Box 11. Climate risks and the implications for financial stability[1]

Climate risks are classified into (i) physical risk, caused by the increased frequency and severity of extreme weather events and (ii) transition risk, generated by the transition towards a low-carbon economy.

The topic of climate risk is particularly relevant for Romania. From the point of view of carbon intensity (measured as the share of CO_2 emissions in GVA), Romania is among the top five carbon-intensive European countries. However, considering the rate of decrease of carbon intensity in the period from 2008 to 2017, Romania ranks second among the countries making progress in this area. The economic sectors exposed to transition risk, given the criteria on direct CO_2 emissions are utilities, agriculture, mining and quarrying, manufacturing, road transport, trade, construction and real estate activities. They account for approximately 90 percent of the CO_2 emissions in the economy (data for 2017).

To capture the intersectoral dependencies and the indirect CO_2 emissions a transition vulnerability factor (TVF) is determined (Vermeulen *et al.*, 2018[2]):

$$FVTj = \frac{\frac{\sum_{i=1}^{n}(a_{j,i} * CO_2 emissions_i)}{CO_2\ emissions_j}}{CO_2 emissions\ intensity\ at\ national\ level}$$

where: $a_{j,i}$ = is the share of (sub)sectors (i = 1,n) that interact with sector j, generating the indirect CO_2 emissions for sector j. Based on this factor (TVF), the sectors exposed to the transition risk are reclassified as having low, moderate or high impact in the event of the transition risk materialising.

The companies in the business sectors selected using the above-mentioned method are important to the banking sector in Romania, accounting for 62 percent of bank exposure to non-financial corporations (September 2019), 16 percent of which are exposures to sectors with high impact arising from transition risk. The degree of concentration is significant, the top 10 banks holding 86 percent of exposures to high-impact sectors. Nevertheless, corporate reliance on bank lending is low, as bank loans make up 7.8 percent of these companies' liabilities.

The relevance of high-impact sectors for the economy is moderate, i.e. they generate 13 percent of GVA, have 8 percent of employees on the payroll and make up 17 percent of total assets. As for their financial soundness, the firms in high-impact sectors are more robust than those in moderate and low-impact sectors. In spite of the lower profitability, they have a considerably lower level of indebtedness and a higher interest coverage ratio.

In order to assess the impact of transition risk on the banking sector, two scenarios have been taken into consideration: (1) setting a carbon tax of EUR 75/tonne CO_2,

1 See also the Special feature in the National Bank of Romania's December 2019 *Financial Stability Report*.

2 Vermeulen, R., Schets, E., Lohuis, M., Kölbl, B., Jansen, D-J. and Heeringa, W. – *An Energy Transition Risk Stress Test for the Financial System of the Netherlands*, OS, Vol. 16-7, 2018.

and, (2) additionally, a 5 percent reduction in sales. Only the first-round effects generated by credit risk were gauged in both scenarios: the impact of carbon tax on financial indicators and the probability of default for each company.

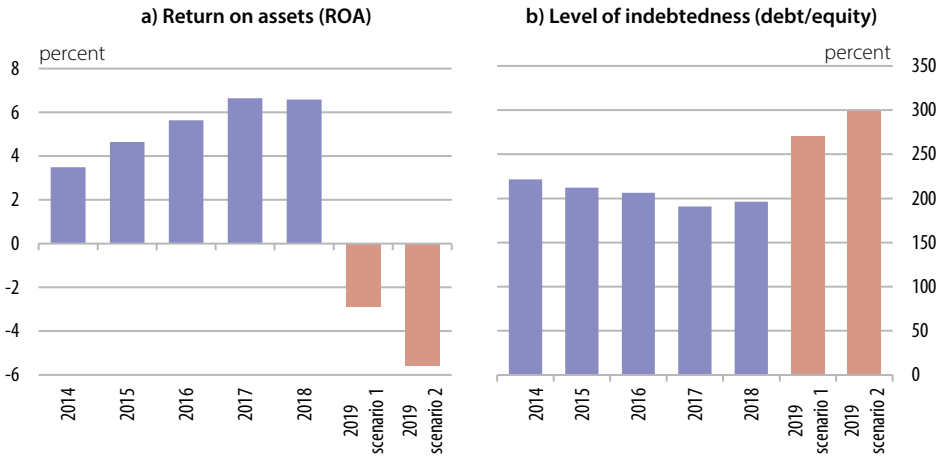

Chart A
Financial indicators of the corporate sector after the stress testing exercise

Source: MPF, NBR calculations

For determining the effect of applying a carbon tax on each company, it is necessary to: (1) calculate the volume of CO_2 emissions at company level as a share in the total volume of emissions in the respective sector, the share being determined based on the company's sales in total sales of the respective economic sector and (2) differentiate the impact based on the sector-specific transition vulnerability factor (TVF):

$$Tax\ on\ company_{i,\,Sector\,j} = Tax * TVF_{Sector\,j} * (Sales\ company_i / Sales_{Sector\,j}) * CO_2\ emissions_{Sector\,j}$$

Findings show that the short-term effects of setting a carbon tax are the rise in expenses and the reduction in sales revenues of companies in high-impact sectors, thus leading to: (i) a marked decline in companies' profitability and a higher level of indebtedness (Chart A); (ii) an increase in the probability of default (for instance, in a situation comparable to that at end-2018, the probability of default would rise from 3.9 percent in the baseline macroeconomic scenario to over 10 percent in both stress scenarios) and a worsening in the companies' rating by at least one notch (only 25 percent of firms would stay, on average, within the same rating class); (iii) an increase in the capital requirements for the banking sector by about 2 percent in the first scenario and 4.2 percent in the second, over a 1-year period.