average ascertained scores have been presented in a tabular format, followed by a graphical summary. The four core elements of TCFD recommendations have been employed to assess the disclosure patterns for all 12 PSBs in the country.

Table 2 Climate-risks related disclosures (bank-wise)

	PNB	SBI	CAN	PSB	BoB	BoI	CBI	UBI	IB	BoM	UCO	IOB
Governance	0.2	0.5	0.1	0	0.5	0.1	0.1	0.7	0	0	0	0
Strategy	0.26	0.24	0.12	0.02	0.18	0.06	0.06	0.12	0	0.04	0.12	0
Risk management	0.32	0.16	0.14	0.04	0.3	0.2	0.1	0.34	0.1	0.12	0.1	0.1
Metrics and targets	0.05	0.225	0.075	0	0	0	0.05	0.15	0	0	0.05	0

Source: Authors' compilation

Figure. 1 Bank-wise climate-risk disclosure

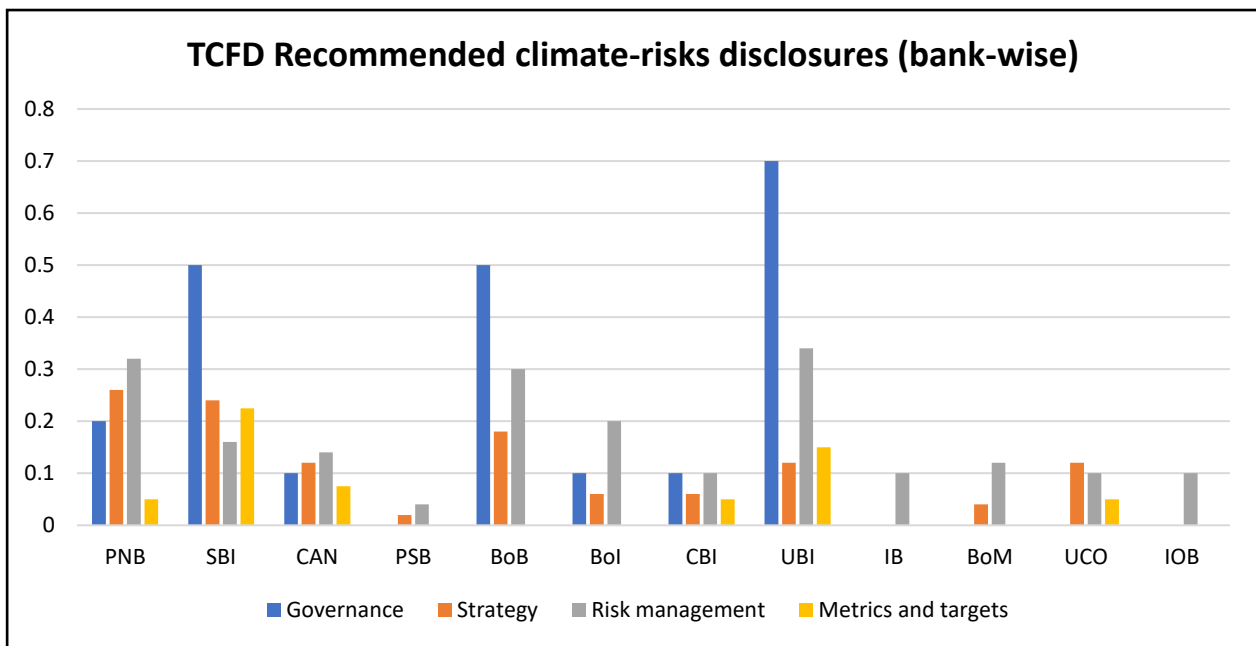


Table 2 shows how the PSBs have encumbered these four parameters, namely: Governance, Strategy, Risk Management and Metrics & Targets, in their annual disclosures for a series of 5 years. A quick overview indicates that the average scores of Governance-related climate-risks disclosures are nil for five banks (PSB, IB, BoM, UCO and IOB). As opposed to this, UBI (70%) stands at the highest, followed by SBI (50%) and BoB (50%). Although CAN, CBI and BoI are at 1%, the gap is almost negligible. Similarly, the next parameter of Strategy is seen to be the highest in PNB (26%) and SBI (24%) in lieu of PSB, which stands at 2%. Also, the average scores for IB and IOB are nil. Next, the average Risk Management scores are more prominently disclosed in comparison to other parameters. UBI (34%), PNB (32%) and BoB (30%) indicate

the highest disclosure pattern in respect of risk management. In contrast, CBI, UCO and IOB stand at only 1%. Lastly, the disclosure pattern for Metrics & Targets is not found to be satisfactory. Excluding SBI (23%) and UBI (15%), the average scores for the remaining banks are closer to zero. Although Figure. 1 presents a summary of disclosure patterns, and the inconsistency of Governance cannot be disregarded. Therefore, it can be clearly observed that UBI scores the highest at 70%, but PSB, IB, BoM, UCO and IOB present an opposite picture altogether. It is imperative to note that UBI emerges as the highest scoring bank in terms of climate-related risks disclosures, followed by SBI.

