Impact of climate change on the resilience of the banking system: The cases of Kazakhstan and Kyrgyzstan

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Policy Workshop «Advancing the green transition in CAREC: Policy pathways for low-carbon growth»

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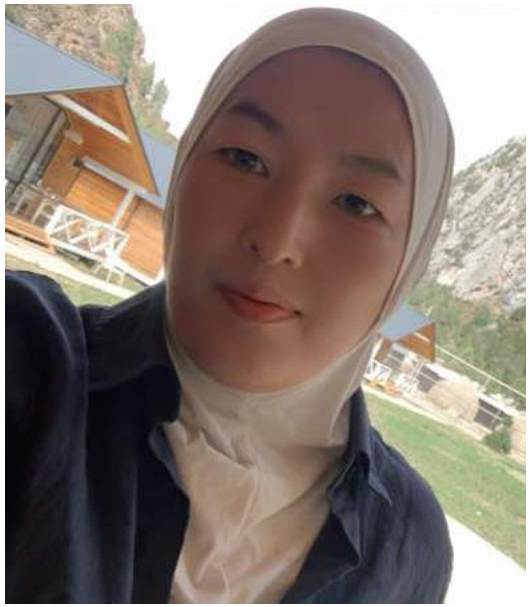
Our team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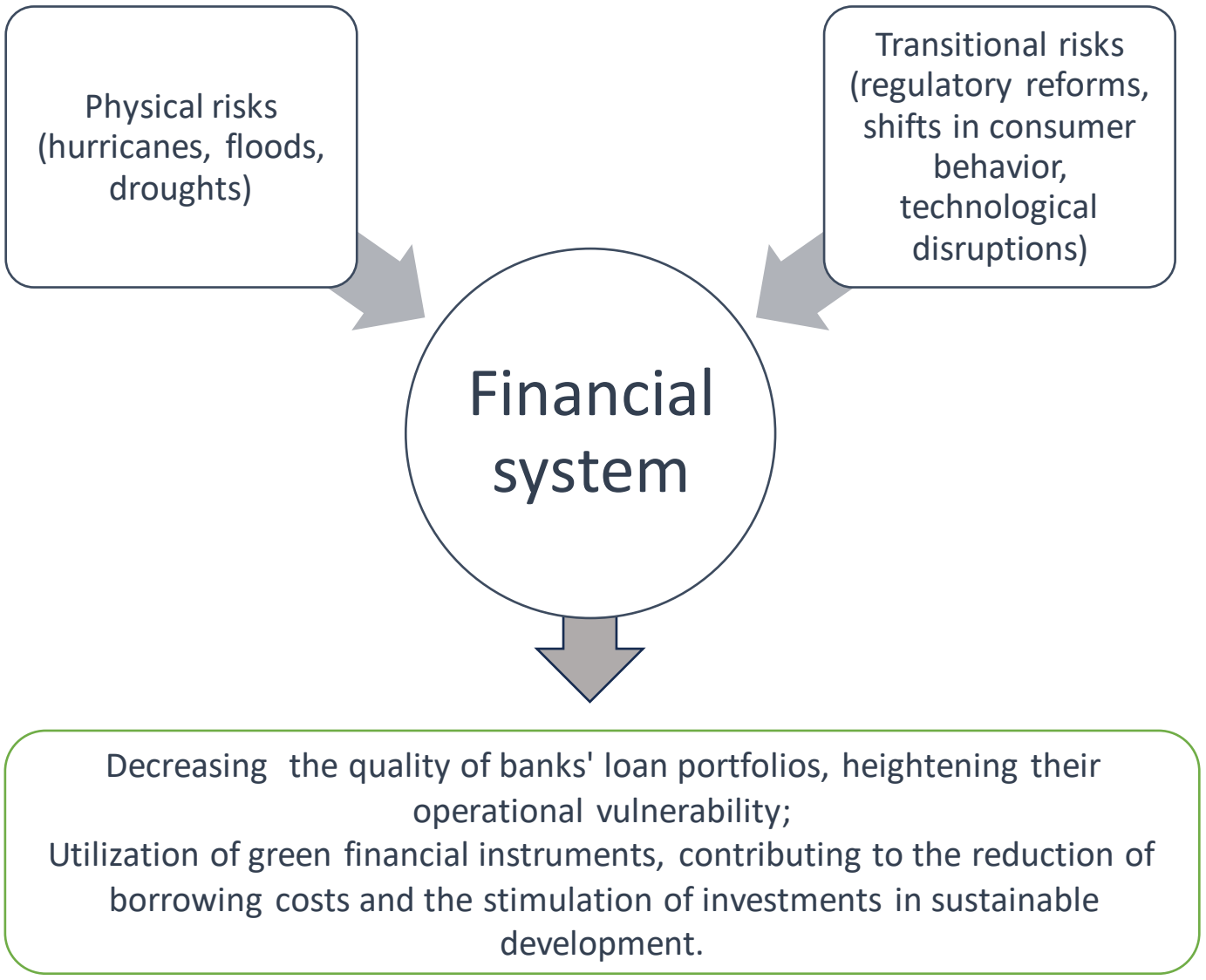


Research aim

to assess the impact of climate change on the resilience of the banking system in Kazakhstan and Kyrgyzstan, and develop the recommendations to enhance both countries' banking policies.

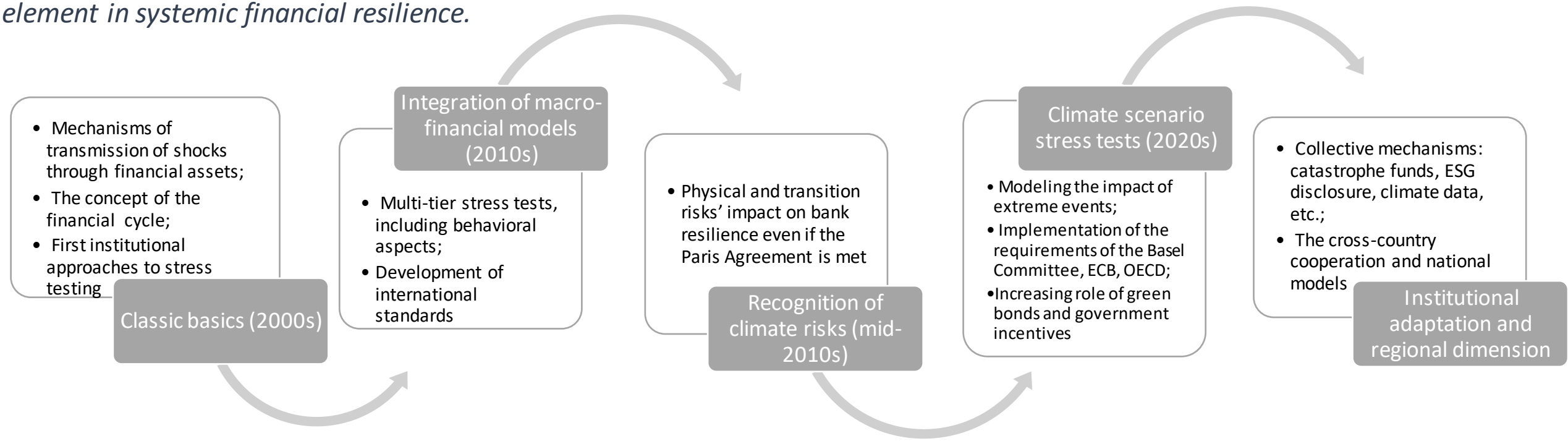
Research tasks

1. Conduct a review of literature and methodologies addressing climate risks and their financial implications;

2. Construct a VAR model to simulate the effects of financial and macroeconomic shocks and forecast the dynamics of key macroeconomic and financial indicators under various stress scenarios;

3. Identify critical thresholds at which climate risks undermine bank stability and propose practical risk management recommendations and contribute to policy improvement by integrating climate risk considerations into banking regulations.

