

Resilience of the Banking Sector

Under both the baseline and stress scenarios, the solvency of the banking sector comes under strain but remains well above the domestic regulatory benchmark over the projected three-year horizon. Systemically important large size banks carry sufficiently higher capital buffers and are expected to sustain the impact of the assumed shocks over the assessment period. Similarly, the medium and small sized banks are also expected to remain resilient to the shocks. However, credit growth under the baseline scenario is projected to remain higher. Under the stress scenario, loans' growth is projected to be decelerating. Considering the uncertainty regarding global commodity markets and macro financial conditions, the SBP continues to closely watch the evolving situation and remains ready to take actions necessary to safeguard financial stability.



4.1 Overview and Scenario Design

SBP conducts series of periodic stress tests¹, including an annual comprehensive top-down Macro Stress Testing² (MST) exercise. This chapter discusses the design of hypothetical scenarios³ and results of MST exercise the SBP conducts in order to gauge the resilience of the banks under these scenarios. The MST is a comprehensive top-down scenario-based approach that involves mapping the impact of credit, market and operational risks, under designed scenarios on banks' solvency position.

The MST exercise incorporates two scenarios: *baseline* or *business as usual* (S_0) and *hypothetical stressed* (S_1).⁴ The projection horizon for the MST exercise is three years, which spans Q1CY25 to Q4CY27. A dynamic balance sheet is assumed, where advances and their delinquency rates are estimated based on developments in macro-financial risk factors. For solvency, the projected paths of lending portfolio and non-performing loans (NPLs) are used to estimate the regulatory capital (RC) and risk weighted assets (RWA), which are impacted by the credit, market and operational risks. Projections are obtained using a suite of vector auto-regressive (VAR) models.

In addition to system level assessment, cross-sectional heterogeneity is also captured for different segments of the banking industry in terms of size, i.e., small, medium, and large banks.

¹ SBP applies various approaches for stress testing i.e., top-down and bottom-up; uses various methodologies i.e., sensitivity and macro stress tests, and; a suite of models. Currently, SBP follows stress testing regime established under Stress Testing Guidelines of [FSD Circular No. 01 of 2020](#).

² MST is considered an important risk analysis tool as it evaluates the financial institutions capacity to absorb shocks stemming from adverse macroeconomic developments in the future.

³ The stress scenario used in this assessment is not a forecast of macroeconomic and financial conditions. It is a hypothetical, coherent, tail-risk setting designed specifically to assess the resilience of the banking sector against hypothesized deterioration in macroeconomic conditions.

⁴ We employ the definitions of Baseline and Hypothetical Stressed Scenario from the BIS paper 'Stress Testing Banks – A Comparative Analysis' (2018). Baseline Scenario is a set of economic and financial conditions that is generally consistent with the projection of a likely path for future economic and financial conditions. Hypothetical Stressed Scenario or Adverse Scenario is a set of economic and financial conditions which is designed to stress the performance of the banking sector or an individual bank.

Source: <https://www.bis.org/fsi/publ/insights12.pdf>

⁵ A brief account of global and domestic developments during CY24 has been covered in Chapter-1.

4 Resilience of the Banking Sector

4.2 The Baseline Scenario (S_0)

The overall macroeconomic conditions stabilized in CY24 despite some challenges at the start of the year. The stabilization in economic growth came as a result of prudent monetary and fiscal policy measures which resulted in sharp decline in inflation, improved current account balance, shored up FX reserves, helped stabilize exchange rate and commodity prices. Moreover, successful engagement with the IMF also supported overall investor sentiment.⁵

Against this backdrop of macroeconomic stabilization and gradual economic recovery in CY24, the baseline scenario, S_0 , is built around three main assumptions regarding domestic and global risk factors.

Continued policy stability along with smooth implementation of economic reforms is expected.

The S_0 assumes the continuation of policy stability over the projection period that started with the change of government in February 2024. It is expected that fiscal and external balances are likely to improve further on account of timely completion of IMF EFF reviews and stable availability of bilateral / multilateral financing. Continuation of these policy measures will provide a space to the government to pursue deep-rooted structural reforms to address issues in fiscal, energy and Stated-Owned Enterprises (SOEs). Further, the

stability measures along with implementation of structural reforms and better external financing, would boost investor confidence, strengthen domestic currency and boost FX reserves. The stabilized currency and fiscal consolidation efforts are also likely to keep external debt and overall public debt under check. However, potential revisions in energy prices and removal of subsidies under fiscal disciplinary efforts coupled with wearing off the base effect are assumed to put an upward pressure on prices. Therefore, the rebound in inflation along with cautious monetary policy is likely to keep the economic growth subdued.

Favorable global financial conditions and declining global energy commodity prices are expected.

Second, the scenario assumes that the impact of recent protectionist trade policies initiated by the US and reciprocated by its trading partners, would be short-lived and unwinding in about a year.⁶ Oil prices are expected to decline on account of weaker demand in China and strong supply from non-OPEC+ countries.⁷ Abating Ukraine-Russia conflict and ceasefire in Gaza war are expected to further ease pressures on energy prices. In case of food, increasing supplies amid favorable weather conditions may lead to a reduction in food commodity prices.⁸ Stable global growth with continued disinflation would result in softening of global financial conditions.

