Central Bank of Armenia

Climate transition risks: Do interbank networks change banks' vulnerability?

RESEARCH NOTE RN-2026-07

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What can happen to a bank if many of its borrowers operate in sectors for which tighter climate policy becomes a serious burden? And can those losses also reach banks that are not directly connected to those borrowers, but have lent to the first bank?

The transition to a low-carbon economy is accompanied by new regulations, technological changes and shifts in the structure of demand. For some firms this can mean higher costs and lower revenues, which weakens their ability to repay loans and generates losses for the banks that lend to them. And because banks also lend to one another, financial distress at one bank can be passed on to others.

This research note shows how far lending links between Armenian banks can change estimates of individual banks' potential losses from climate transition risks. To this end, it applies network analysis, focusing on domestic interbank lending. This is only one of the possible channels of risk transmission, so the study does not claim to provide a comprehensive assessment of all the channels through which risk can spread in the financial system.

How does the climate transition turn into bank risk?

Climate transition risk arises from the policy measures, as well as the market and technological changes, required to move to a low-carbon economy. It is most pronounced for sectors with high carbon emissions.

Consider a firm whose production generates large carbon emissions. If carbon pricing is tightened, the firm's costs rise and its profitability falls. As a result, it becomes harder for the firm to service its loans, and the loss may ultimately be borne by the bank that lent to it. Changes in energy costs and in the structure of demand can lead to the same outcome.

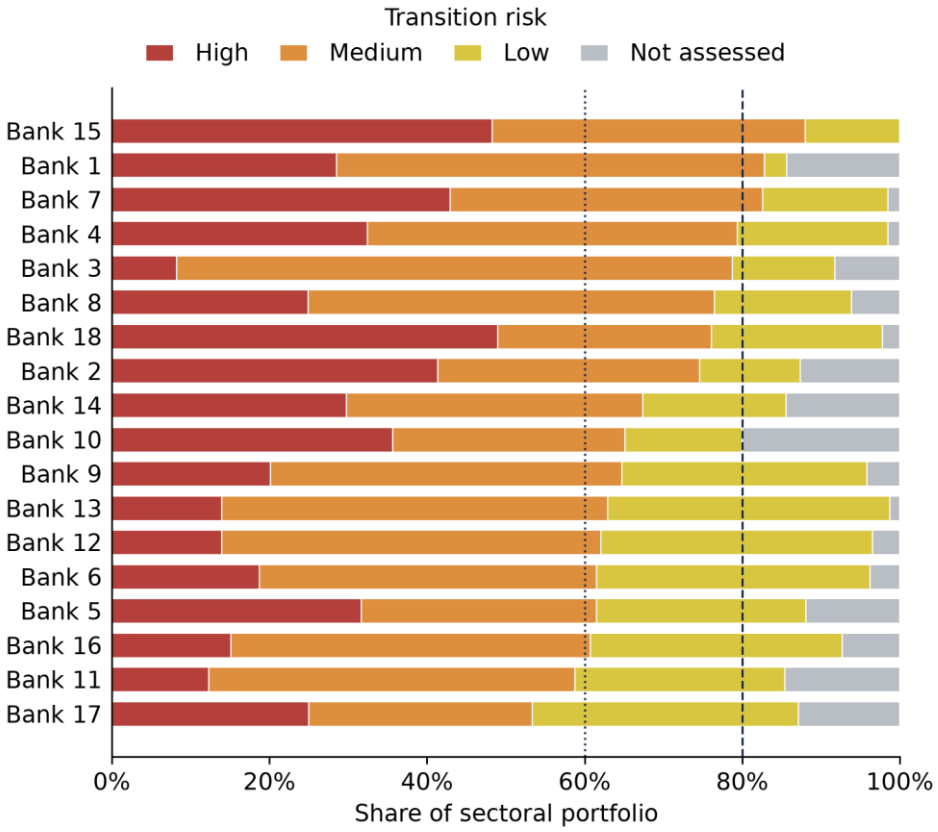
To assess such risks, the Central Bank of Armenia and the World Bank jointly carried out the Climate Transition Risk Stress Testing of the Armenian Banking Sector (CTRST, World Bank, 2026). Within it, the transition risk of economic sectors was assessed on a 0–4 scale, taking into account, among other factors, their contribution to greenhouse gas emissions, the impact of regulatory policy, the availability of alternative technologies and consumer perceptions. The banking system's exposure to transition-sensitive sectors was then assessed, and potential credit losses were calculated under different scenarios.