The evolution of scientific perspectives has been characterized by a progression from rudimentary theories of financial shocks to the acknowledgement of climate change as a pivotal element in systemic financial resilience.



Research gaps

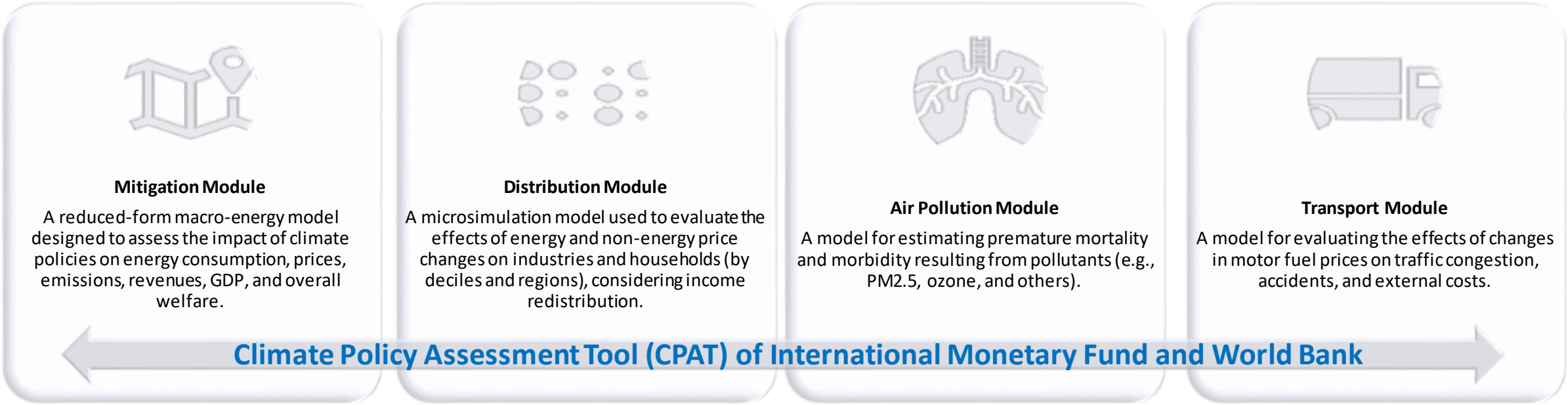
an absence of nationally focused models for post-Soviet countries;

an insufficiency of sectoral climate data;

a paucity of integration of climate risk into banking supervision;

a deficiency in cross-country collaboration on cross-border risks;

a thorough evaluation of the water, migration, and infrastructure risks that are unique to Central Asia still represents a considerable challenge.



Core Model

The analysis is based on a consolidated banking balance sheet (assets and liabilities). The VAR model includes the following variables:

- GDP growth rates;

- Inflation and exchange rate;

- Banking indicators: Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Return on Assets (ROA), Return on Equity (ROE).

Shock Assessment

Credit Shock: Increase in NPL

Market Shock: Asset depreciation, decline in the value of government bonds

Currency Shock: Devaluation, rising inflation

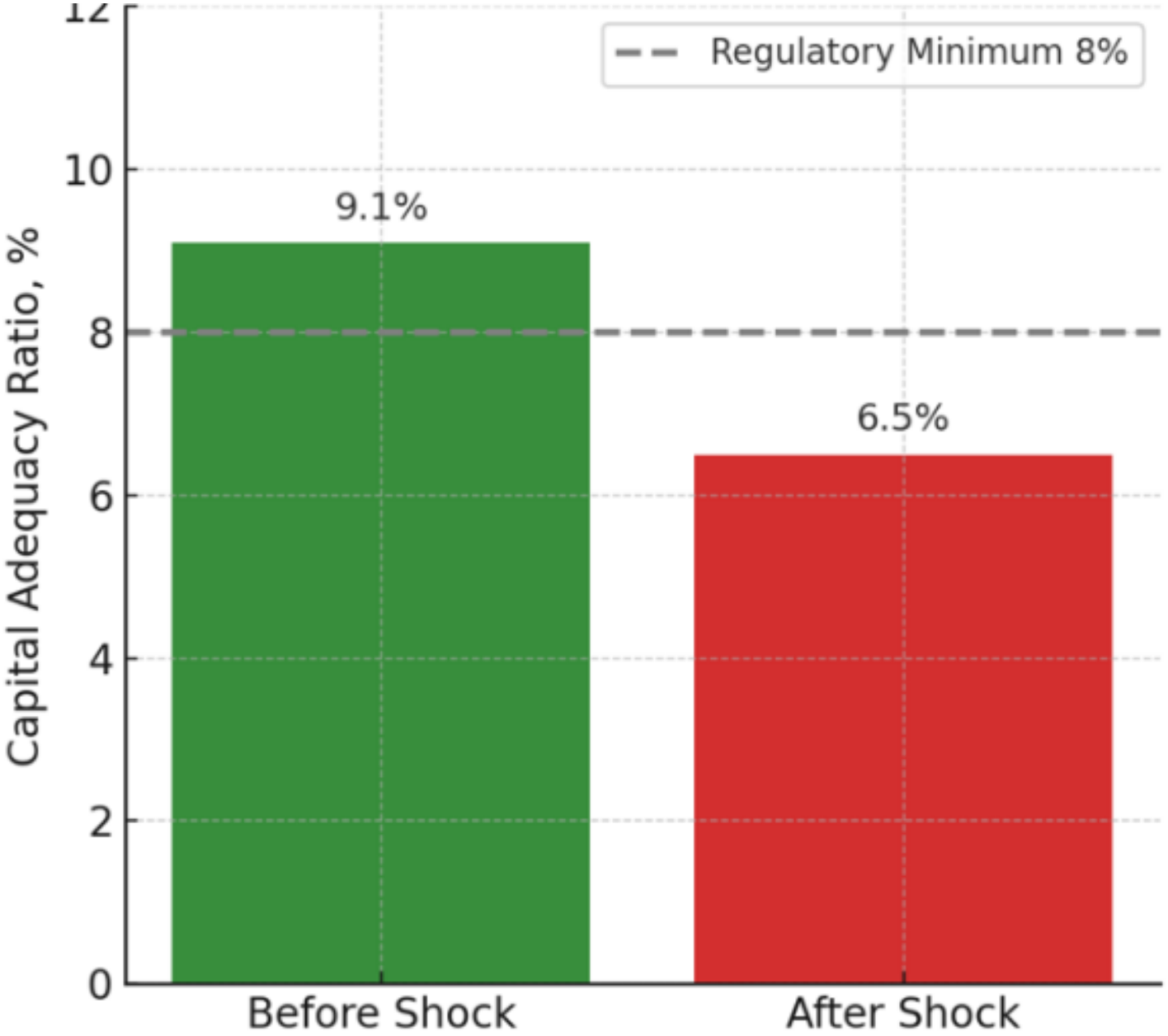
Climate Shock:

Physical risk — gradual deterioration of macroeconomic indicators through 2050

Transition risk — abrupt policy-economic shock in 2024 (e.g., implementation of a global carbon tax)

Construct	Operationalization (Variable)	Data Source
Physical Climate Risk	Frequency and severity of climate-related disasters (e.g., hurricanes, droughts)	UNEP Atlas, EM-DAT
Transition Climate Risk	Carbon price dynamics, revenue changes in carbon-intensive sectors	Carbon Pricing Dashboard, IMF
Financial Stability	CAR, NPL, capital, foreign exchange reserves	National Banks of KR and KZ, IMF FSAP, WB GFD