Declining commodity prices are likely to further reduce the import bill while trend in the growth of export receipts and workers' remittances is expected to continue. These developments, along with favorable global financial conditions and improved country's risk rating, would

provide support to external balance, complement economic growth, keep the exchange rate stable and ease pressure on domestic prices.

Domestic agricultural policies and climate related events may offset ease in price pressures.

The S_0 also assumes that, two recent developments in domestic agriculture policies and climate risk related events may offset receding price pressures on food commodities. Firstly, the abolishment of Minimum Support Price (MSP) for wheat may discourage wheat cultivation and result in some pressure on consumer price. Secondly, three provinces have passed Agricultural Income Tax (AIT) laws from their respective provincial assemblies.⁹ The AIT law is expected to mostly impact large farmers and is likely to have limited impact on overall food commodity prices, nevertheless it may slow the pace of disinflation.

Furthermore, given Pakistan's vulnerability to recurring climate change disasters, climate risk related events of limited scale may lead to economic losses during the projection horizon.¹⁰ The scenario assumes that average level floods and droughts (in some areas) may impact economic activity, while causing temporary bouts of food inflation.

Consequently, at an overall level, growth is assumed to remain subdued while inflationary pressures are likely to remain around target in a stable environment with fiscal consolidation...

In this perspective, S_0 assumes GDP to grow by around 3.1 percent in FY25 and 3.7 percent in

⁶ World Economic Outlook Update, January 2025, International Monetary Fund.

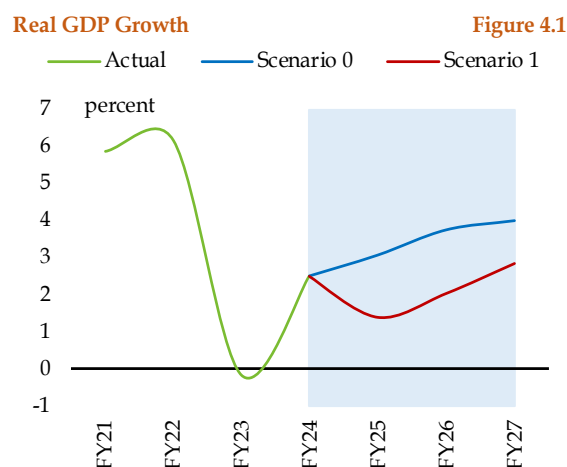
⁷ Petroleum liquids supply growth driven by non-OPEC+ countries in 2025 and 2026 including US, Guyana, Canada and Brazil., In-Depth Analysis, U.S. Energy Information Administration. [Petroleum liquids supply growth driven by non-OPEC+ countries in 2025 and 2026 - U.S. Energy Information Administration \(EIA\)](#)

⁸ Commodity Markets Outlook, October 2024, World Bank

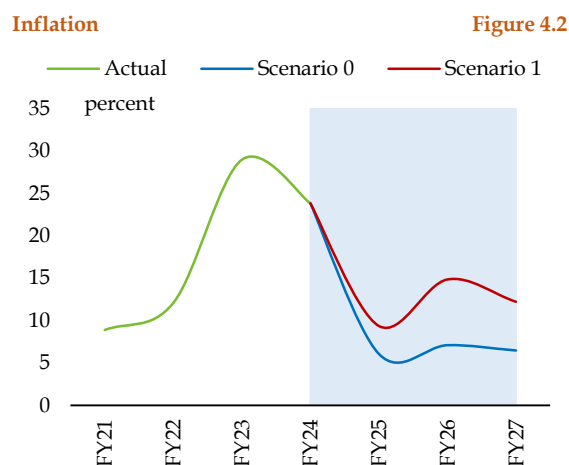
⁹ The agricultural income tax laws propose maximum tax rate for agricultural income, minimum agricultural income exempt from tax, super tax on agricultural income among other things. The tax is proposed to be collected from January 01, 2025 onwards.

¹⁰ The Germanwatch has included Pakistan among the four countries (other three being, China, India, and the Philippines) as countries affected by recurring extreme climate events (continuous threats) in 2025. [Global Climate Risk Index \(CRI\) 2025. Germanwatch.](#)

FY26. Subsequently, real GDP growth is expected to rise to 4.0 percent in FY27 on account of the assumed improvements in global and domestic economic environment (**Figure 4.1**). Further, YoY average CPI inflation may recede to 6.1 percent in FY25 before rising to 7.1 and 6.5 percent during FY26 and FY27, respectively, well within the medium term target of 5-7 percent (**Figure 4.2**).



Source: SBP Calculations



Source: SBP Calculations

4.3 The Hypothetical Stressed Scenario (S₁)

The following assumptions regarding global and domestic risk factors are made under hypothetical stressed scenario, S₁.

The resurgence in policy uncertainty could slow the pace of structural reform

The continuity of fiscal policy is critical for implementation of much needed structural reforms and debt sustainability. Given high financing needs, any fiscal slippages would undermine revenue collection and expenditure reduction efforts. The S₁ assumes that owing to lower revenue collection and tax concessions and subsidies to support some sectors, the budget deficit would widen. Furthermore, structural reforms in the fiscal, energy and SOEs may be politically difficult to implement. The increased policy uncertainty and stalled reforms may hurt the country risk premium and investor confidence. Amid this backdrop, access to external financing would either become difficult or costlier. Absence of external financing avenues together with planned debt repayments would exert pressures on the external accounts, deplete FX reserves and impact stability of the exchange rate.

