Transition risk stress-test simulation

Summary. The climate transition risk stress-test simulation is an excel-based simulation game designed to train participants in the decision-making process underpinning the implementation of climate stress-tests in banks. The simulation has been applied as part of the SOAS Green Finance course (20 students) and a capacity building workshop for UK and Chinese financial institutions (25 participants). The simulation material involves a briefing note with a reading list and Excel document that hosts the simulation functions.

Learning objectives. Learning outcomes include understanding the sensitivity of climate stress-test results to inputs (both environmental and non-environmental), the relative justification and benefits related to different approaches for different use cases, the relative trade-offs required between granularity / scope vs. data quality, and the key components that make up a climate stress-test exercise. The simulation has been delivered both virtually and in-person.

Description of simulation / Pedagogical content. Participants are provided a briefing document with the task to set up and run a climate stress-test exercise on a simulated loanbook portfolio provided to them through an Excel spreadsheet. They are then paired into groups of 3-4 participants and are given 60-90 minutes (depending on number of groups and time availability) to work through the loanbook simulation file, configure and run the stress-test. Following the break-out, each group returns to the plenary to present their choices, reasoning, the results and to provide for Q&A. In the online format, each group has a moderator provided, in-person sessions allow for 1 moderator for up to three groups given the increased ease of moving between the groups. Total simulation duration is between 150-210 minutes including briefing and debriefing.

The Excel document has a preloaded loanbook portfolio. The simulation involves three steps. First, participants calibrate three financial aspects (recovery rate, financial data input, and adaptive capacity). Second, users choose among 5 “environmental data – model” combinations for the application of the stress-test. Third, users can parametrize one key element in the model (e.g. for credit risk model, users can choose the start date – Now, 2025,2030; for the carbon tax model the carbon tax level; for the historical simulation model the downgrade notches by sector / region). The data-model options have been built in a simplified structure into the excel and are selected based on real world combinations chosen by financial supervisors or governments in their risk assessments.

The excel spreadsheet automatically calculates the shock to the loanbook based on the user input and no specific excel skills are required as the simulation operates using macros. Users can keep the simulation file and simulate alternative combinations after the end of the simulation session. Users are given a briefing document and a verbal briefing to support and inform their discussions.

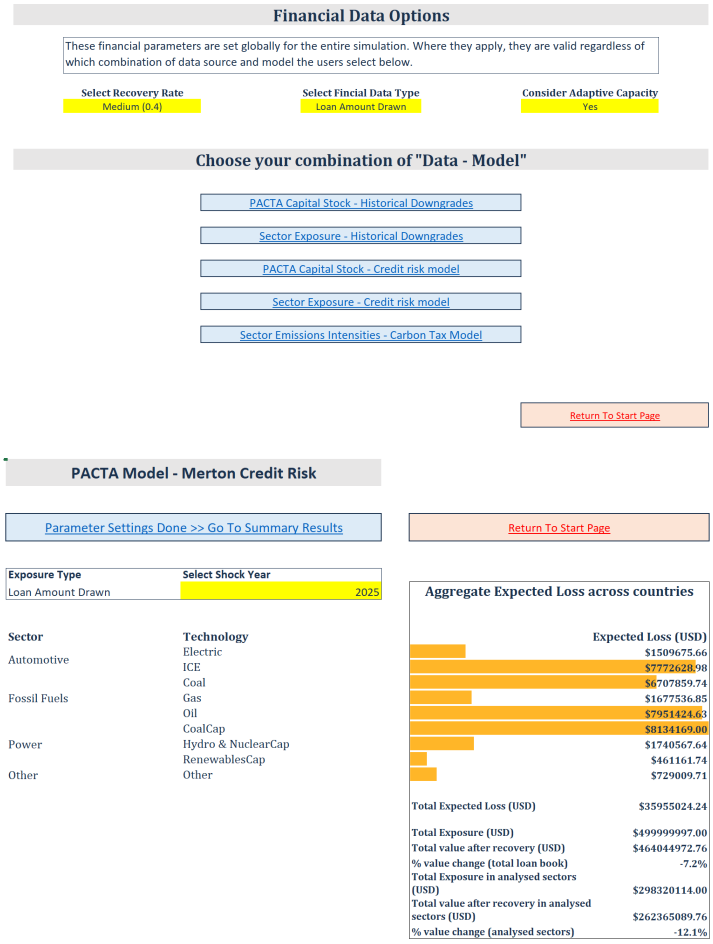
Benefits of the approach / lessons learned. The simulation closely mirrors in a ‘sandbox’ format the exact choices and trade-offs made by banks and supervisors in designing climate transition stress-tests, building on the experience of the simulation designers in advising over 6 supervisory authorities to date on these approaches. Users are required to make choices for each parameter, but also understand the relationship between choices. For example, when the simulation was applied in the SOAS Green Finance course, groups that chose a high recovery rate also chose to run the exercise without adaptive capacity considerations and vice-versa. The opposite choices demonstrated to participants the logic of the other group and the pros and cons behind each choice.

Finally, the comparison of choices between groups surfaces the rationale of different choices based on different use cases. The briefing is sufficiently vague that users have to further calibrate the use case in the discussion slightly in the breakout group. As a result, participants choose different model-

scenario combinations based on slightly different objectives they have defined for themselves in the course of the simulation. This highlights that even within a high-level brief (e.g. climate stress-test), nuances in use case may motivate different modelling approaches.

Implementation. The simulation has been implemented as part of a learning programme conducted by 2° Investing Initiative as part of the UK-China Task Force (20 participants) and the SOAS postgraduate Green Finance Course (15 participants). Following these successful online and in-person applications, the simulation will be formally integrated into the curriculum and is set to be applied as part of a number of capacity building programmes run by SOAS over the next 18 months.

Images of the Excel simulation:



Financial Data Options

These financial parameters are set globally for the entire simulation. Where they apply, they are valid regardless of which combination of data source and model the users select below.

Select Recovery Rate	Select Fincial Data Type	Consider Adaptive Capacity
Medium (0.4)	Loan Amount Drawn	Yes

Choose your combination of "Data - Model"

- PACTA Capital Stock - Historical Downgrades
- Sector Exposure - Historical Downgrades
- PACTA Capital Stock - Credit risk model
- Sector Exposure - Credit risk model
- Sector Emissions Intensities - Carbon Tax Model

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PACTA Model - Merton Credit Risk

Parameter Settings Done >> Go To Summary Results

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Exposure Type	Select Shock Year
Loan Amount Drawn	2025

Sector	Technology
Automotive	Electric
	ICE
Fossil Fuels	Coal
	Gas
	Oil
	CoalCap
Power	Hydro & NuclearCap
	RenewablesCap
Other	Other

Aggregate Expected Loss across countries

	Expected Loss (USD)
	$1509675.66
	$7772628.98
	$6707859.74
	$1677536.85
	$7951424.63
	$8134169.00
	$1740567.64
	$461161.74
	$729009.71
Total Expected Loss (USD)	$35955024.24
Total Exposure (USD)	$499999997.00
Total value after recovery (USD)	$464044972.76
% value change (total loan book)	-7.2%
Total Exposure in analysed sectors (USD)	$298320114.00
Total value after recovery in analysed sectors (USD)	$262365089.76
% value change (analysed sectors)	-12.1%