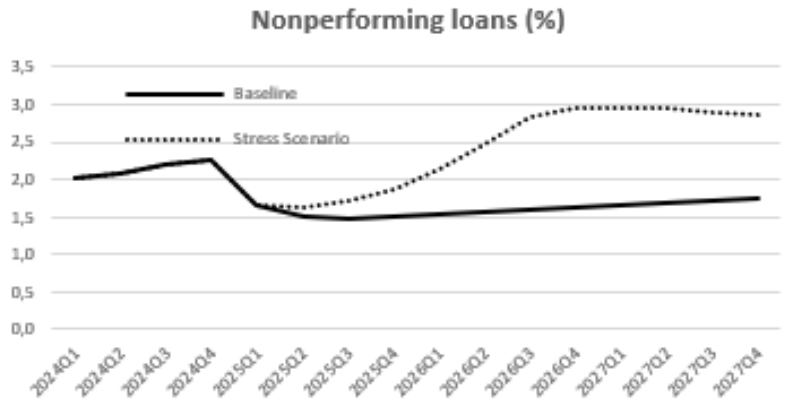
Kyrgyzstan

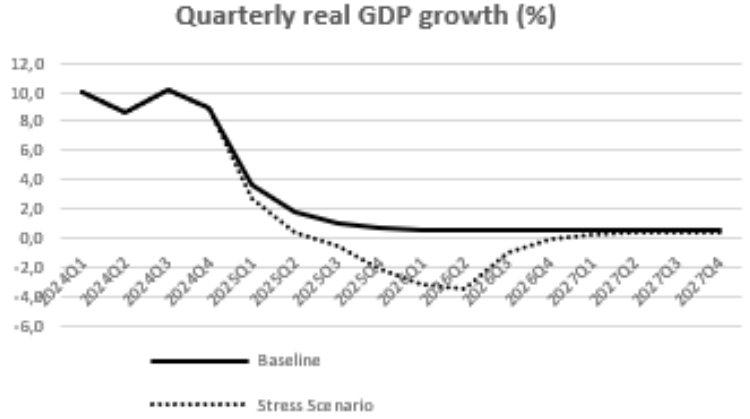


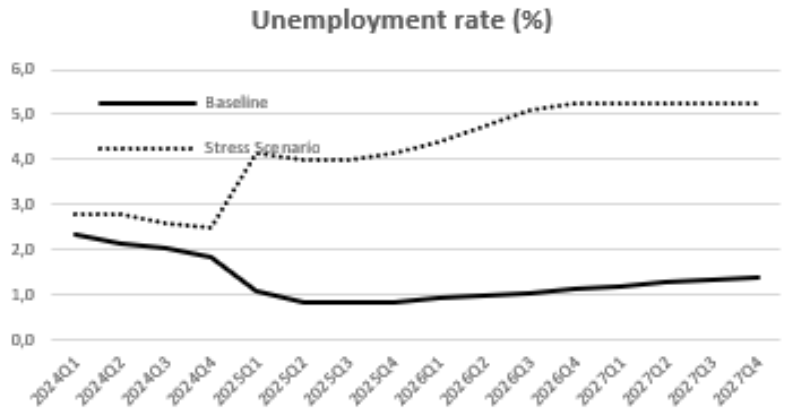
Simple Top-Down Stress Testing

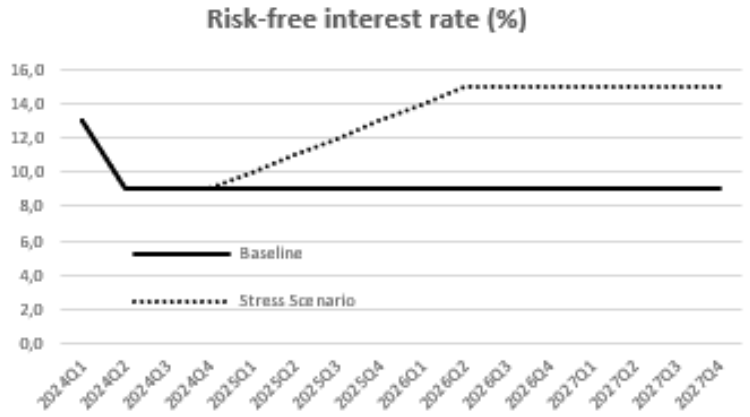
The capital adequacy ratio (CAR) declined from 9.1% in the initial scenario to 6.5% under stress, with the value falling below the regulatory minimum threshold of 8%.

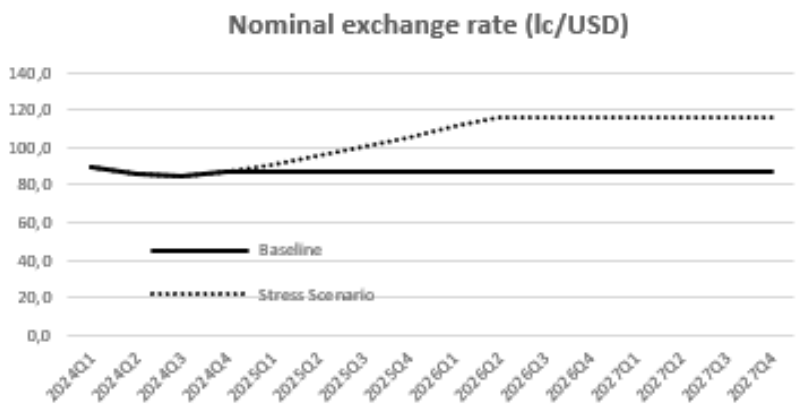
This clear breach of the capital adequacy norm visually highlights the vulnerability of the banking sector to simultaneous macroeconomic and climate-related shocks, which may generate systemic risks for the provision of credit and the intermediation of funds.

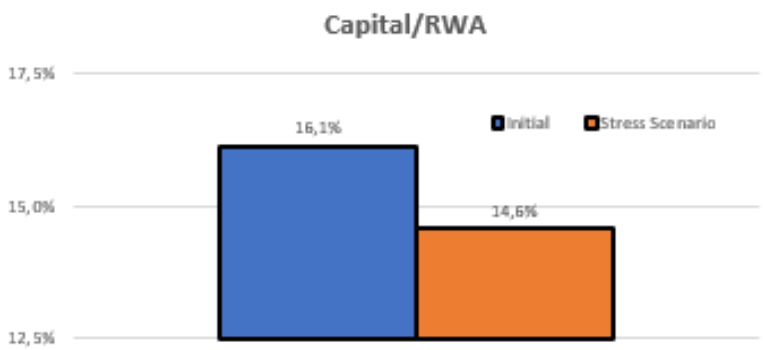










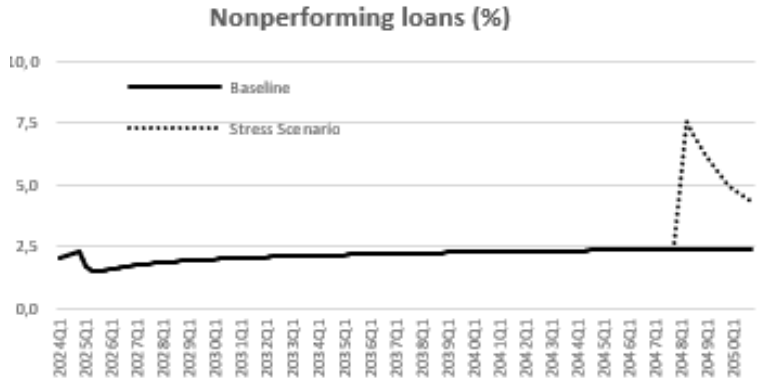


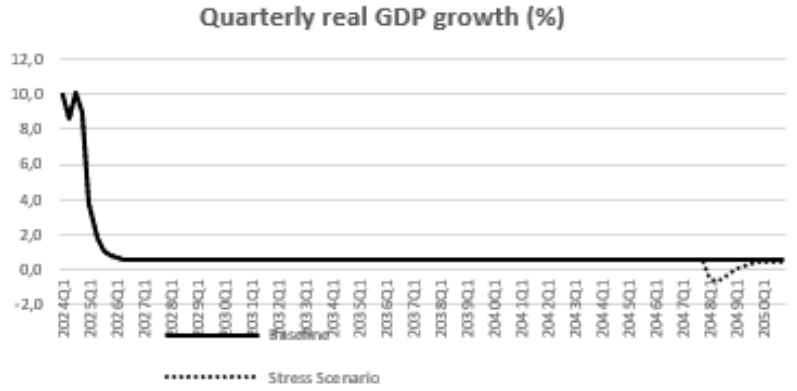
Conventional Top-Down Stress Test with Macro Forecast