The protectionist global trade policies may lead to rebound in global inflation and tighten global financial conditions...

S₁ assumes that the intensification of protectionist trade policies on global level could bring about a rebound in global inflation and disruption in supply chains. The inflated domestic prices in the US and its major trading partners and resulting weak consumer demand may lead to recessionary conditions in the global economy.

... plunging the global economy into a recession

Due to high inflation amid trade restrictions and weak demand, major economies are likely to plunge into a recession. The major central banks are expected to respond with appropriate monetary policy stance. In addition, global commodity prices are assumed to witness renewed spikes amid potential geopolitical escalations.

On the domestic front, exports would suffer due to weaker global demand and imports would become more expensive, hence widening the current account deficit. The increase in global commodity prices would trigger a renewed wave of higher inflation via increasing import prices. The higher risk averse environment would restrain external financing for emerging markets like Pakistan.

Climate related events are assumed to adversely affect economic stability.

Recent changes in local agricultural tax policies may result in lower cultivation of staple crops, raising food insecurity and increasing food inflation. Considering Pakistan is prone to climate change events with high frequency, the low production of staple crops and recurrence of major climate events – e.g., heavy rains and floods similar to CY22 and droughts in some other areas – are assumed to create severe food shortages and economic losses. The additional pressure on imports would further exacerbate consumer prices.

To sum up, the domestic economy may witness balance of payment pressures and high inflation during the projection horizon...

Consequently, economic growth is assumed to be 1.4 percent in FY25, before resuming to a growth level of 2.0 and 2.9 percent in FY26 and FY27, respectively. Under S_1 , the adverse supply shocks are assumed to reverse ongoing disinflationary trends in the domestic economy. Accordingly, headline inflation in FY25 and FY26 is assumed to be 9.4 and 14.9 percent, respectively. Inflation is assumed to gradually come down to 12.3 percent in FY27.

4.4 Stress Testing Results: System Level

There has been an exceptional growth in advances portfolio of the banks during Q4CY24, driven by multiple factors including ADR-linked tax policy. Banks extended hefty Rs. 3,913 billion advances (gross) during last quarter of 2024 – a QoQ growth of 30.1 percent versus a negative 0.2 percent average growth in preceding three quarters. Resultantly, both gross non-performing loans ratio (GNPLR)¹¹ and capital adequacy ratio (CAR)¹² of banking sector witnessed a sharp fall due to a higher denominator. Therefore, for the purpose of stress testing, both advances as well as RWAs were adjusted to normalize the ratios. Specifically, the gross advances and the RWAs were assumed to increase at average of year-on-year growth rate of last five years (except 2020 due to pandemic). As a result, for Q4CY24, the adjusted GNPLR of 7.3 percent and CAR of 21.8 percent have been used in the estimations, against realized ratios of 6.3 percent and 20.6 percent, respectively.

a) Impact on Credit Riskiness

The results of the MST exercise indicate that the GNPLR, under S_0 , is likely to remain on higher side over the first half of the projection period followed by a moderate decline towards the end (**Figure 4.3**). The initial rise in loan delinquency ratio was due to decline in advances growth during first half, the denominator effect. However, advances growth is likely to recover in the second half of projection period, leading to 100 bps decline in GNPLR. On average, advances are projected to grow by around 9 percent over FY25 –FY27, under S_0 .

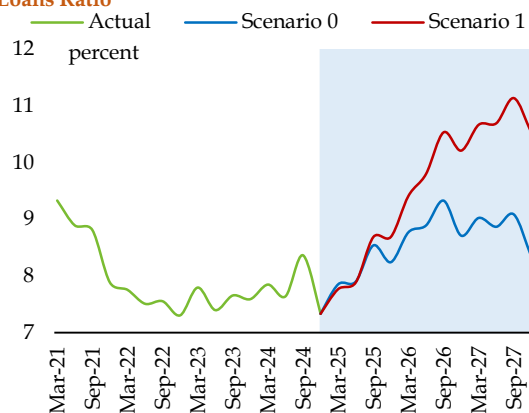
¹¹ GNPLR = Gross Non-Performing Loans ÷ Gross Advances

¹² CAR = Eligible Capital ÷ Risk Weighted Assets

Besides the denominator effect, the lagged effects of recent economic challenges e.g., slowdown in economic activity, high inflation and high interest rate may also lead to a slight surge in NPLs. As a result, the GNPLR is expected to peak at 9.3 percent from current adjusted-level of 7.3 percent before settling at 8.3 percent by the end of projection period CY27.

The asset quality indicator, under hypothetical stressed scenario, S_1 , on the other hand, follows an upward trajectory because of the assumed sharp economic slowdown amid elevated global commodity prices and domestic supply shocks. The advances growth may also be affected. Under S_1 , the lending portfolio is projected to grow, on average, by 5.7 percent over the projection period. The delinquency rate rises gradually and peaks at around 11 percent before taking a slight dip and settling at 10.5 percent towards the end of projection horizon (Figure 4.3).