7.1.2 TCFD recommended disclosure pattern summary (year-wise):

Furthermore, an overall summary signifying disclosure patterns over the years has been presented below. The disclosure scores have been presented yearly (2020-2024), signifying the trend altogether.

Table 3 Overall disclosure pattern (year-wise)

	2020	2021	2022	2023	2024
Governance	0.125	0.166667	0.125	0.208333	0.291667
Strategy	0.05	0.041667	0.058333	0.125	0.233333
Risk management	0.111111	0.097222	0.138889	0.152778	0.298611
Metrics and targets	0.010417	0.010417	0.020833	0.0625	0.145833

Source: Authors' compilation

Figure. 2 Year-wise climate-risk disclosures

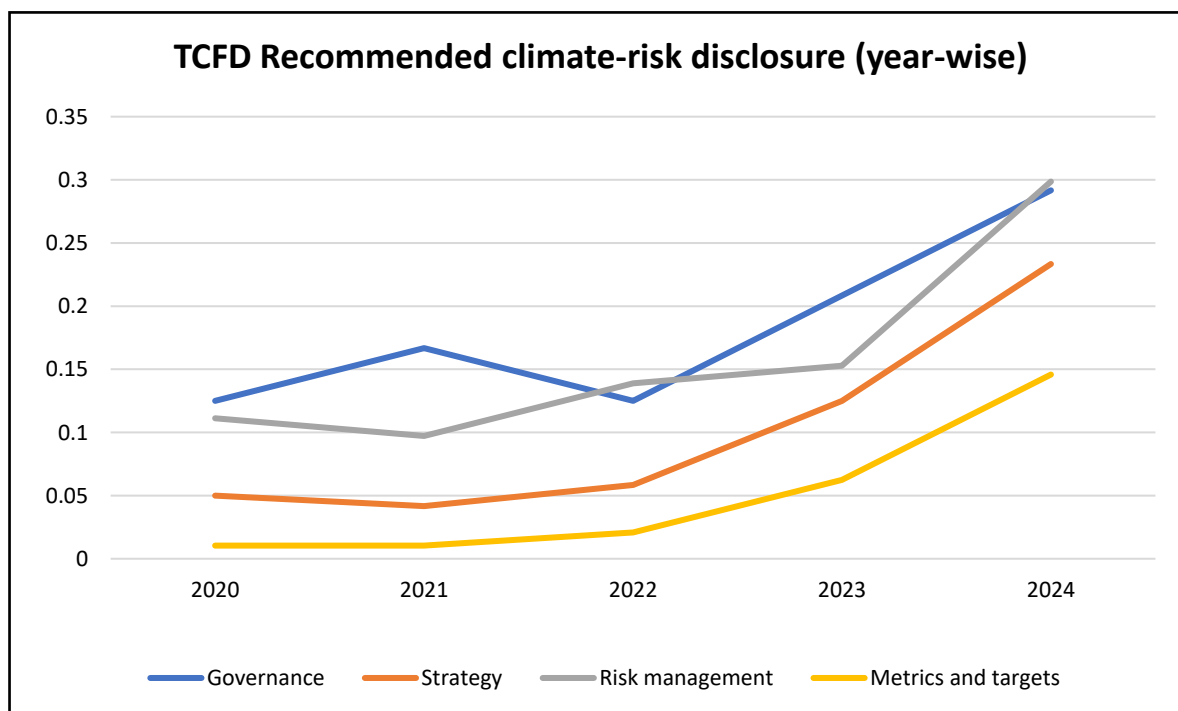


Table 3 and Figure. 2 draw the overall summary of TCFD recommended climate-risk disclosures for the last five years. Although there is improvement in the quality of climate-risk disclosures over the years, the

growth has been inconsistent. The year 2021 saw a sharp increase in the governance disclosure scores, which later dropped to 12% (approx.) in the year 2022. However, a consistent spike could be observed thereafter. Against this, risk management saw a decline in its transition from 2020 to 2021. With an inconsistent rise till 2024, the disclosure pattern displays minor breaks, which is, in fact, a contrast to the above Governance pattern. Likewise, there was a slight dip in the strategy disclosure pattern initially. However, the subsequent years saw an overall surge, with the year 2023 marking the highest disclosure score for strategy. Lastly, Metrics & Targets have been stable for the initial years at 1.04% (approx.). Nevertheless, there has been a consistent growth till 2024, concluding at 15% (approx.) in respect of Metrics & Targets.