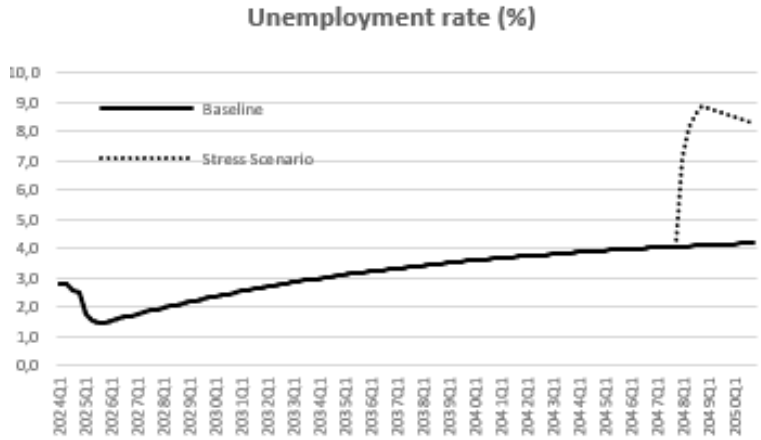
The adverse scenario was based on a pronounced decline in gold rent, the principal export resource of the Kyrgyz economy. This external shock leads to a slowdown in economic growth, a rise in unemployment, and a significant depreciation of the national currency.

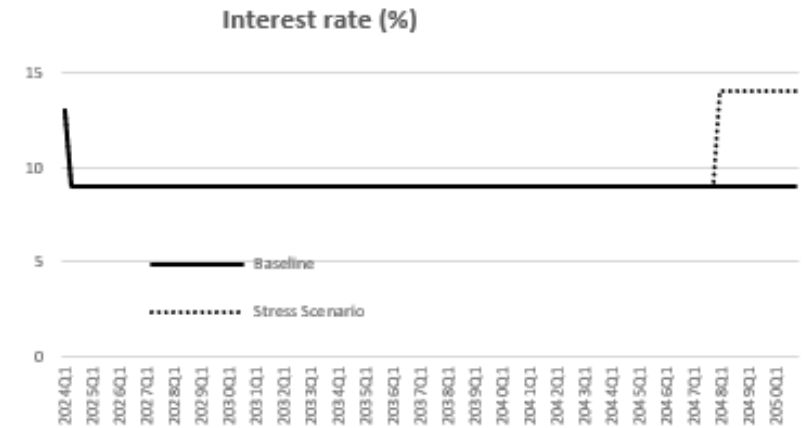
The stress test also reveals marked sensitivity of the securities portfolio to increases in the risk-free interest rate: the projected portfolio value declines by 16.5% as a result of heightened market risk (as calculated using the duration formula). Additionally, the adverse scenario is associated with a gradual rise in the proportion of non-performing loans, reflecting heightened credit risk in a deteriorating macroeconomic environment.

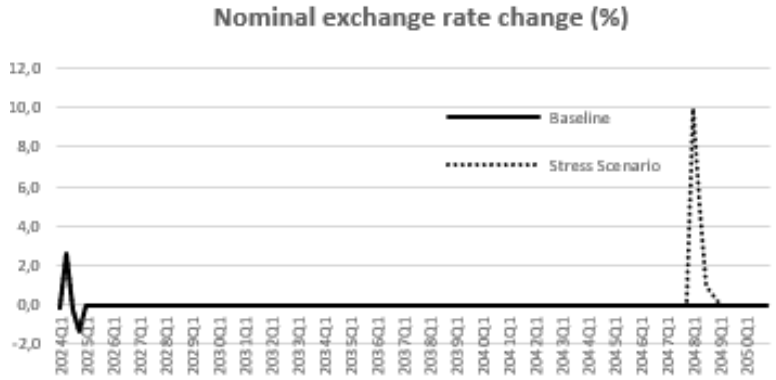
Despite severe macroeconomic shocks, the CAR of the banking system remains well above the regulatory minimum of 8%, reaching 14.6%. This finding indicates a substantial capital buffer, sufficient to absorb cumulative shocks without breaching prudential requirements.

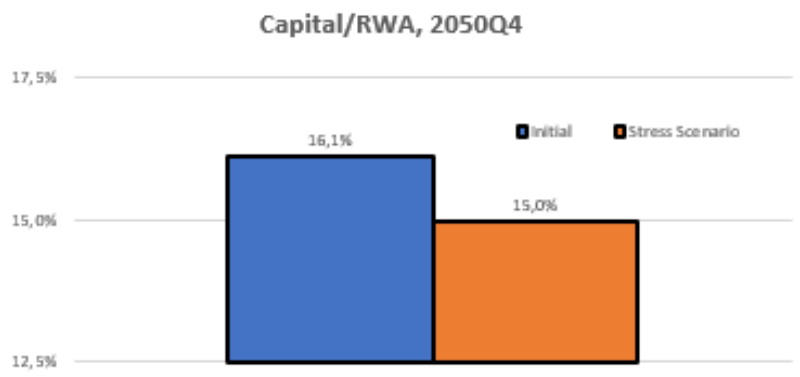












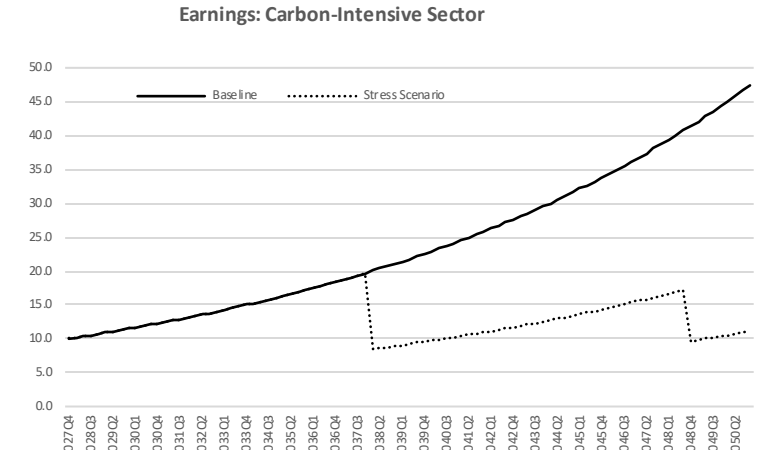
Top-Down Stress Test with Physical Climate Risk

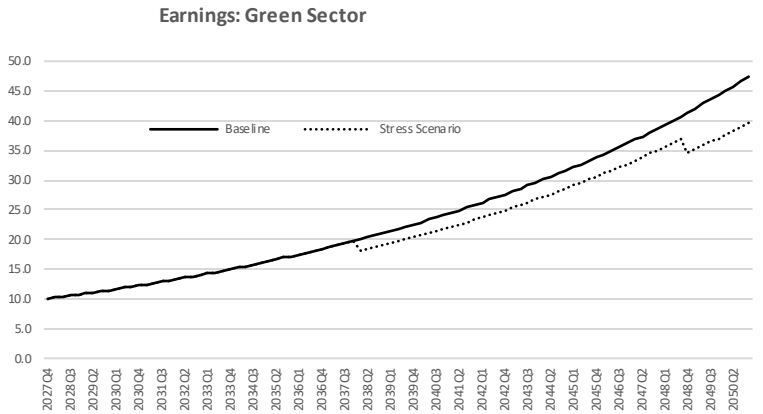
The scenario simulated the increasing frequency and severity of extreme weather events driven by climate change, with a particular focus on the macro-financial repercussions of a major climate hazard in the mid-2040s.