However, the CTRST estimates do not account for the fact that losses can also spread from bank to bank. If a bank that incurs losses has obligations to other banks, the deterioration of its financial condition can generate losses for its lenders as well. In this sense, lending and borrowing relationships between banks form a financial network through which initial losses can spread across the whole system. This research note complements the CTRST assessment in precisely this direction, by examining the domestic interbank lending network.

Which banks are most exposed to risky sectors?

Before turning to the spread of risk, it is necessary to understand which banks lend more to sectors that are sensitive to the climate transition. Based on the CTRST sectoral classification, the structure of banks' loan portfolios shows significant differences (Figure 1). In particular, more than 80% of the sector-classified loan portfolios of Banks 15, 7 and 1 is directed to high- and medium-transition-risk sectors, while for Banks 11 and 17 the share is below 60%.

Figure 1. Banks' sectoral loan portfolios by climate-transition risk category, 2025



Note: Banks are anonymised and numbered from 1 to 18. Banks are ordered by the combined share of high- and medium-risk sectors, in descending order. The vertical lines correspond to the 60% and 80% levels. Shares refer to the sector-classified loan portfolio, using the latest available observation within 2025 for each bank-sector pair. 'Not assessed' denotes sectors without an assigned transition-risk score and should not be interpreted as a zero-loss rate. Consumer and mortgage lending are incorporated separately in the quantitative shock calculation.

Source: Authors' calculations based on lending data and CTRST sectoral risk scores.

It is important to note that the 0–4 scale only classifies sectors by transition risk and does not itself indicate the magnitude of potential losses. Banks' losses are calculated using the credit losses estimated in the CTRST under the different scenarios. In addition, Figure 1 is based on 2025 data, whereas 2024 lending exposures were used for the loss estimates, in order to align with the CTRST reference year.

How are losses and their spread estimated?

The starting point of the assessment is the three CTRST scenarios: Orderly, Disorderly and Perverse Disorderly. They define the initial losses arising from climate risks. This research note estimates how these losses are distributed across banks and how they then spread through the network of domestic interbank loans[1]. The estimation is carried out in two steps.

Step 1: direct losses. Five-year cumulative credit losses relative to the Baseline scenario are converted into loss rates for each risk category, by dividing each category's loss by the banking system's aggregate lending exposure in that category. These rates are then applied to each bank's corresponding lending exposures, and

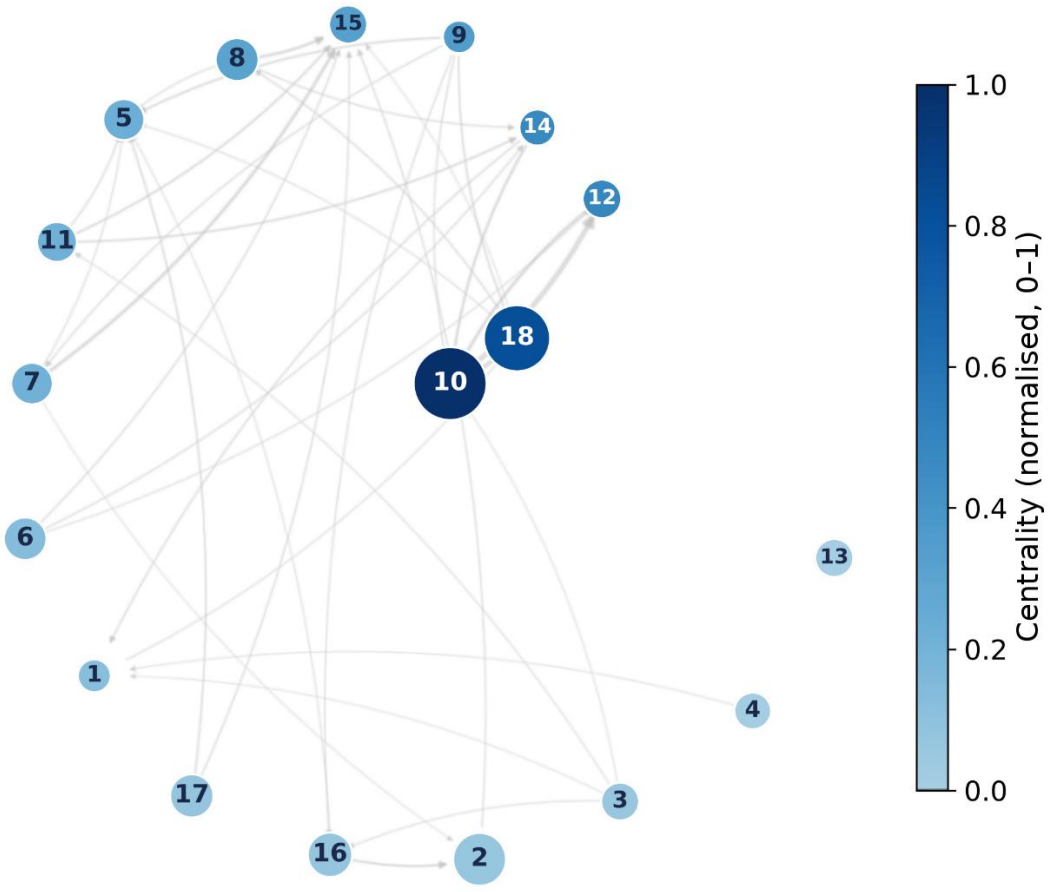
1 The analysis is restricted to domestic interbank loans with identified bank counterparties and does not include other interbank instruments or exposures, including repo transactions and cross-border interbank exposures.