The overall pattern, thereby, pictures the year-wise disclosures as against the backdrop of the four core elements of TCFD recommendations. Although Governance scores denote a significant rise as opposed to average risk management scores, the year 2024 saw a somewhat rise in the latter. Moreover, the last parameter of Metrics & Targets has the lowest disclosure scores, hence indicating that the disclosure is unsatisfactory.

7.1.3. Lending growth pattern of select PSBs over the year:

Figure. 3 Liquidity (LQ) for the period 2020-2024

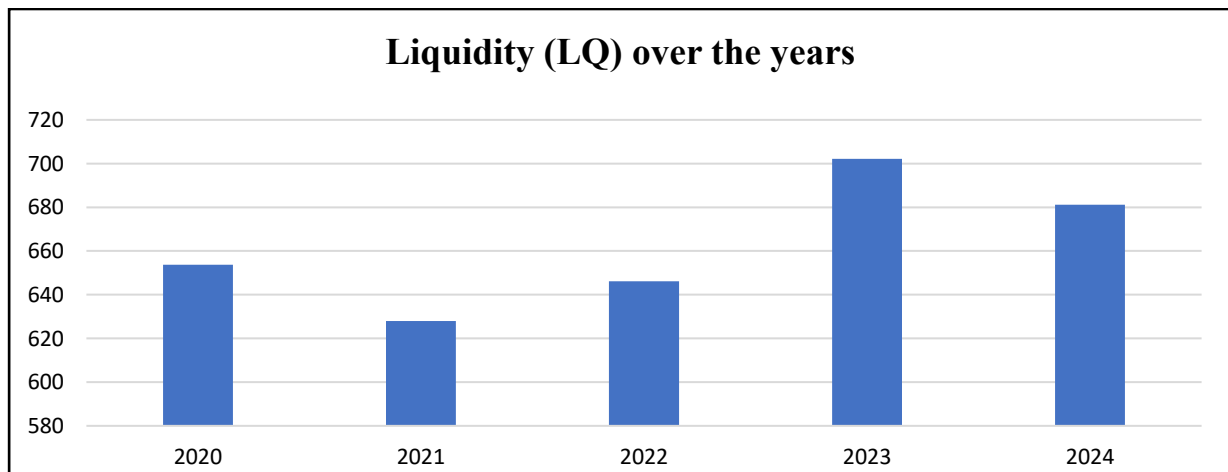


Figure. 3 indicates an inconsistent growth of Liquidity (LQ) over the years. Although LQ dropped slightly in the initial period, there seemed to be a surge till 2023. However, the year 2024 saw a drop in LQ, which indicates the potential dip in PSBs’ ability to meet their financial commitments.