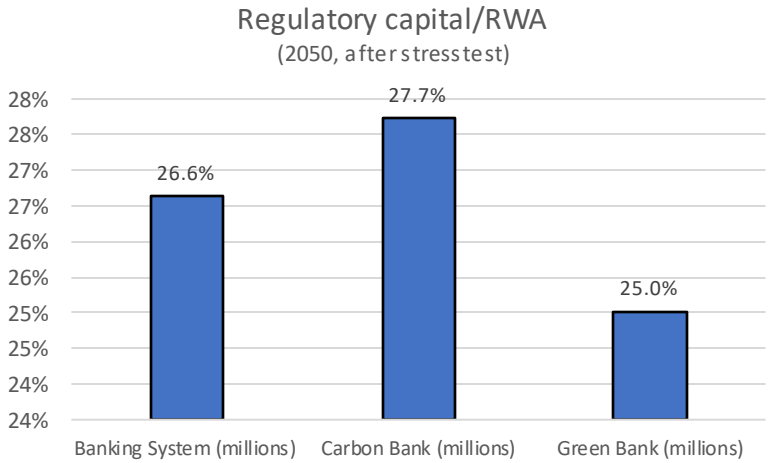
Under the stress scenario, the system experiences a distinct spike in NPLs, unemployment, interest rates, and exchange rate volatility at the time of the climate shock, followed by partial stabilization.

The CAR remains robust and above the critical regulatory threshold, indicating a substantial capital buffer that enables the sector to absorb even severe, climate-related macro-financial shocks.

Bottom-Up Stress Test with Transition Risk







The scenario assumed a progressive increase in carbon price from $3/ton in 2025 to $60/ton in 2045, as part of international climate mitigation efforts. Earnings growth rates, discount rates, and sector-specific sensitivities to carbon pricing were used to estimate shocks to future corporate earnings ("Minsky Moment") and corresponding changes in market value of equity (MVE) for both sectors.

Carbon-intensive sectors are projected to experience severe shocks to earnings (-57.6% in 2035 and -45.0% in 2045), while clean sectors face much milder declines (-9.6% and -7.5% respectively). The market value of equity (MVE) drops sharply for carbon-intensive assets (-29.4%) compared to a limited fall in clean sector MVE (-5.2%).

Despite the increase in NPLs and deterioration in asset quality, the regulatory capital ratios (Capital/RWA) for both Carbon Bank and Green Bank improve under the stress scenario, reaching 27.7% and 25.0% respectively by 2025, compared to an initial system-wide 16.1%. This paradoxical result is explained by a sharp contraction in risk-weighted assets as high-risk exposures are recognized and provisioned, coupled with differences in risk-weights between sectors.

The heterogeneity of climate policy impacts across sectors and bank portfolios. While the Kyrgyz banking system as a whole demonstrates sufficient capital to withstand transition shocks in the modeled horizon, banks with high concentrations in carbon-intensive assets face significant declines in earnings, loan performance, and market value. Over time, repeated or more aggressive transition measures could further erode these buffers, underscoring the necessity of proactive portfolio rebalancing, sectoral diversification, and integration of climate risk metrics into core supervisory and risk management frameworks.

Recommendations for increasing the resilience of the banking system of the Kyrgyz Republic

1. Improving the quality of bank management

- Introducing **monitoring indicators** reflecting climate risks
- Introducing **corporate governance standards** with climate indicators
- Creating **a Council for Sustainable Development and ESG Risks** in banks

2. Improving the interest rate and currency risk management system

- Conducting a **regular comprehensive assessment of market and currency risks**
- Introducing the **IRRBB (Interest Rate Risk in the Banking Book) approach** to assessing risk based on duration
- Creating **stress scenario analysis centers** and publishing regular reports for prompt response

3. Transforming the structure of banking products

- Establishing **limits on the concentration of industry risks**, especially in climate-vulnerable sectors (agriculture, energy)
- Developing and implementing "**green" financial products** (green loans, mortgages for energy-efficient housing)

4. Regulation taking into account climate and macro-financial risks

- Application of **DSGE and VAR models** for macro-financial monitoring of systemic risks
- Implementation of the **National Classifier "Green Taxonomy of the Kyrgyz Republic"**
- Introduction of mandatory **disclosure of information on climate risks and portfolio sustainability**
- Stimulating **digitalization of the banking sector** to reduce transaction costs and expand access to products.

Kazakhstan

Simple Top-Down Stress Testing

The stress test scenario:

- a 25% increase in the share of non-performing loans,

- a 10.1% decline in the value of the securities portfolio,

- and a simultaneous 25% depreciation of the national currency.

Loans: NPL = 12.08 trillion ₸ (101.3% of the portfolio), Reserves ↑ from 14.6 → 18.2 billion ₸

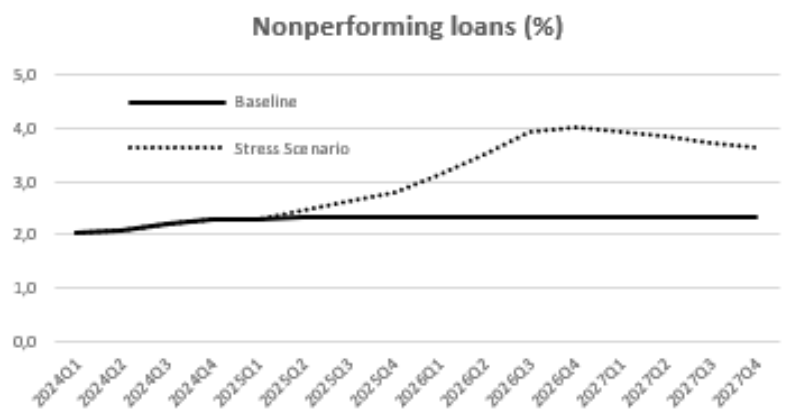
Securities portfolio: Direct losses, reduction in the value of investments

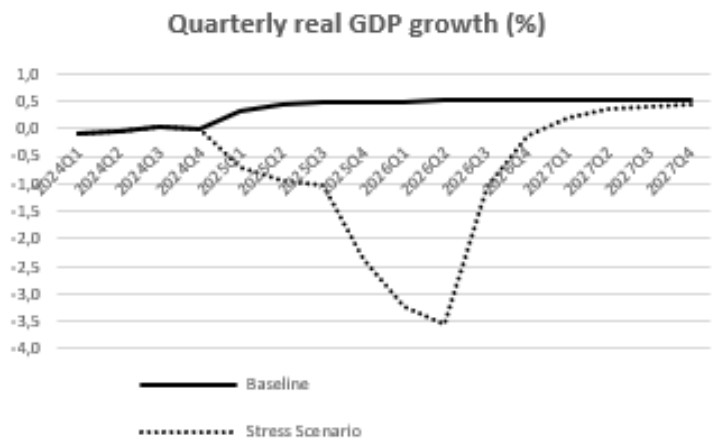
Foreign exchange positions: Foreign exchange deposits = -75.1 billion ₸, Significant increase in foreign exchange risks

