

Box 4.1: Climate Risk Scenario Analysis

According to the Climate Risk Index, Pakistan is ranked as 15th most vulnerable country to Climate Change.¹¹ Weather-related disasters have become frequent, intense, and unpredictable; and result in loss of lives, destruction of vital infrastructures, homes, and businesses. Keeping in view the importance of climate risk for financial sector, SBP has been proactively engaging with stakeholders to incorporate climate-related vulnerabilities in their risk management frameworks. The climate risk has been included in stress testing framework and the central bank has been conducting climate risk stress testing exercise and publishing the same annually in its FSR since 2018.¹² Recently, SBP issued Climate Stress Testing Guideline (CST 2025)¹³ and Regulatory Framework for Effective Management of Climate-related Financial Risks¹⁴ in 2025 to further strengthen the climate risk assessment framework of financial sector.

The Sector-District Climate Vulnerability

Building upon the previous work, this box assesses the vulnerability of banking sector to floods as it is the most important risk emanating from changing climate patterns. More precisely, this box explores the impact of floods on credit risk of the banking sector by looking into quarterly district wise advances of Banks and MFBs. Since vulnerability to floods varies across business sectors and geographical regions, the box assesses the resilience of banking sector along both these dimensions.

To serve this purpose, Climate Vulnerable Exposure (CVE) is calculated for each District-Sector combination using district and sector vulnerability scores. The sectoral vulnerability scores have been taken from CST 2025,¹⁵ whereas, the vulnerability for districts is taken from the National Disaster Management Plan 2025 (NDMP).¹⁶ The NDMP assigns scores to all districts of Pakistan, depending upon their vulnerability to natural disasters.

Based on the level of vulnerability, sectors are scored as *Low*, *Medium* and *High* whereas districts are scored as *Extremely low*, *Low*, *Medium* and *High*.¹⁷ The weight is calculated for every District-Sector exposure to estimate CVE using following formula:

$$CVE_{i,j} = \alpha_{i,j} \times \text{Fund Based Exposure},$$

where i is the district and j is the sector.

Table 4.1.1 shows the calculated weights for unique District-Sector combinations: weights are calculated by multiplying independent weights assigned to districts and sectors. For instance, if the physical risk of a given district and a given sector are medium and high, respectively, then 50 percent (50% × 100%) of the Fund Based Exposure (FBE) of that sector in the district will be taken as CVE. The Total CVE is then calculated by adding CVEs for all District-Sector combinations.

As per the NDMP 2025, the shares of *High* and *Medium* flood hazard districts are, respectively, around 17 and 38 percent of total districts. Moreover, 51 percent of banks' exposure is in climate vulnerable sectors. This puts around 1

Weights for Vulnerable Districts and Sectors Table 4.1.1

		Sectoral Vulnerability		
		High (100%)	Medium (30%)	Low (10%)
District Vulnerability	High (100%)	1.00	0.30	0.10
	Medium (50%)	0.50	0.15	0.05
	Low (20%)	0.20	0.06	0.02
	E. Low (0%)	0.20	0.06	0.02

Source: Climate Stress Testing Guidelines 2025, State Bank of Pakistan

¹¹ Please note that this ranking is a long-term ranking, covering 1991-2024 period. During 2022, CRI placed Pakistan as the country most affected by Climate Change.

¹² For details see [FSR 2023](#) and [FSR 2024](#).

¹³ [Climate Stress Testing Guideline \(CST 2025\)](#)

¹⁴ [Regulatory Framework for Effective Management of Climate-related Financial Risks](#)

¹⁵ Selected sectors of banks and all sectors of MFBs are considered as climate vulnerable, respectively.

¹⁶ [National Disaster Management Plan 2025](#)

¹⁷ Extremely low = Scores of 1 and 2; Low= Score of 3; Medium= Score of 4; High= Score of 5

percent of banks' exposure and 17 percent of MFBs' exposure in *high-high* categories. Moreover, geographically, 2 percent and 25 percent of total exposures are in highly vulnerable districts for banks and MFBs, respectively, indicating a divergent risk profile for banks and MFBs with regards to floods (Table 4.1.2). Total weighted CVE is then calculated for each District-Sector combination. An analysis of CVEs shows that MFBs are more vulnerable to climate shock than the banks: 43 percent of MFB exposure is in the most vulnerable category, while for banks, the share is only 8 percent (Table 4.1.2). On sectoral basis, agriculture, construction and consumer financing are the most vulnerable sectors. Almost half of total exposure in these sectors has been classified as 'climate vulnerable' across banks and MFBs.

