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National case study report #3

Climate stress tests: what co-benefits can we expect for transition financing?

An ex-post analysis

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31 March 2023

Abstract

This report presents an ex-post impact analysis of climate stress tests. This study identifies what possible co-benefits climate stress tests may have on transition financing, as well as their limits in this regard. The findings presented are based on an analysis of the initial lessons learned by French banks and supervisors from these exercises. The analysis was conducted following the two exercises in which French banks participated, the pilot climate exercise conducted by the ACPR in 2021 and the prudential exercise conducted by the ECB on eurozone banks in 2022. In this study, the impact of climate stress tests is examined throughout their process, from the operational processes of their implementation to the impact they may have on banks' strategic thinking and decision-making concerning transition financing. The study identified several co-benefits, but also several limitations of climate stress tests on transition financing. These results are presented in this report.

Acknowledgements: The analysis presented in this report was conducted further to 15 semi-structured interviews conducted with banking actors, as well as exchanges with European and national regulators and supervisors. The full list of respondents who agreed to be mentioned can be found in the annex.

The report benefited from comments and contribution received from I4CE researchers, Romain Hubert, Anuschka Hilke and Michel Cardona, and from external reviewers, Chiara Colesanti Senni (CEP) and Boris Jaros and Sébastien Diot (ACPR).

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List of abbreviations

ACPR	Autorité de Contrôle Prudentiel et de Résolution (French prudential supervisor)
BIS	Bank of International Settlements
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
EBA	European Banking Agency
ECB	European Central Bank
EEA	European Environmental Agency
EPC	Energy Performance Certificate
FBF	French Banking Federation
FTE	Full Time Equivalent
GDP	Gross Domestic Product
GHG	Greenhouse gases
IAM	Integrated Assessment Model
IPCC	Intergovernmental Panel on Climate Change
JST	Joint Supervisory Teams
KPI	Key Performance Indicator
NACE	Nomenclature of Economic Activities
NFRD	Non-Financial Reporting Directive
NGFS	Network for Greening the Financial System
NUTS	Nomenclature of Territorial Unit for Statistics
P2G	Pillar 2 Guidance
SME	Small and Medium-sized Enterprise
SREP	Supervisory Review and Evaluation Process
SSM	Single Supervisory Mechanism

Executive summary

Since their introduction, climate stress tests have taken a lot of space in the public debate. Put in the spotlight by supervisors and the NGFS, their primary objective is to encourage banks to integrate climate-related risks into their activities and to carry out an initial assessment of the banks' capacity to deal with these risks.

The public debate around climate stress testing has quickly focused on the methodological difficulties of developing a framework for analysing climate-related risks or developing appropriate transition scenarios. This study seeks to move away from this focus by looking at another aspect. Beyond their contribution in terms of assessing the exposure of financial institutions to climate-related risks, and although this is not their initial objective, climate stress tests could in fact also have indirect impacts on transition financing. The study makes the hypothesis that a better understanding of banks' climate risk exposure could lead to a better understanding of transition issues, modify their decision-making processes accordingly and thus potentially increase their ability to finance the transition.

This study identifies what possible co-benefits climate stress tests may have on transition financing, as well as their limits in this regard. The study does not however analyse whether climate stress tests have achieved the initial objectives set by the supervisors.

The findings presented are based on an ex-post analysis of the initial lessons learned by French banks and supervisors from these exercises. The analysis was conducted following the two exercises in which French banks participated, the pilot climate exercise conducted by the ACPR in 2021 and the prudential exercise conducted by the ECB on eurozone banks in 2022. In this study, the impact of climate stress tests is examined throughout their process, from the operational processes of their implementation to the impact they may have on banks' strategic thinking and decision-making concerning transition financing (see Figure n°1).

The most significant co-benefit of climate stress testing: a process that mobilises banks' internal teams and supervisors around climate-related issues

The successive climate stress tests implemented by the supervisors on French banks have had the most significant effect through mobilising the banks' internal teams around climate issues. They have been very useful in enabling an initial integration of these issues into the banks' organisational processes and governance.