System-Level Gross Non-Performing Loans Ratio Figure 4.3



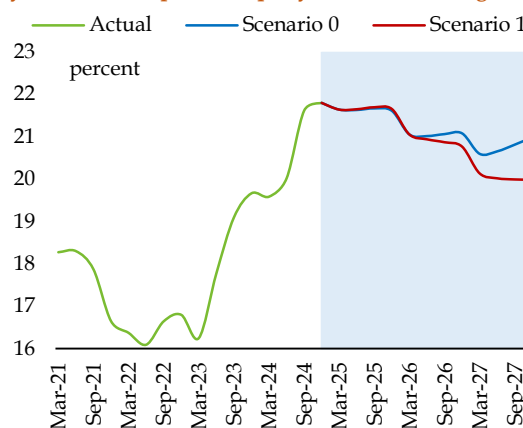
Source: SBP Calculations

b) Impact on Solvency

The impact on solvency is measured via CAR of the banking system. The CAR of the system declines in both the scenarios. Under the

baseline, the CAR moderates by merely 81 bps by the end of CY27 from the prevailing adjusted-level of 21.8 percent. However, in stress scenario, it falls by 181 bps from the current adjusted-level (Figure 4.4).

System-Level Capital Adequacy Ratio Figure 4.4



Source: SBP Calculations

However, under both the scenarios, the banking industry maintains its CAR above the local minimum regulatory requirement of 11.5 percent and global benchmark of 10.5 percent during the entire period of projection horizon.

The banking sector, despite the substantial level of assumed slowdown in real economy, is expected to sustain its solvency level because: (i) the banking sector is already maintaining higher capital buffers i.e., 1,030 bps¹³ above the regulatory benchmark of 11.5 percent; (ii) the release of 100 bps capital conservation buffer during COVID-19 has not been reversed yet, which gives banks additional liquidity; (iii) favorable overall repricing gaps amidst assumed policy rate movements provide further cushion during times of stress; and (iv) the sector's historical behavior has been to re-balance asset portfolio from riskier private sector loans to risk-free treasury investments in times of stress.¹⁴ Moreover, within a robust regulatory and

¹³ Vis-à-vis adjusted level of 21.8 percent. The buffer is 910 bps considering actual CAR of 20.6 percent as of December 2024.

¹⁴ The exposure of banks to the public sector stands at 59.1 percent of total assets at the end of CY24.

supervisory regime, the banks in general follow a conservative lending strategy and prefer to lend to borrowers with better credit worthiness as well as capacity to withstand macroeconomic shocks.

4.5 Results: Cross Sectional Dynamics of Banking Segments

In line with the system-level credit risk analysis, infection ratios of banking segments (small, medium and large sized banks)¹⁵ have also been projected separately. This aspect of the banking industry is included to assess how cross-sectional heterogeneity affects the resilience of banks against various macroeconomic risks.

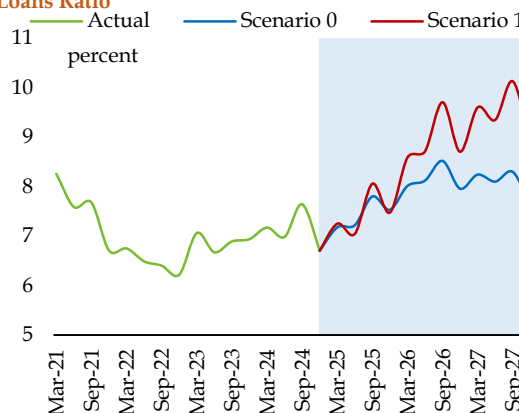
For the GNPLR, system-level projections of NPLs and gross advances are distributed proportionately based on the contribution of each segment to the aggregate loan portfolio of the banking system as of December 2024. Similarly, capital is also distributed proportionately to compute segment level CARs.

(a) Large Banks

The large banks segment – comprising around 77 percent of the banking sector’s assets – under S_0 witnesses an increase of 92 bps in GNPLR by end CY27 from its current adjusted-level of 6.7 percent. Under S_1 , however, the rise in infection ratio is a bit sharper: 220 bps by the end of projection horizon (**Figure 4.5**). The CAR decreases by 81 bps in the baseline scenario and falls by 182 bps in the stressed scenario from prevailing adjusted-level of 21.9 percent over the projection horizon (**Figure 4.6**). Remarkably though, the CAR remains, respectively, 957 and

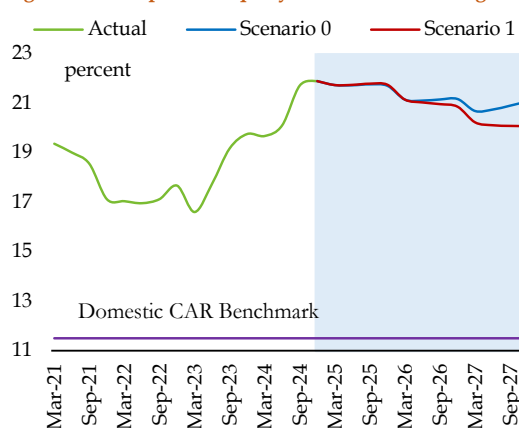
856 bps higher than the local benchmark under S_0 and S_1 .