Figure 4 CRAR for the period 2020-2024

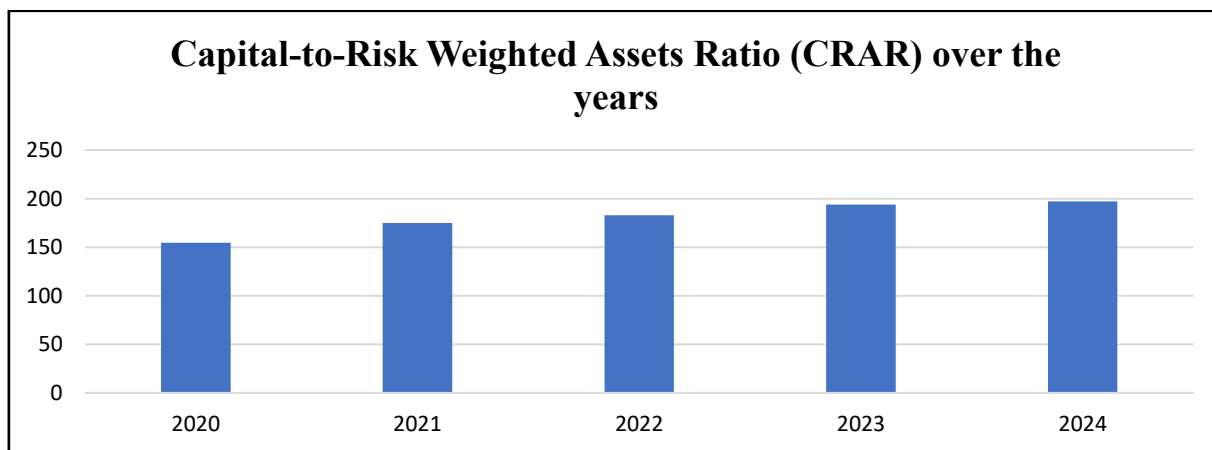


Figure. 4 establishes a consistent growth pattern in CRAR for the last five years. This unveils that the 12 PSBs are at a position to absorb losses even if customers cease to make timely repayments. The chances of banks turning insolvent also drop due to the increasing CRAR over the years.

Figure. 5 Asset Quality (AQ) for the period 2020-2024

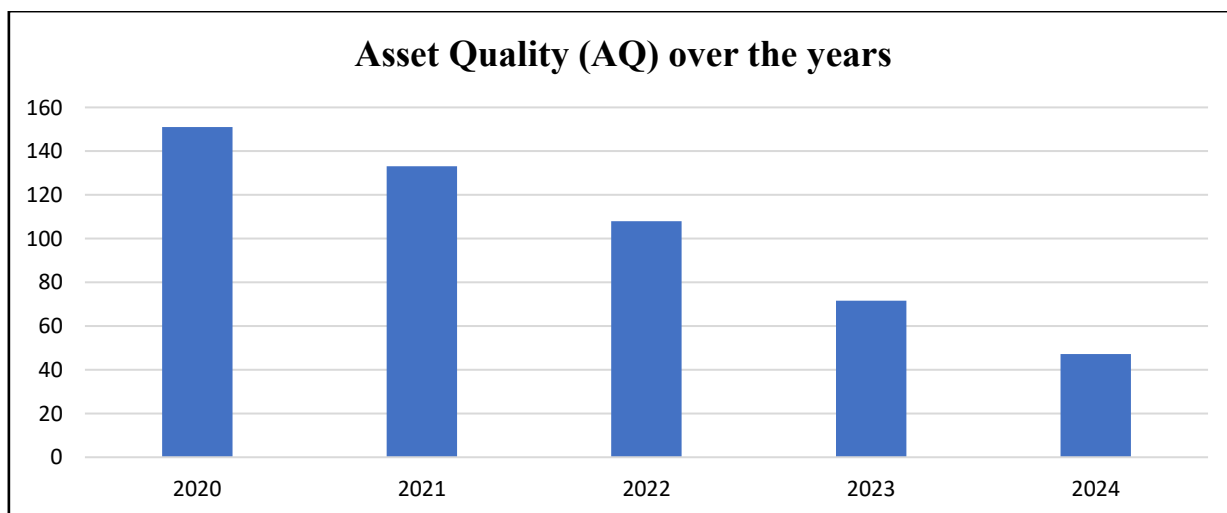


Figure. 5 further indicates that Asset Quality (AQ) plunged over the years. This indicates that the chances of default are rising. With a fall in AQ, potential losses and solvency problems arise for the PSBs, as indicated for the last five years. Hence, except for CRAR, the other bank-specific variables show a dip over the last five years, suggesting the need for improvement in lending operations.

7.2 Descriptive statistics

Table 4 Descriptive Statistics

Indicator	Variable	Obs	Mean	Std. Dev.	Min	Max
Capital-to-Risk Weighted Assets Ratio	CRAR	60	15.055	1.705	10.72	18.54
Asset Quality	AQ	60	8.514	4.325	1.88	18.92

Liquidity	LQ	60	55.185	9.027	6.063	72
Disclosures	DS	60	.126	.138	0	.575
Return on Equity	ROE	60	4.868	11.951	-52.78	22.24
Return on Assets	ROA	60	.299	.757	-3.27	1.32
Firm Size	LnFS	60	14.965	3.692	11.518	24.933

Source: Authors' compilation

Table 4 displays the overall statistical summary of the various indicators that are used for the study. The mean value of ROA is 0.299 with a standard deviation of 0.757. Also, ROE has a mean value of 4.868 with a standard deviation of 11.951. The Figures for the various components of bank-specific variables i.e. CRAR, LQ and AQ have also been presented herein. The mean values for CRAR, AQ and LQ are 15.055, 8.514 and 55.185. Meanwhile, the standard deviations for CRAR, AQ and LQ are 1.705, 4.325 and 9.027. Further, DS bears a mean value of 0.126 with a standard deviation of 0.138. Lastly, LnFS indicates that the mean value stands at 14.965 while the standard deviation is 3.692.