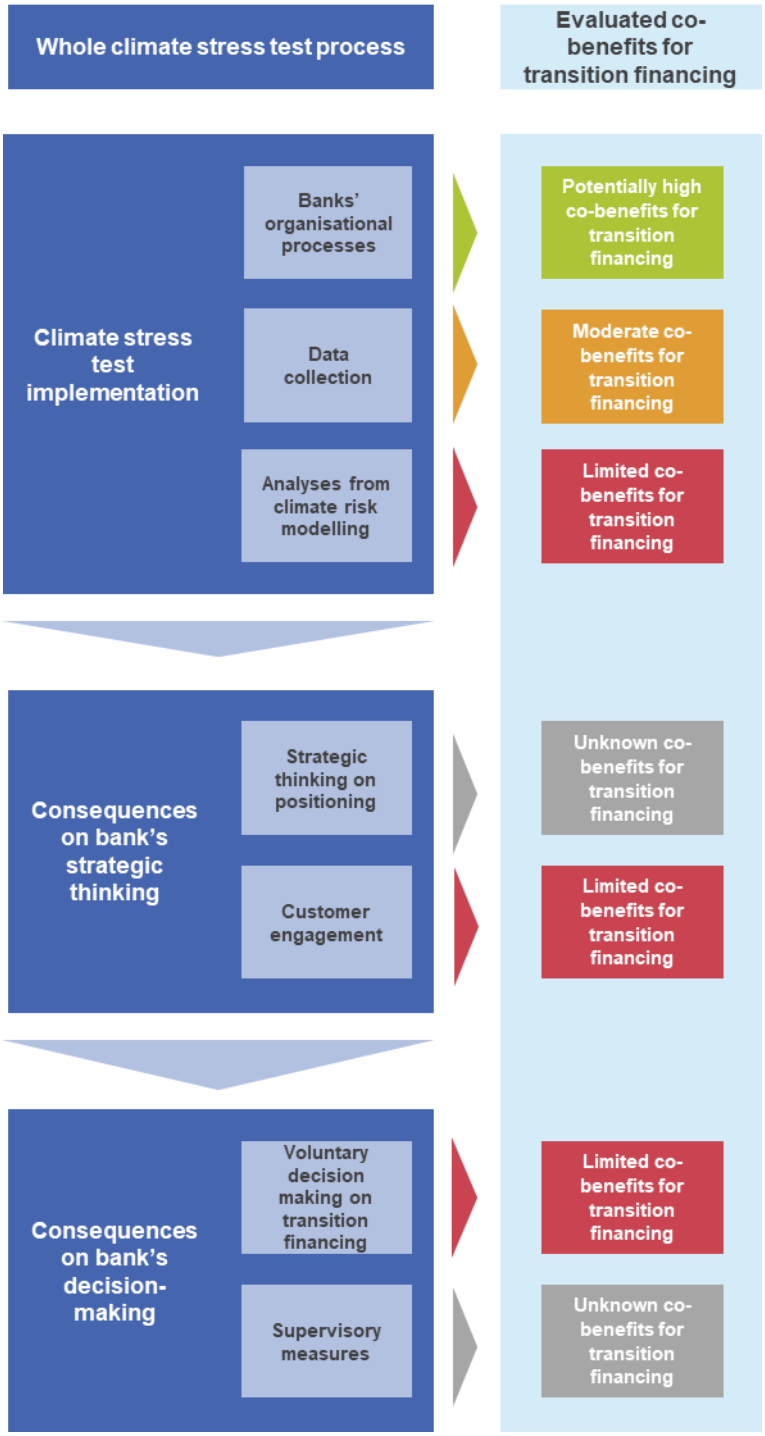

Figure 1: Analysis of the co-benefits of climate stress tests for transition financing at different stages of their process.

Source: I4CE

As these were exercises initiated by the supervisors, the climate stress tests have given credibility to climate issues among the banking teams. As a result, they have set up trainings for a certain number of their teams on climate-related issues and risks, and mobilised internally the human and financial resources necessary to carry out these exercises. These exercises also helped them to strengthen the coordination between their various teams, from the Risk, Corporate Social Responsibility, Business and Executive Committee departments, consolidating their communication and knowledge transfer on these subjects.