Large Banks - Gross Non-Performing Loans Ratio Figure 4.5



Source: SBP Calculations

Large Banks - Capital Adequacy Ratio Figure 4.6



Source: SBP Calculations

The large banks are generally well-placed to withstand stress over the simulation horizon. Higher capital buffers available with larger banks are the likely factor behind this resilience. Incidentally, these banks generally have relatively lower costs of funds due to their wider outreach, giving them a competitive advantage to maintain a loan portfolio of relatively better rated obligors. More importantly, the systemically important banks are also likely to

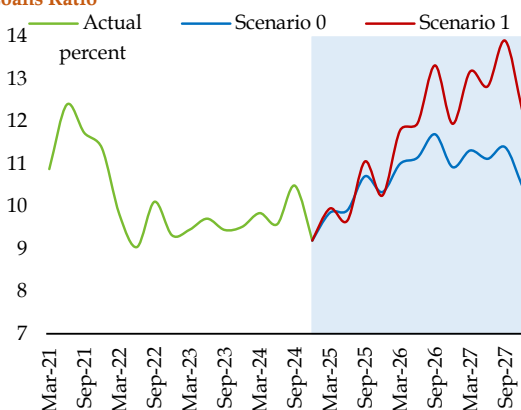
¹⁵ The categorization has been done based on size of banks’ balance sheet. The banks with assets above 70th percentile of the entire banking sector are termed as ‘Large’ while below 30th percentile are categorized as ‘Small’. The banks falling in between these two thresholds are categorized as ‘Medium’ sized banks.

remain well-capitalized and resilient to the shocks assumed in stressed scenario.

(b) Medium-sized Banks

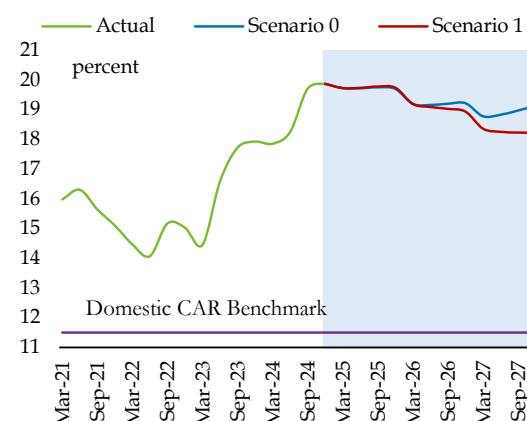
By the end of the projection period, the infection ratio of medium-sized banks (having market share of around 17 percent) increases by 126 and 301 bps in S_0 and S_1 , respectively, from existing adjusted-level of 9.2 percent (Figure 4.7). The CAR, correspondingly, is likely to remain 74 and 165 bps lower level compared with the prevailing adjusted-reading of 19.9 percent, under the two scenarios. The medium-sized banks are, therefore, also expected to remain compliant with the regulatory CAR standards, even under the stressed scenario (Figure 4.8).

Medium Banks - Gross Non-Performing Loans Ratio Figure 4.7



Source: SBP Calculations

Medium Banks - Capital Adequacy Ratio Figure 4.8



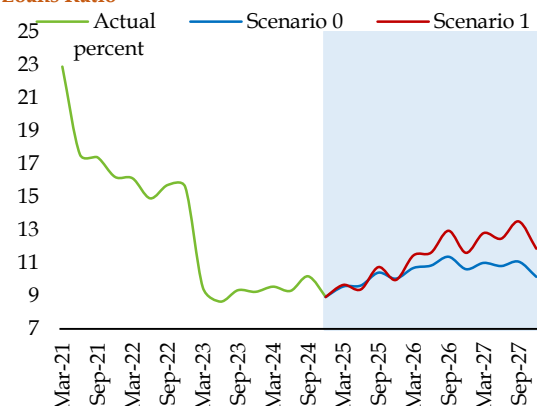
Source: SBP Calculations

The level of CAR for medium sized banks remains 763 and 672 bps percentage points above the minimum regulatory requirement (11.5 percent) in S_0 and S_1 , respectively. Although their delinquency ratios are higher and pre-shock capital buffers are lower than the large and small banks segments, however, medium-sized banks also carry sufficient capital buffers and are expected to withstand assumed shocks under stressed scenario.

(c) Small Banks

Small banks – contributing around six percent of the banking sector assets – are also found to be resilient against both baseline and stressed scenarios. From its existing adjusted-level of 8.9 percent, the loan delinquency rate increases by 122 bps in S_0 , whereas it rises by 293 bps under S_1 , by the end of horizon (Figure 4.9).

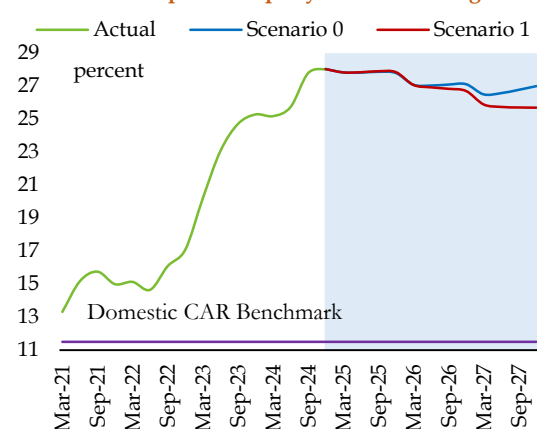
Small Banks - Gross Non-Performing Loans Ratio Figure 4.9



Source: SBP Calculations

In terms of solvency, the CAR of small banks falls by 104 and 233 bps under S_0 and S_1 from the prevailing adjusted-level of 28.1 percent (Figure 4.10). The CAR, however, remains a solid 1,551 bps higher than the local benchmark in S_0 while also staying 1,422 bps above the minimum requirement under S_1 . Over time, this segment has strengthened its resilience by substantially building the capital adequacy levels.