the results are summed. Consumer and mortgage loans are incorporated separately. Finally, each bank's initial loss is expressed as a share of its total capital, using the latest available observation within 2024.

Step 2: propagation through the network. The initial losses are propagated through the interbank network using the DebtRank model (Battiston et al., 2012). The logic of the model is as follows: if a borrowing bank incurs a loss, part of it is transmitted to the banks that have lent to it. The size of the transmitted loss depends on the size of the lending bank's interbank claim and on the share of its capital that the borrowing bank has lost. The new losses can then be transmitted to other banks in subsequent rounds, and the process continues until no further material losses are generated. DebtRank therefore makes it possible to estimate, alongside direct losses, the additional losses arising from interbank linkages[2].

The network through which losses spread is shown in Figure 2. It shows the direction of lending between banks, banks' relative centrality within the network and differences in their capital. Banks 10 and 18, which have the largest capital and the most central position in the network, stand out, while Bank 13 is isolated from the network.

Figure 2. Domestic interbank lending network, December 2025



Note: Arrows indicate the direction of lending, from lender to borrower. Circle size reflects the relative size of banks' capital, while colour represents their relative centrality within the network (eigenvector centrality, normalised to a 0–1 range). Darker colours indicate higher centrality.

Source: Authors' calculations.

2 During the network analysis, interbank exposures are held fixed and potential bank-management responses are not modelled.

At the system level, the network effect is limited

After accounting for propagation through the interbank network, aggregate losses increase in all three scenarios, although not by much (Table 1). Under the Orderly scenario, they amount to 3.04% of total banking-system capital, instead of the 2.92% estimated for direct losses alone. Under the Disorderly scenario, the figure rises from 4.00% to 4.17%, and under the Perverse Disorderly scenario from 10.09% to 10.54%. In other words, the network effect increases aggregate losses relative to direct losses by approximately 4.3%, 4.4% and 4.4%, respectively.

However, the aggregate result is not the whole picture. The effect that appears limited at the system level masks significant differences in loss amplification between individual banks.

Table 1. Aggregate losses before and after propagation through the interbank lending network

Scenario	Direct loss (% of capital)	Total loss after propagation (% of capital)
Orderly	2.92%	3.04%
Disorderly	4.00%	4.17%
Perverse Disorderly	10.09%	10.54%

Note: Both columns use the same total capital denominator and cover all 18 banks. Losses are cumulative over the five-year scenario horizon and represent additional losses relative to the Baseline scenario. The isolated bank's direct loss is included in both columns. Values are rounded to two decimal places. Relative increases are calculated using the underlying loss amounts rather than the rounded percentages of capital shown in the table.

Source: Authors' calculations.