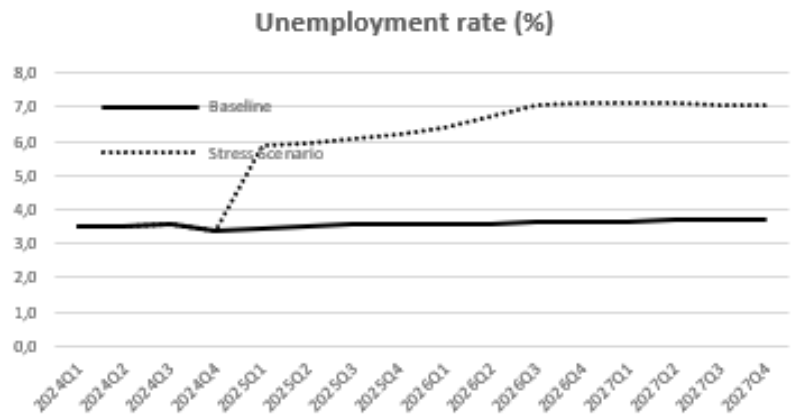
Capital: Total capital = -11.66 trillion ₸, CAR = -2.8%

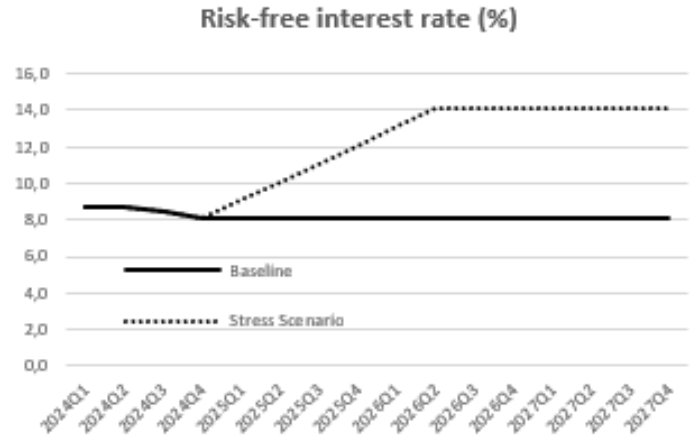
Kazakhstan's banking system, given its current balance sheet parameters, is extremely sensitive to the simultaneous impact of credit, market, and currency shocks.

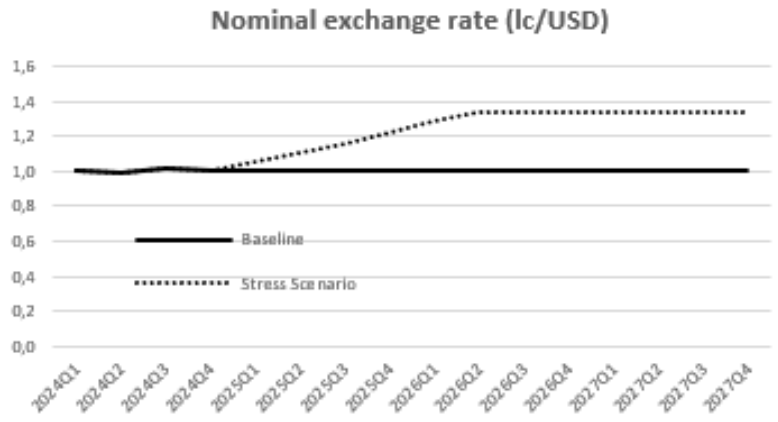
The need for a radical strengthening of risk management mechanisms, improving the quality of the loan portfolio, and creating additional capital buffers

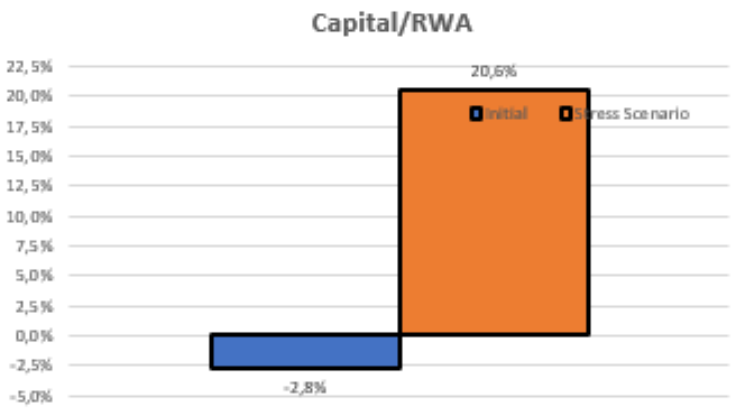










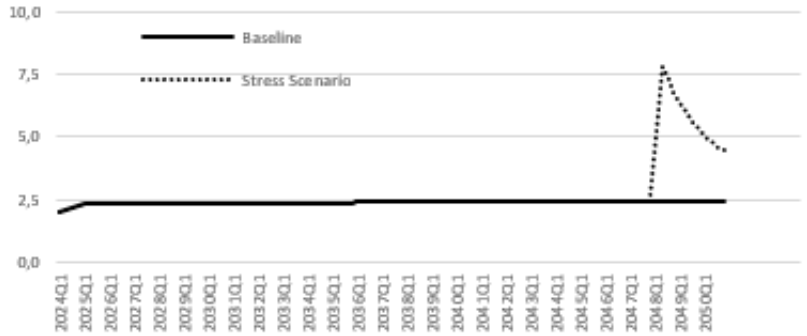


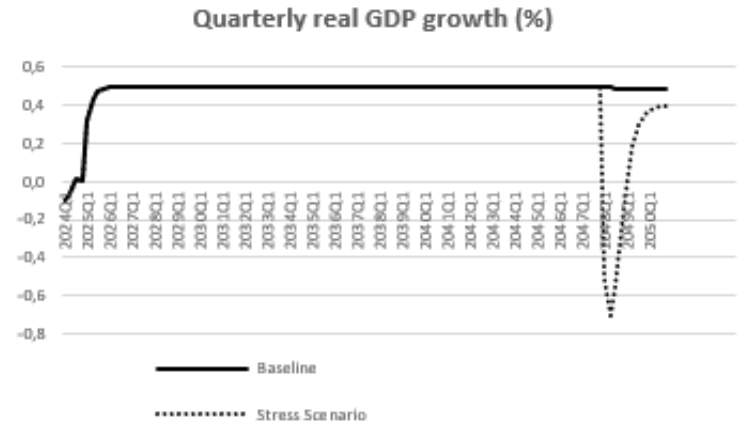
Conventional Top-Down Stress Test with Macro Forecast

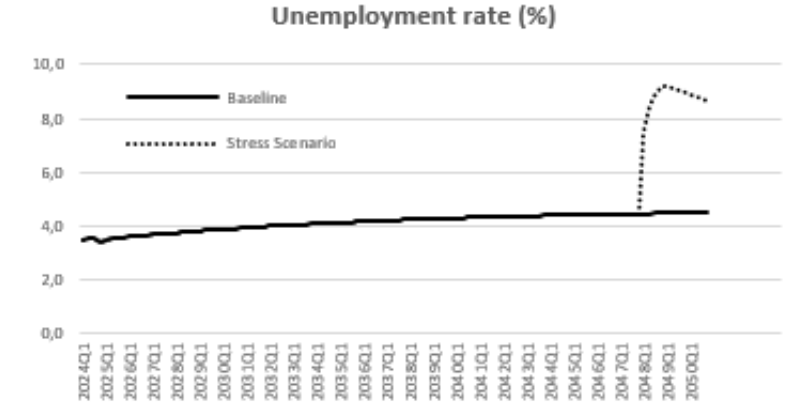
The stress scenario: a decline in quarterly real GDP growth rates (from –1.00% to –0.05%), a significant increase in the risk-free interest rate (up to 5 p.p.), an increase in the unemployment rate (up to 3 p.p.), as well as a deterioration in asset quality, reflected in an increase in the share of non-performing loans (NPLs) to 4.44% of the gross loan portfolio by 2050, compared to 2.47% in the baseline scenario.