The more the banking teams are trained and coordinated on climate issues, from the bank's executive committee to the operational teams, the more they could potentially be in a position to take decisions in favour of financing the transition. It should be noted, however, that while the above conditions are necessary for the development of relevant bank strategies, they are not necessarily sufficient to actually trigger a shift in banks' financial flows towards transition finance. This will depend on whether banks are able to identify financial opportunities in doing so, due to their improved understanding, or whether regulatory requirements provide incentives.

The climate stress tests enabled a fragmented analysis of climate-related issues, moderating or limiting the co-benefits of these exercises on transition financing

The processes of collecting climate data from banks on their counterparties, prompted by the climate stress tests, have been of partial use depending on the types of data requested.

During the climate stress test exercises, and in particular during the ECB exercise, banks had to set up processes for collecting climate data on their counterparties, such as Environmental Performance Certificates (EPCs) of the buildings of several counterparties, as well as the GHG emissions of their largest counterparties. These data collection processes have been time-consuming and laborious for banks, and many have had to rely on proxies to provide the required information. Although there is still a lot of progress to be made, the momentum for data collection has been set in motion and is expected to continue to grow in the future in most of the banks surveyed.

The process of setting up the collection of EPCs, is essential for banks if they wish to participate in the financing of the transition in the real estate sector. The collection of EPCs makes it possible to document the need for financing in housing renovation and can then be compared in relation to the sector's transition objectives set by the national decarbonisation strategy. This data can therefore be extremely useful for banks to plan transition strategies in this sector.

To date, the collection of GHG emissions data on banks' largest counterparties has had a limited impact on transition financing. On the one hand, it is very difficult for banks to collect this type of information reliably, especially regarding the Scope 3 emissions of their counterparties. On the other hand, this data does not provide any insight into the transition potential of the counterparty in question or into the financing needs related to the implementation of the counterparty transition

plan. It is this latter element that enables banks to support their counterparties in the transition in the most efficient way.

The analyses deriving from the modelling exercises had a limited impact on the ability of banks to finance the transition.

Understanding the dynamics of the transition to a low-carbon economy requires analysing the impacts of the transition at a granular sectoral and intra-sectoral level. However, the transition scenarios developed by the NGFS and currently used in the context of climate stress tests, as well as banks' internal models, do not have a sufficient sectoral granularity. These modelling exercises therefore present numerous difficulties in assessing the impact of the transition in the real economy, and they do not manage to sufficiently grasp the dynamics of the transitions and the various risk transmission channels.

The results of the climate stress tests also presented measured financial impacts for the banks. These impacts that were considered to be largely underestimated by experts and by the supervisors themselves, demonstrating the difficulty of these techniques in capturing the financial materiality of climate-related risks.

If these models and scenarios can be improved, it seems unlikely that they will ever allow banks to completely capture the essence of the transition dynamics, as it is not their primary purpose. Yet, for banks to be able to participate in the financing of the transition, it seems very important that they have fully integrated all the specificities of these dynamics, in order to take decisions accordingly. This thus indicates the need for complementary assessments with regards to fostering transition finance.

Climate stress tests have played a limited role in the development of banks' climate strategies and decision-making processes.

Although climate stress tests have prompted some strategic thinking among banks, especially about their positioning, they have not yet led to major changes in banks' decision-making processes related to providing transition finance.

The lack of reliability given to the results of the stress tests has been a major obstacle for banks to engage discussions on the results of the stress tests with their counterparties, causing them to miss the opportunity to introduce a dialogue on climate issues with them. Yet, this dialogue is essential if banks are to be able to support them in their transition.

Banks have also yet to change their investment or financing criteria as a result of the climate stress tests. The main reason for this is that they do not consider the results of climate stress tests to be sufficiently reliable to be incorporated into decision-making processes. The difficulty in demonstrating the financial materiality of climate-related risks, generated by the uncertainties linked to the modelling of adverse transition scenarios and their impacts, currently hinders the direct use of climate stress test results in banks' investment and financing decisions. Even if it

was the case, it is not certain that it would still lead to decisions in favour of the transition. The difficulty of these exercises in demonstrating environmental materiality, in the sense that they are not able to differentiate companies that are on a credible transition pathway from those who are not, is obviously also an obstacle to transition financing.