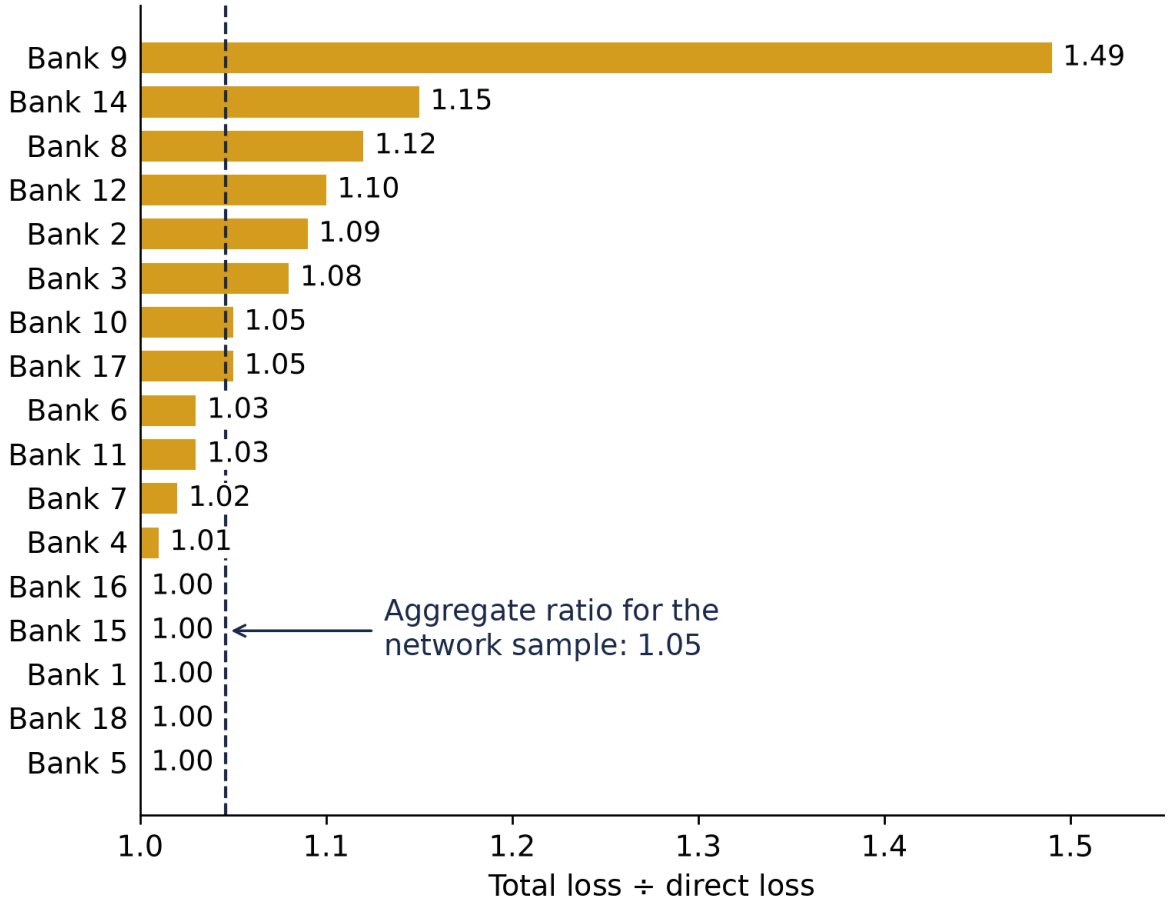
For individual banks, the effect can be substantial

To illustrate these differences, Figure 3 presents the ratio of total to direct losses for each bank under the Perverse Disorderly scenario. It shows by what factor a bank's losses grow because of interbank linkages.

As the figure shows, the effect of the network differs greatly from bank to bank. Bank 9's losses increase by approximately 49% as a result of interbank linkages, and those of Banks 14 and 8 by approximately 15% and 12%, respectively. At the same time, for five banks the additional loss attributable to the network is almost absent.

The effect of the network becomes more tangible when losses are viewed relative to banks' own capital (Table 2). The table presents two banks: Bank 14, which has the highest final loss relative to its own capital, and Bank 9, whose losses are amplified the most. As a result of propagation through the interbank network, their losses increase by approximately 1.9 and 2.8 percentage points of own capital, respectively.

Figure 3. Loss amplification by bank under the Perverse Disorderly scenario



Note: Each ratio is calculated as the total loss estimated after interbank propagation divided by the direct climate-related loss. For example, a ratio of 1.49 means that the total loss is 49% higher than the direct loss, not that the bank loses 49% of its capital. The dashed line shows the aggregate ratio for the 17-bank network sample, calculated as total loss divided by direct loss within that sample (not the arithmetic mean of the bank-level ratios). The isolated bank is excluded from this figure but included in Table 1.