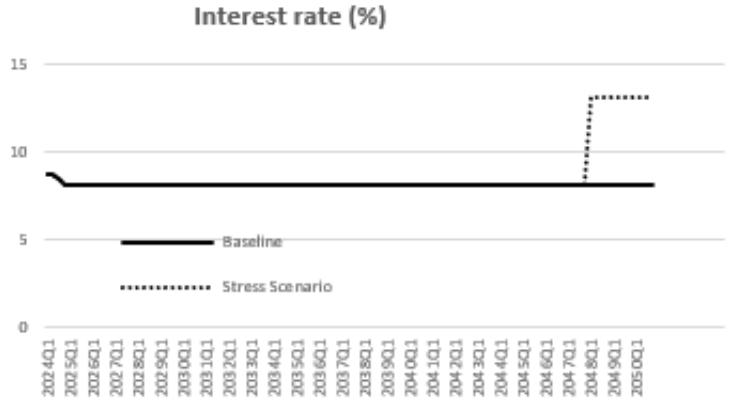
Results: The capitalization of the banking system becomes minimal, regulatory ratios approach zero, and the quality of the loan portfolio and the volume of reserves formed do not provide the necessary protection against further macroeconomic and market shocks.

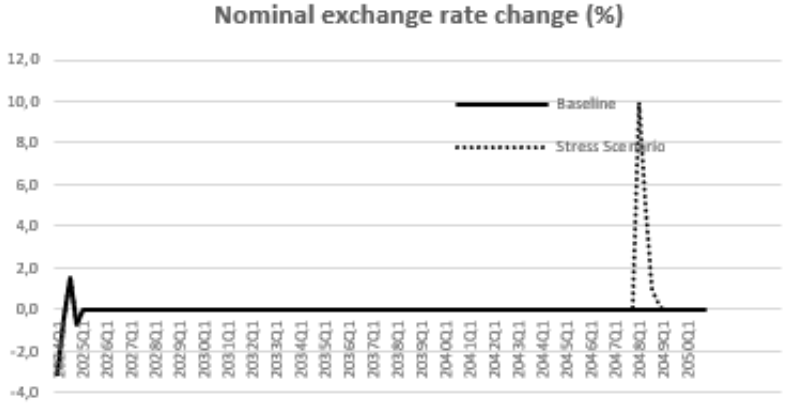
Top-Down Stress Test with Physical Climate Risk

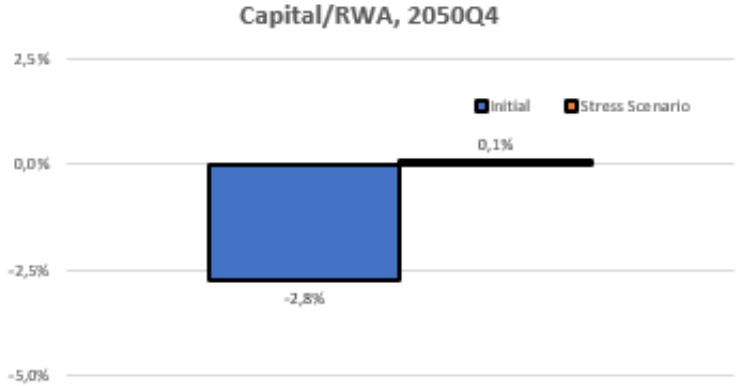






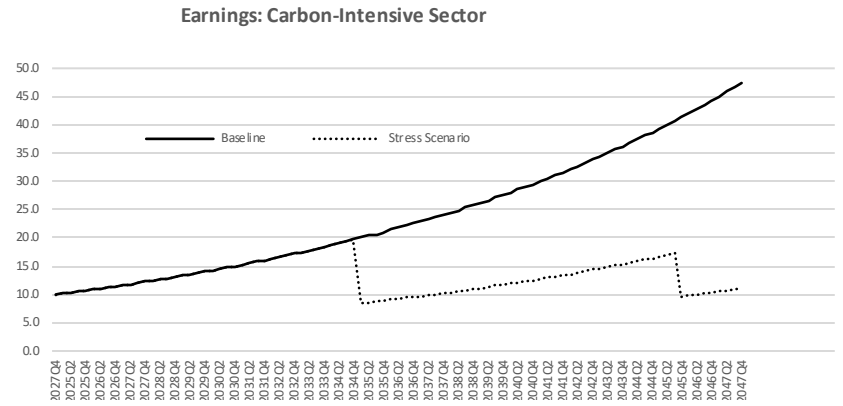


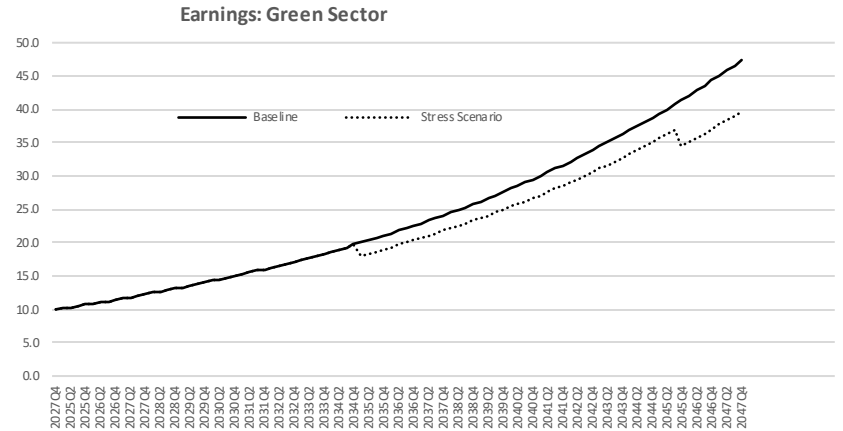


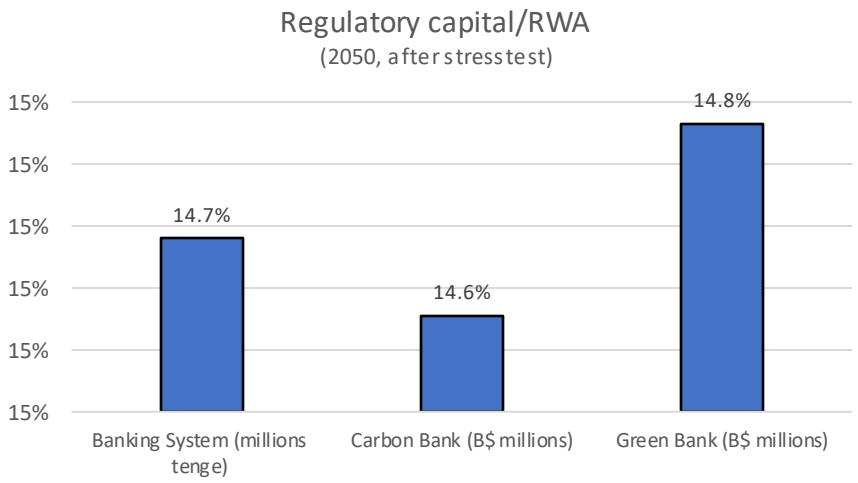


In a stress scenario, simultaneous deterioration is observed across several channels: growth in NPLs, decline in economic growth and employment rates, devaluation of the national currency, sharp reduction in capital buffers to negative values.