Small Banks - Capital Adequacy Ratio Figure 4.10



Source: SBP Calculations

Overall, under the baseline scenario, the delinquency ratio is expected to rise moderately whereas the solvency of the banking sector portrays an encouraging picture with capital adequacy staying well above the domestic regulatory benchmark. Under the hypothetical

stress scenario as well, the banking sector is expected to withstand a severe slowdown induced by adverse global and domestic macroeconomic conditions, including the global commodity market pressures. In terms of size, all the segments of the sector (small, medium, and large) can withstand the assumed stressed conditions as well. Encouragingly, the large size banks, whose stability has particular significance for economy and financial system, carry higher capital buffers and are thus able to sustain the impact of hypothesized shocks for the projection period of three years.

Also, the other two segments of banks meet the solvency criteria during the projection horizon. Furthermore, the domestic banking sector has generally performed quite reasonably during severe downturns, such as the external sector crises in 2008, COVID-19 pandemic and flash floods of 2022. This is visible in the results of the stressed scenario (S_1), as the sector remains well capitalized and resilient.

However, since the exact severity, duration, and paths of assumed global commodity markets and macro financial conditions remain highly uncertain due to ongoing geopolitical tensions in Middle East and Eastern Europe, the stress-test results are also subject to significant uncertainty. SBP continues to closely watch the evolving situation and remains ready to take necessary actions to safeguard financial stability.

Box 4.1: Climate Transition Risk and Financial Stability in Pakistan**Introduction**

Climate change poses significant threat to the Pakistan's economy. The country is ranked as 8th most vulnerable jurisdiction by German Watch's Global Climate Risk Index (CRI).¹⁶ It is faced with some of the highest disaster risk levels, ranking 20th out of 191 countries on Inform Risk Index (2025).¹⁷ This risk is driven in particular by country's exposure to climate change induced periodic flooding. Pakistan was the country most affected by climate change in 2022 (CRI 2025), mainly due to exceptionally high economic losses due to floods.¹⁸

Climate change can affect the financial system through physical and transition risks.¹⁹ Physical risk arises when the financial system is exposed to counterparties that experience damage to their assets due to climate change induced hazards. This can lead to increased default risk or erosion in the value of financial assets. On the other hand, transition risks result from the process of adjustment towards a low carbon economy including changes in climate policy, technology and market sentiment. Financial institutions can incur losses on exposure to corporates and financial assets that are vulnerable to transition.

Given the country's economic vulnerability to climate change, SBP has issued Green Banking Guidelines and Environmental and Social Risk Management manual, which set regulatory expectations from banks to assess and manage the climate related risk. Also, the central bank has been incorporating the impact of physical risks through demand side variables in its annual stress tests published in the previous versions of FSR. The results of a detailed climate scenario analysis exercise were first time published in the FSR 2023, which attempted to quantify the vulnerability of Pakistan's banking sector to physical and transition risk. This box, continuing with previous exercise, focuses on the transition risk. Using data from latest financials and a larger sample of firms, it explores the impact of carbon tax on the financial health of non-financial corporates (NFCs) listed on Pakistan Stock Exchange (PSX) and the resulting impact on the credit risk of banking sector.

Impact of Carbon Tax on Probability of Default

Changes in climate policy such as carbon taxation, emissions regulation and renewable energy mandates, incentivize investment in clean energy and penalizes carbon intensive firms. As a result, companies with higher emission intensities face compliance costs affecting their profitability and market valuations.

Analysis presented in this section explores the impact of carbon taxation on the probability of default (PD) of listed NFCs. Carbon tax is expected to impact the profitability of firms, which in turn may have adverse impact on their key soundness indicators and credit worthiness, represented by probability of default in this scenario. PDs of NFCs are estimated at carbon tax imposed on tons of CO₂ emission (tCO₂e) levels from US\$ 5/tCO₂ to US\$ 50/tCO₂,²⁰ by employing a logit regression model using some indicators of Altman Z-Score, augmented with macroeconomic variables. The model is represented as:

$$\Pr(y_{it} = 1) = \Lambda(X_{it}\beta)$$

$$X = \left[\frac{WC}{TA}; \frac{Sales}{TA}; \frac{RetEarn}{TA}; \frac{Eqty}{TA}; \frac{EBIT}{TA}; GDP_Growth; Int. Rate \right]$$

¹⁶ For details please see: [German Watch – Global Climate Risk Index 2025](#)

¹⁷ For details please see: [Inform Risk Index](#)

¹⁸ [Post disaster needs assessment](#) prepared by GoP in collaboration with the world bank estimated damages at nearly US\$ 15 billion along with a reconstruction cost of US\$ 16 billion.

¹⁹ For details please see: [Grippa, P., Schmittmann, J., Suntheim, F. \(2019\). Climate Change and Financial Risk, Finance & Development, December.](#)

²⁰ Carbon tax range from US\$ 5/tCO₂e to US\$ 50/tCO₂e used for the study is well within plausible range as [IMF \(2021\)](#) suggests a floor of US\$ 25/tCO₂e for lower income emerging countries. Also, as per [World Bank's Carbon Pricing Dashboard](#), 30 jurisdictions have imposed carbon taxes in the range of US\$ 1/tCO₂e (Ukraine) to US\$ 156/tCO₂e (Uruguay), with an average tax of US\$ 36/tCO₂e

Where TA represents the total assets of a firm, Sales represents sales of firm, WC denotes working capital, RetEarnings represents Retained Earnings, Eqty shows equity of the firm and EBIT represents Earnings Before Interest and Taxes.