7.3 Correlation analysis

Table 5 Correlation Analysis

Variables	ROA	ROE	DS	LQ	CRAR	AQ	LnFS
ROA	1.000						
ROE	0.985	1.000					
DS	0.283	0.313	1.000				
LQ	0.235	0.262	0.358	1.000			
CRAR	0.556	0.548	0.088	0.231	1.000		
AQ	-0.625	-0.637	-0.429	-0.304	-0.597	1.000	
LnFS	0.409	0.414	0.513	0.070	0.336	-0.726	1.000

Source: Authors' computation and compilation

Table 5 displays correlation results using different variables. Firm performance is measured through ROA and ROE. Thereafter, a strong positive correlation can be discovered between the two. Further, ROA and ROE has a positive association with all the other variables except AQ. Moreover, LQ and CRAR show a positive correlation with all the other variables, excluding AQ. Moreover, AQ indicates a negative correlation with all the other variables. There exists a strong negative correlation between LnFS and AQ. Likewise, DS also signifies a positive correlation with all the variables except AQ in the present study.

7.4 Empirical model

By performing the Hausman test, the Random Effect (RE) model has been selected for performing regression analysis on ROA. Likewise, the Fixed Effect (FE) model has been applied on ROE. The following regression model has been used in the present study:

$$DV_{it} = \alpha + \beta(INDV_{it}) + \lambda(CV_{it}) + \omega_{it}$$

Here, $i = 1, 2, 3, \dots, 12$, that signifies the number of banks and $t = 1, 2, 3, 4$ and 5 signifying the number of years for which firm observation was collected. DV stands for dependent variable, i.e., ROA and ROE for representing firm performance. While INDV indicates the independent variables such as, AQ, LQ CRAR and DS. β depicts the coefficient for INDV while λ exhibits the coefficient for CV which further represents the control variable LnFS. Moreover, α has been taken as the constant and ω_{it} is the term for composite error. Taking into consideration DV and INDV, the following sub-models have been established:

$$ROA = \alpha + \beta_1(DS_{it}) + \beta_2(CRAR_{it}) + \beta_3(LQ_{it}) + \beta_4(AQ_{it}) + \lambda(LnFS_{it}) + \omega_{it} \dots\dots\dots(M1)$$

$$ROE = \alpha + \beta_1(DS_{it}) + \beta_2(CRAR_{it}) + \beta_3(LQ_{it}) + \beta_4(AQ_{it}) + \lambda(LnFS_{it}) + \omega_{it} \dots\dots\dots(M2)$$

7.4.1 Regression Analysis

Table 6 Regression results of the ROA and ROE models

Model 1

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
DS	.55	.715	0.77	.441	-.851 1.952	
LQ	0	.01	-0.04	.965	-.02 .019	
CRAR	.132	.058	2.27	.023	.018 .246	**
AQ	-.066	.026	-2.51	.012	-.117 -.015	**
LnFS	-.016	.034	-0.47	.635	-.083 .051	
Constant	-.986	1.364	-0.72	.47	-3.659 1.687	

Mean dependent variable	0.299	SD dependent variable	0.757
Overall r-squared	0.450	Number of observations	60
Chi-square	44.218	Prob > chi2	0.000
R-squared within	0.461	R-squared between	0.393

*** $p < .01$, ** $p < .05$, * $p < .1$

Model 2

ROE	Coef.	St.Err.	t-value	p-value	[95% Conf Interval]	Sig
DS	10.974	11.151	0.98	.325	-10.882 32.831	
LQ	.017	.154	0.11	.914	-.285 .319	
CRAR	1.949	.906	2.15	.032	.172 3.726	**
AQ	-1.084	.409	-2.65	.008	-1.887 -.282	***
LnFS	-.308	.531	-0.58	.561	-1.348 .731	
Constant	-13.772	21.275	-0.65	.517	-55.47 27.926	

Mean dependent variable	4.868	SD dependent variable	11.951
Overall r-squared	0.463	Number of observations	60
Chi-square	46.612	Prob > chi2	0.000
R-squared within	0.480	R-squared between	0.424

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Authors' computation and compilation

Table 6 presents the regression results of the ROA and ROE models, which primarily focus on the two models, namely, M1 and M2. It is crucial to note that CRAR displayed in both M1 and M2 indicates a significant positive relationship with both ROA and ROE. Meanwhile AQ has a negative association with ROA and ROE as unveiled in M1 and M2. However, DS, LQ and LnFS seem to have no significant relationship with ROA and ROE in M1 and M2 respectively.