Even with the recovery of individual indicators by the end of the forecast horizon, the banking system continues to show signs of a systemic crisis: negative dynamics of capital and credit portfolio quality indicators, high sensitivity to macroeconomic and climate shocks, and insufficient reserves.







Bottom-Up Stress Test with Transition Risk

The rise in carbon prices from $3 to $60 per ton over twenty years leads to a sharp deterioration in the corporate earnings prospects of companies focused on carbon-intensive sectors. The calculations use a model according to which corporate earnings decline by 1.8% for every $10 per ton increase in price in carbon-intensive sectors and by 0.3% in clean sectors. Thus, by 2045, the cumulative projected shock to corporate earnings in carbon-intensive sectors reaches -57.6%, and for companies in clean sectors, -45.0%.

This leads to a significant reduction in market capitalization: for carbon-intensive companies — by 29.4%, for clean sectors — by 5.2%. This dynamic causes a significant increase in the probability of default (pd) for the respective borrowers: +8.82 percentage points for carbon-intensive sectors and +1.55 percentage points for clean sectors. In turn, the sensitivity of the level of non-performing loans (NPL) to changes in the probability of default is set at a coefficient of 0.1 — that is, a 5 p.p. increase in pd increases NPL by 50%.

The implementation of a scenario of sharp growth in carbon regulation and emission prices leads to profound structural changes in banks' balance sheets. Banks with significant exposure to carbon-intensive sectors face exponential growth in NPL ratios, rapid declines in securities values, increases in impairment provisions, and declines in capital efficiency. Even for “green” banks, despite their lower exposure to carbon-intensive industries, there is still a risk of portfolio quality deterioration amid general macroeconomic instability.

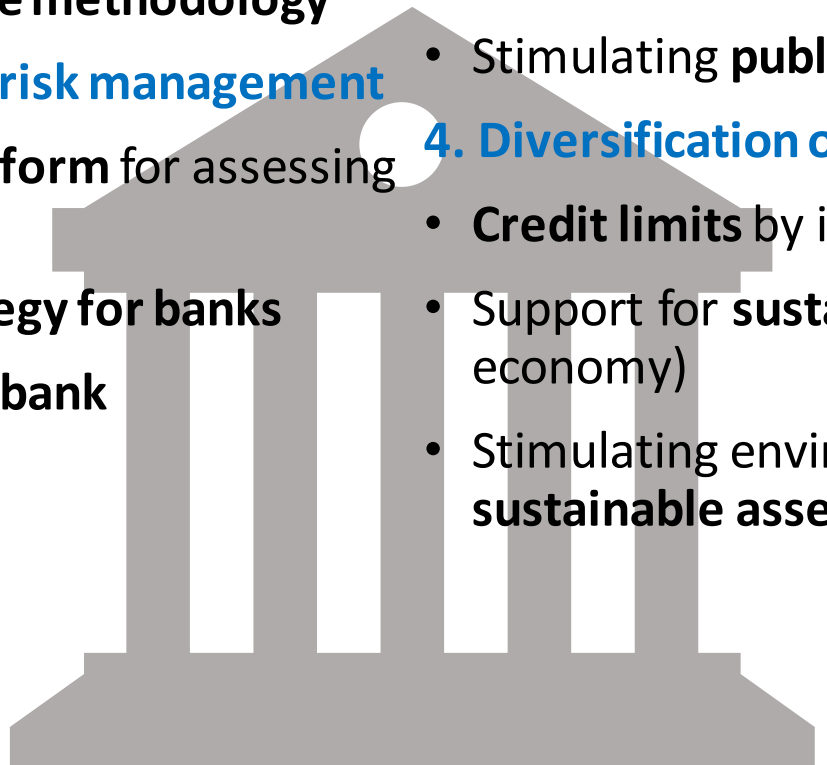
Recommendations for increasing the resilience of the banking system of the Republic of Kazakhstan

1. Strengthening the capital base and reserves

- Increasing **regulatory capital requirements**
- Introduction of a **countercyclical capital buffer**
- Development of a **stress reserve methodology**

2. Reform of the National Bank's risk management

- Implementation of an **ERM platform** for assessing aggregate risks
- Development of a **climate strategy for banks**
- Possibility of creating a **climate bank**



3. Reducing currency risks and de-dollarization

- **Restrictions** on open currency positions
- Development of **instruments in national currency** (long-term bonds)
- Stimulating **public confidence** in the tenge

4. Diversification of bank portfolios

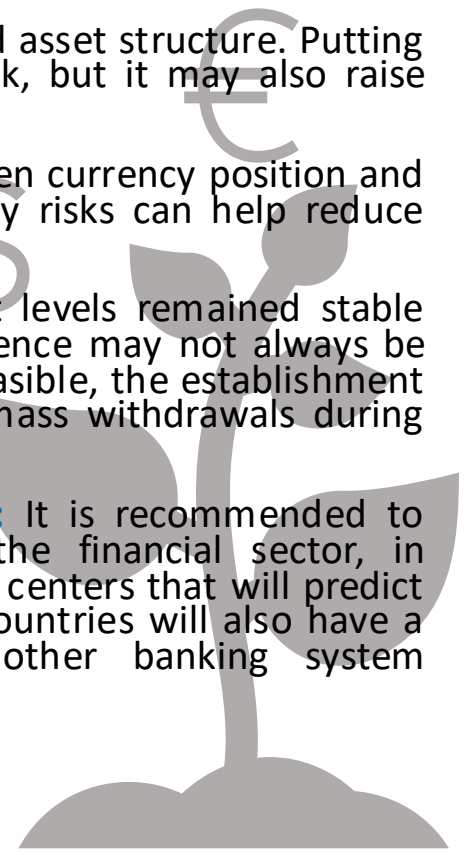
- **Credit limits** by industry
- Support for **sustainable sectors** (IT, "green" economy)
- Stimulating environmentally and technologically **sustainable assets**

General recommendations for enhancing future stability

To intensify efforts to integrate climate and transition risk scenarios into banking regulation, develop stress testing at the supervisory level, and establish cross-sectoral cooperation mechanisms to minimize systemic threats to financial stability:

- increasing capital buffers and reserves;
- the introduction of regular climate and transition stress testing;
- diversification of loan portfolios and reduction of concentration in carbon-intensive industries;
- integration of climate risks into solvency assessment procedures and asset and liability management strategies;
- development of tools for early detection and control of systemic risks.

- **Building Capital:** Banks should keep building capital when the economy is doing well and not pay out too many dividends to restore and keep their buffers at a healthy level.
- **Improving Risk Management:** It's very important to make risk management systems better. This includes putting loan and securities portfolios through tough stress tests against situations like a drop in GDP, rising interest rates, and a drop in the value of a currency.
- **Spreading Out Assets:** There is need in a balanced asset structure. Putting more money into securities may lower credit risk, but it may also raise interest rate risk.
- **Managing Currency Exposure:** Keeping a small open currency position and encouraging borrowers to hedge against currency risks can help reduce indirect exposure.
- **Monitoring Deposit Dynamics:** Although deposit levels remained stable during the recent stress period, depositor confidence may not always be robust. Sufficient liquidity coverage and, where feasible, the establishment of insurance mechanisms could protect against mass withdrawals during future crises.
- **Developing of competencies and infrastructure:** It is recommended to review the educational training program for the financial sector, in particular the banking sector, and create research centers that will predict shocks, assess risks, etc. Integration with other countries will also have a positive impact on the implementation of other banking system management practices.



Thank you very much!

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