Using panel of 343 NFCs, spanning from 2018 to 2023, the model estimate pre and post-shock PDs of firms in response to various carbon tax levels, after adjusting the relevant variables for carbon tax. Default of a firm is proxied ($y_i = 1$) using firm specific data from SBP's Credit Registry, where a firm is considered to have defaulted, if its credit obligations become overdue by 90 days or above ($OD \geq 90$).

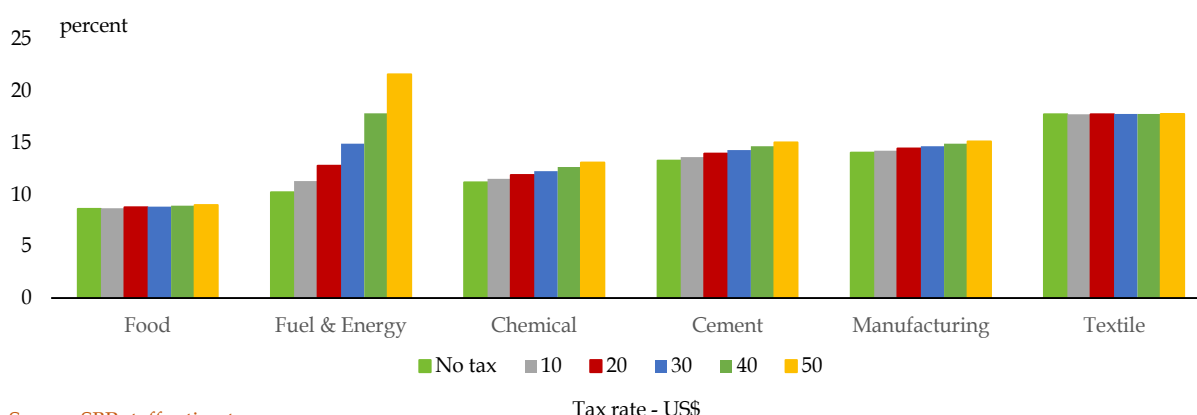
Carbon tax of a firm is calculated using Standard and Poor (S&P) sectorwise carbon emission intensities, expressed as tons of CO₂ emitted per million US\$ of revenue.²¹ Specifically,

$$\text{Carbon emission} = \text{Emission intensity} * \text{Sales}$$

$$\text{Carbon tax} = \text{Carbon emission} * \text{Tax rate}$$

Sector wise PDs at various carbon tax levels
(Top 5 sectors by outstanding exposure)

Figure 4.1.1

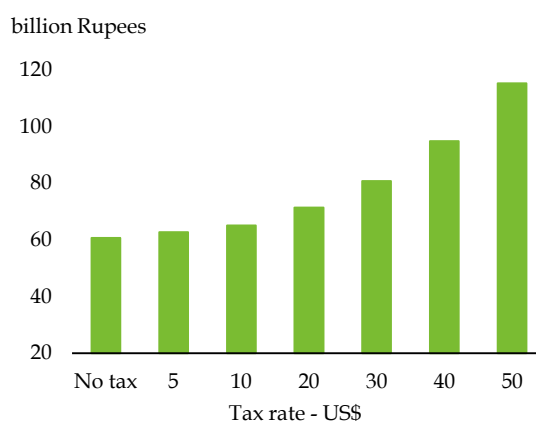


Source: SBP staff estimates

Model estimates suggest a marginal increase in PDs of listed NFCs, as the average PD of the sample slightly increases by 170 bps from 14.9 percent before shock to 16.6 percent at the highest tax level of 50 USD/tCO₂. Sectoral PD distributions show minimal migration of firms to default zone (PD > 50 percent). However, sectors with higher emission intensities such as, fuel and energy, chemical, cement and manufacturing appear more vulnerable to transition as their PDs surge at higher tax levels. Specifically, firms operating in fuel and energy sector may face significant financial constraints, as the post shock PD of the sector rises to 21.6 percent at tax rate of US\$ 50/tCO₂. On the other hand, textile sector, with the largest share of corporate loans and relatively higher pre-shock PD remains resilient in response to the imposition of carbon tax. This signifies robust financial health of the firms operating in the textile sector (Figure 4.1.1).

Expected Credit Loss

Figure 4.1.2



Source: SBP Staff estimates

Results of the analysis provide some evidence that imposition of carbon tax could impact the PDs of listed NFCs, as their profitability declines. However, the impact on PDs may remain relatively contained due to the already available

²¹ Please see: See S&P Global (2021), "[Transition Risk: Historical Greenhouse Gas Emissions Trends for Global Industries](#)" for sectoral emission intensities

financial cushions of these firms. Expected credit loss (ECL) estimates suggest an incremental increase of Rs 55 billion at the highest tax level of US\$ 50/tCO₂ from pre-shock ECL of Rs 61 billion (**Figure 4.1.2**).²² Given the large capital base of the sector, this is expected to have a negligible impact on the solvency of banking sector. Nonetheless, pockets of vulnerability exist in sectors with higher emission intensities, which may require enhanced due diligence from the banks along with careful calibration of the carbon tax policy by the government.