In addition, the results of the stress tests have not yet led to binding supervisory measures for banks, which could have had an impact on their financing decisions in favour of the transition. However, it is not clear whether the introduction of additional capital requirements would actually have a beneficial effect on transition financing by banks.

Conclusion

Although climate stress tests have made it possible to integrate climate issues into the organisational and governance processes of banks and although these are necessary conditions to generate strategic thinking within the banking teams, they have had a limited overall impact on transition financing the transition to date. It is still too early to estimate the full indirect impacts they may have over time. However, it seems unlikely that they will ever succeed on their own in actually triggering an important shift in transition financing. To achieve this objective, stress tests should be accompanied by other instruments that allow banks to better understand the transition dynamics of their counterparties in order to better support them in the transition. Banking transition plans could be effective solution for that, since they should rely on banks' counterparties transition plans, and allow the banks to better understand how they can accompany their counterparties in the transition (Evain & Noguès, 2022). They could then have a significant role in filling in the missing pieces needed to put banks in a position to provide transition financing and thereby play an active part in the quest for an orderly transition.

1. Introduction

The need to boost banks' ability to finance the transition

In 2015, the Paris Agreement established the objective of making global financial flows compatible with climate goals. As of 2022, despite an increase in investments in low-carbon projects (UNFCCC, 2022), the investment gap necessary to meet the objectives of the Paris Agreement remains large (IPCC, 2022) and investments in fossil fuel activities remain significant (UNFCCC, 2022). These investment gaps can be partly filled by public authorities but will also above all, require a significant mobilisation of private finance.

Several obstacles however, still prevent financial players from mobilising the financing necessary for the transition. These obstacles are mainly the lack of training, data and tools available to the banking teams that are necessary for them to understand the challenges of the transition, financial actors' preference for the short term, and the returns of certain low-carbon projects that could be considered too low by financial actors (Evain & Cardona, 2021).

In practice, supervisors have directed their work towards climate stress testing to stimulate the integration of climate risks into banks' practices

Since 2015, regulators and supervisors have progressively mobilised on climate issues, as these can pose a systemic threat to the whole financial sector (NGFS, 2019). Several financial regulations have thus integrated climate issues and new regulations have been put in place. These regulations first progressed through changes in disclosure requirements for financial institutions' exposure to climate risks. This was the case in France with Article 29 of the 2019 Energy and Climate Law[1] and in Europe with the revision of the NFRD[2] in 2017. At the European level, the ECB published in 2020 a guide setting out expectations on sound management of climate-related risks for banks in the Single Supervisory Mechanism (ECB, 2020). This publication was followed in 2021 by an initial assessment of the alignment of the European banking sector with the ECB's expectations (ECB, 2021c). In 2022, the ECB undertook its first wide climate stress test with euro area banks (ECB, 2022e), carried out conjointly with a broad thematic review on the integration of climate-related risks into banks' practices (ECB, 2022f). Within the European Union, other supervisors at national level also undertook their own climate stress test exercises, such as the Netherlands in 2018 (Vermeulen et al., 2018) or France in 2021 (ACPR, 2021).

Although they are called *stress tests*, these early exercises did not have the primary objective of affecting banks' capital requirements, depending on the results, as is the case with usual stress tests (EBA, 2021). Their objective was first and foremost to encourage banks to integrate climate-related risks into their activities, and to carry out an initial assessment of the methodological framework for analysing these risks and the capacity of the banks to deal with them. Therefore,

[1] Law No. 2019-1147 of 8 November 2019 on energy and climate.
https://www.legifrance.gouv.fr/dossierlegislatif/JORFDOLE000038430994/
[2] DIRECTIVE 2014/95/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014.
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0095&from=EN

these initial exercises served primarily as an educational tool for banks, but since they are integrated into Pillar 2 of the prudential regulation, supervisors could ultimately have a certain number of prudential levers at their disposal in the event of non-compliance with the requirements requested (Evain et al., 2022).