Source: Authors' calculations.

Table 2. Direct and total losses for selected banks under the Perverse Disorderly scenario

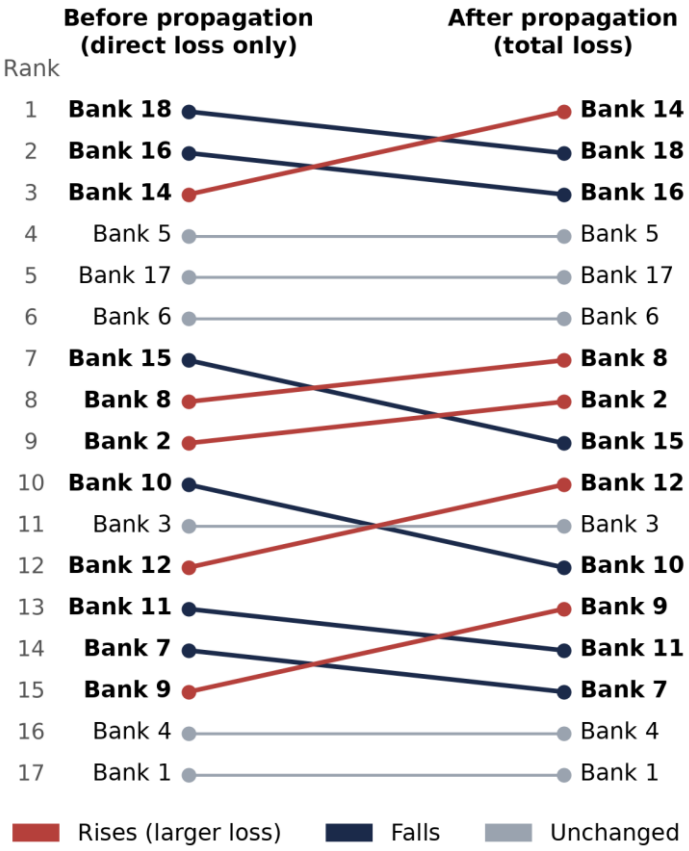
Bank	Direct loss (% of own capital)	Total loss (% of own capital)	Amplification	Rank before / after
14	12.9%	14.8%	1.15	3 / 1
9	5.8%	8.6%	1.49	15 / 13

Note: Loss shares are shown to one decimal place. Amplification ratios are calculated using the underlying unrounded values and therefore need not equal the ratio of the rounded loss shares shown in the table. Rankings refer to the 17-bank network sample.

Source: Authors' calculations.

Because the network affects banks differently, the ordering of banks by losses relative to their own capital also changes. Of the 17 ranked banks, 11 change position (Figure 4).

Figure 4. Banks ranked by losses relative to their own capital before and after interbank propagation under the Perverse Disorderly scenario



Note: Rankings are calculated within the same 17-bank network sample, using each bank's loss as a share of its own pre-shock capital. Rank 1 corresponds to the largest loss. Red lines indicate movement to a higher rank (larger relative loss), while dark blue lines indicate movement to a lower rank. A move to a lower rank does not mean that the bank's own loss has declined. The isolated bank is excluded from both rankings. Source: Authors' calculations.

Bank 14 moves from third to first place, Bank 12 from twelfth to tenth, and Bank 9 from fifteenth to thirteenth. At the same time, the three banks with the highest losses remain the same, although their order changes. This means that interbank linkages can change not only the magnitude of losses but also which banks are relatively more vulnerable.

Conclusions

The results show that domestic interbank lending links can change the distribution of losses from climate transition risks across banks. Under the Perverse Disorderly scenario, propagation through the interbank network increases aggregate losses from 10.09% to 10.54% of total banking-system capital. That is, the network effect generates an additional loss of approximately 0.45 percentage points of total capital, equivalent to an increase of about 4.4% relative to direct losses.

At the system level this effect is relatively limited, but for individual banks the relative increase in losses can be considerably larger. It is therefore appropriate to consider banks' interbank exposures alongside direct lending exposures in climate-risk monitoring.

At the same time, it should be borne in mind that the results are an initial assessment of a single risk-transmission channel, and are not a comprehensive assessment of banks' overall vulnerability or of the financial system's resilience[3].

References

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3 The results are conditional scenario-based estimates and should not be interpreted as forecasts or as assessments of regulatory capital adequacy.