The results fail to reject the null hypothesis, H_0 and thereby, postulates that there exists no significant relationship between climate-risk related disclosures and firm performance. Unlike DS, the study establishes a significant negative association with AQ and firm performance while CRAR draws a positive impact on ROA and ROE.

8. Results and Discussions

The regression results display the significant impact of the various independent variables on the dependent variables, i.e., ROA and ROE. In line with Malarvizh *et al.*, (2016), the present study reports enough evidences to show no significant impact of DS on ROA and ROE. However, this contradicts the findings of Kouloukoui *et al.* (2019) and Vestrelli *et al.* (2024) which highlighted a favourable association between firm performance and climate change disclosures in case of Brazilian and US companies. Also, Adu *et al.* (2024) established a favourable relationship between climate change disclosures and firm performance in the banking sector which refutes the current results. This indicates that although the disclosure pattern has been on a rise recently, yet firm performance is hardly affected by such revelation. Climate change may only indirectly affect banks as their concentration is mainly focused in the financial domain. Hence DS hardly has any impact on firm performance. Similarly, LQ alongside the control variable, LnFS also seem to draw no significant relation with ROA and ROE. However, the other lending growth variable namely, AQ indicates a significant negative relation with both the firm performance indicators, i.e. ROA and ROE. This further presents that Gross NPAs are spiking on an overall basis which adversely affects the performance outcomes for PSBs. Nonetheless, CRAR presents a positive impact on ROA and ROE. This is again challenged in another study conducted by Chalabi-Jabado *et al.* (2024) which depicted AQ to have a significant positive relation with both ROA and ROE. Meanwhile, CRAR showed a significant unfavourable relation with ROE only.

9. Limitations

Although climate-risk related disclosures show a recent surge, however, its implication in the banking sector is limited. Content analysis may lead to instances of banks not adequately disclosing every aspect. Hence, the possibility of potential unfairness needs to be considered. Also, the study can be further extended by covering all the private sector banks as well as foreign banks. Due to time-constraint, the results have been based on the last five years data score. Future work could study disclosure pattern in respect of a larger time

interval. It is also imperative to note that only considering Indian PSBs have limited the study to the country's economy. Moreover, a novel pursuit to carry out cross-country analysis following TCFD guidelines could also be attempted.

10. Conclusion

Recent times have seen the gravity of climate-risk in different sectors of the economy. Frequent studies have attempted to accentuate the significance of climate-related disclosures on the performance of firms. With the motive of targeting the Indian banking scenario, the association between climate-risk disclosures and banks' performance through ROA and ROE has been initiated. In line with TCFD recommendations, the present study employs content analysis of 12 PSBs for the period ranging from 2020-2024. Further, the application of an appropriate panel data regression model presumes that firm performance hardly gets affected through disclosure requirements. The results shed light on the extent of association between climate-risk related disclosures as well as lending growth and firm performance. DS and LQ had no significant relationship with ROA as well as with ROE which could be because of time constraint factor as the observations amount to a maximum of 5 years. A larger sample and higher time-interval could lead to a different result altogether. Hence, survival in the global economy require banks to disclose climate change disclosures regardless of their financial performance. Meanwhile, firm performance is positively affected by CRAR while AQ posits a negative impact on both ROA and ROE. This underscores that the bank's ability to absorb potential losses has a favourable influence on its financial performance. On the other hand, increasing Gross NPAs have an unfavourable impact on PSBs. This has been further established through graphical presentations indicating that the overall AQ has been plunging over the years. Moreover, the results make an interesting appeal to the regulatory bodies and policymakers for considering well-informed choices. Climate-related disclosures improve stakeholders' perception as well as reduces the possibility of litigation. Policymakers have the earnest duty to plan and implement quality climate-related disclosure policy. Thus, the need for proper climate related disclosures are of utmost importance for an ever-developing economy like India.

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