Stress Scenario Analysis - Vulnerability to Floods

The vulnerability to floods is considered under two scenarios: a hypothetical and an historical one.

Stress Scenario 1: In this hypothetical scenario, locational-sectoral CVE is stressed by 5, 10 and 20 percent, respectively. The impact of shocks on banks' credit risk is relatively subdued, as they have lower exposure in vulnerable districts and sectors (Figure 4.1.1). The infection ratio barely budges in small shock while increases by 200 basis points (bps) in extreme scenario. However, MFBs appear to be more vulnerable to floods; as a result, their non-performing loans ratio (NPLR) surges by 200 and 800 bps post-shock under small and large shocks, respectively. This could be because of (i) a higher concentration of their portfolio in flood-prone districts and (ii) relatively low net worth of their borrowers.

Stress Scenario 2: In this historical scenario, vulnerable portfolio in flood affected districts is stressed equivalent to the actual growth in credit delinquencies observed during the one-year period following the floods of 2022. Since SBP allowed banks and MFBs to restructure and reschedule significant amounts of loans during the episode, the scenario will assess the impact of floods with and without regulatory relief to gauge the full impact of shock on exposures.

As expected, banks remained highly resilient under this shock, with infection ratio almost unchanged under shock with regulatory relief and inching up by 50 bps in shock without regulatory relief. This is result of low share of flood-affected districts in overall lending portfolio of banks. However, due to high share of lending portfolio in affected districts and the low net-worth of borrowers, the impact of shocks is significant for MFBs (Figure 4.1.2).

In conclusion, MFBs are more prone to climate-related risks than banks as their loans are concentrated in highly vulnerable

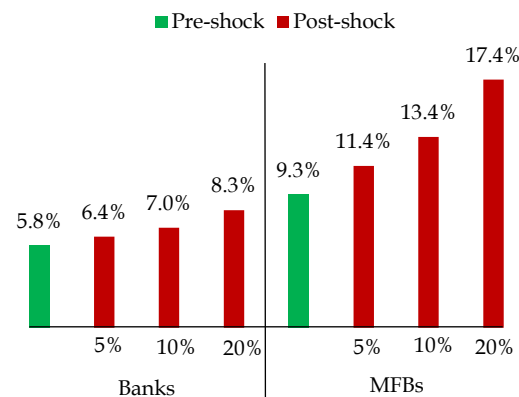
Share of Advances and CVE in District-Sector Combinations Table 4.1.2

Share of Advances					
District Vulnerability					
			Low	Medium	High
Sector Vulnerability	Banks	Low	0	4	0
		Medium	1	31	1
		High	2	11	1
	MFBs*	Medium	9	17	8
		High	22	26	17
Share of CVE					
Sector Vulnerability	Banks	Low	0	2	0
		Medium	1	39	3
		High	3	44	8
	MFBs*	Medium	1	6	6
		High	11	32	43

* The share of low vulnerable sectors is negligible for MFBs.

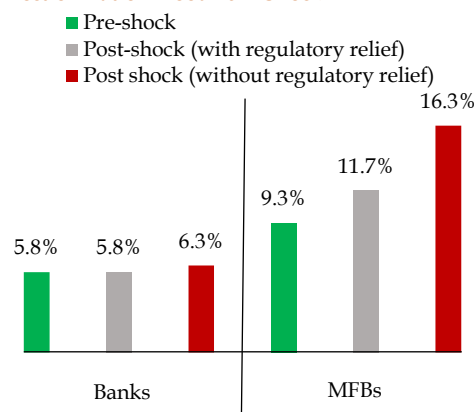
Source: SBP Staff Calculations

Infection Ratio - Shocks to CVE Figure 4.1.1



Source: SBP Staff Calculations

Infection Ratio - Flood 2022 Shock Figure 4.1.2



Source: SBP Staff Calculations

districts and sectors. However, this does not pose any significant risk to the stability of overall financial sector as share of MFBs in combined loan portfolio of banks, DFIs and MFBs at 3.2 percent is very small.