Impact of Carbon Tax on Interest Coverage Ratio:

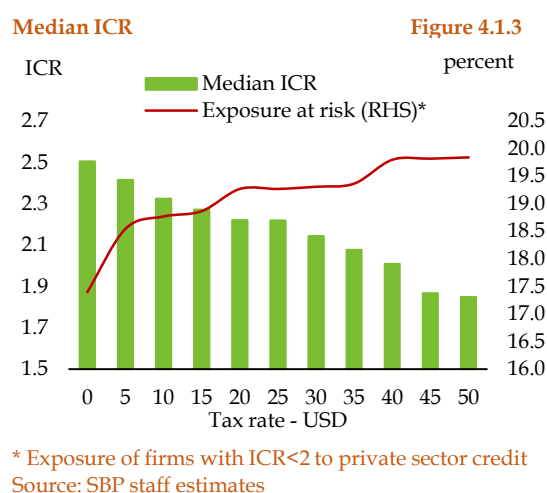
A PD-based model has the limitation of reliance on multitude of factors, in particular, the historically low delinquency rates and strong financial cushions, which are strong enough to dampen the aggregated impact of carbon tax on the PDs. To isolate the impact of carbon tax on the debt repayment capacity of corporates, Interest Coverage Ratio (ICR) of firms at different carbon tax levels is analyzed. ICR is a financial metric that is calculated as:

$$ICR = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest Expense}}$$

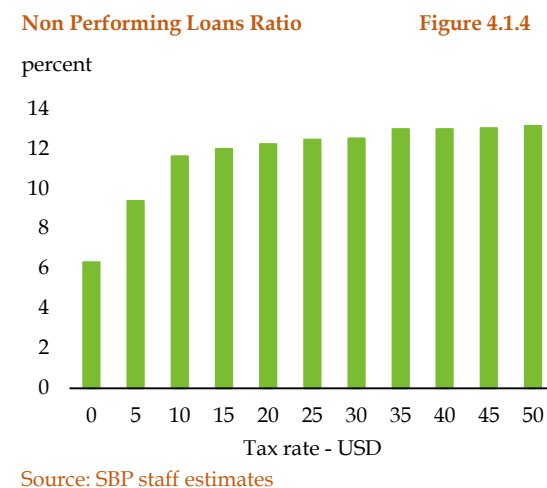
ICR measures the extent the EBIT of a firm can cover its interest expense. Generally, a higher ratio implies that a firm is in better position to repay its interest obligations and vice versa. ICR value above two is considered safer and reflects the ability of a firm to pay its interest expense more than twice with its earnings. On other hand, ICR below two (2) is considered risky, while a value below one (1) shows the inability of a company's earnings to cover its interest expense.

Based on annual financial statement data of 2023,²³ median ICR of listed NFCs is 2.51 times (2.51X). Lower pre-tax ICR is attributed to historically high interest rates that prevailed during CY23, substantially raising the interest expense of firms. With the imposition of carbon tax, median ICR falls to 2.2X at a rate of US\$ 25/tCO₂ and further to 1.85X at the highest tax level of US\$ 50/tCO₂. Decline in median ICR at higher tax rates suggest increased vulnerability of firms with higher emission intensities to transition risk. Pre-shock, outstanding exposure of corporates with debt at risk (ICR<2) to total private sector credit is 17.4 percent, which may rise by 244 bps to 19.8 percent at the highest tax level of US\$ 50/tCO₂ (**Figure 4.1.3**), indicating that this level of carbon-tax shock to the firms' earning may involve some financial stability concerns.

Assuming that ICR below 1 is a critical level, it is estimated that after shock, the non-performing loans ratio (NPLR) may increase from the current level of 6.3 percent to 12.4 percent at carbon tax of US\$ 25/tCO₂ and further to 13.1 percent at the level of US\$ 50/tCO₂ (**Figure 4.1.4**). This suggests that the banking sector has significant number of borrowers with higher emission intensity and relatively weaker debt repayment capacity to absorb the shock. Sectoral analysis



Pre-shock, outstanding exposure of corporates with debt at risk (ICR<2) to total private sector credit is 17.4 percent, which may



²² ECL is calculate as PD x LGD x EAD. Loss given default (LGD) is proxied with provision coverage ratio, whereas exposure at default (EAD) is the outstanding exposure of the firm, sourced from SBP credit registry.

²³ Source: [Financial Statements Analysis \(Non-financial Companies\) Listed on Pakistan Stock Exchange](#)

further shows that firms operating in fuel & energy, cement and chemical sectors face the most decline in their post-shock median ICR, accentuating their vulnerability to transition. **(Figure 4.1.5)**

Estimates are based on assumption that the firms fully absorb the carbon tax levied on their emissions. However, in practice, output prices, quantities, production processes and inputs would all adjust to the transition. Modelling these dynamics is highly complex and beyond the scope of this exercise. Therefore, these results may be interpreted as an upper bound of the financial impact on firms due to the carbon taxation.

From a financial stability perspective, the analysis provides some evidence that listed non-financial firms, which are the major user of bank credit in Pakistan, may face financial challenges in the face of imposition of carbon tax. This will likely affect the riskiness of credit exposure of the banking system with implications for its solvency. Therefore, policies driving the country’s transition towards a low carbon economy will need to be designed carefully to ensure a smooth transition.