Beyond these initial objectives however, climate stress tests could also potentially have a role to play in financing the transition by removing a number of previously identified barriers.

An ex-post analysis of climate stress tests' impacts on banks' transition financing

This study seeks to identify the possible co-benefits of climate stress test on transition financing, as well as their limits in this regard. The study makes the hypothesis that a better understanding and practice of climate risk management could modify banks' internal decision-making processes and thus potentially improve their ability to finance the transition. This raises the question of the complementarity between financial supervision, focused on the assessment of the risk management of the financial system on the one hand, and on the other hand the contribution of the financial system to the financing of the transition. This issue still raises many debates among the expert community (Hilke et al., 2021; Hubert et al., 2022).

To this end, this report is based on an ex-post analysis of the initial lessons learned by banks and supervisors from conducting these exercises. This report will be based on the results of the pilot climate exercise conducted by the ACPR in 2021 and on the prudential exercise conducted by the ECB on euro area banks in 2022 (see Methodology). It proposes an analysis of the various impact items in the different stages of the climate stress tests processes, analysing each time the co-benefits that they could have on the financing of the transition.

The study will first detail the specific features of the two exercises studied, pointing out elements that are useful for the study analysis. The report will then assess the transition financing co-benefits generated by the implementation of internal processes within banks and supervisors in the context of these exercises. The report will also assess the co-benefits generated by the analyses resulting from the modelling exercises, as well as those generated by the collection of indicators, allowing banks to better understand the transition dynamics of their counterparties. Finally, the study will assess the impact that climate stress tests has had on banks' strategic and decision-making processes.

2. Case study design

2.1 Background

Stress tests are risk measurement tools used by supervisors and financial institutions. They are designed to measure the sensitivity of financial institutions to scenarios simulating severe but plausible macroeconomic and financial shocks. The results of these exercises can determine the capital requirements for financial institutions to cope with these different shocks. Stress tests emerged in the late 1990s in the wake of the Asian financial crisis and expanded widely after the 2008 financial crisis.

Applied to the climate, they consist of changing several variables, such as the carbon price or the occurrence of natural disasters affecting infrastructures and sectors, and quantifying the impact on the banks' balance sheets, while analysing the strategies adopted by banks to cope with these changes. The latter specificity is peculiar to climate stress tests. The risks that the stress test seeks to measure are twofold: the transition risks, linked to the financial losses caused by the transition to a low-carbon economy, and the physical risks, linked to the financial effects of climate change (reduced productivity, material damage, etc.).

Using this type of exercise to measure the impact of climate risks on financial institutions is still in its infancy, however several supervisory authorities have started to carry them out, such as the Bank of the Netherlands (Vermeulen et al., 2018), the Bank of England (Bank of England, 2019), the Banque of France and the ACPR (ACPR, 2021) or the ECB (Alogoskoufis et al., 2021; ECB, 2021b).

While the public debate around climate stress tests mainly focused on methodologies and scenarios relevance, the present study will focus on the impact that these exercises may have on transition financing. Studying this aspect of climate stress tests is a new field of research, as it is not the main objective of these exercises. However, as they have the potential to influence the organisational and strategic processes of banks, they could potentially have an impact on the financing of the transition.

2.2 Relevance for transformative climate policy

The objective of the 4i traction project is to analyse what EU transformative climate policy could look like. The objective of this present study is to participate to the evaluation of the ex-post assessment of an EU climate policy that have been put in place in the recent years by analysing the factors that have contributed to attaining EU's climate objective. As described above, the case study will try to evaluate the potential co-benefits that climate stress tests can have on transition financing.

The financial sector has a key role to play in helping the EU to attain its climate objective. As underlined in the last IPCC report (IPCC, 2022), delayed investment and financing will result in significant carbon lock-in, stranded assets and additional costs and will significantly hamper the ability of developed and developing countries to reduce their GHG emissions and meet their climate objective.

The prevailing approach to facilitating investment and finance for climate neutrality has not led to transformative outcomes, neither within the finance sector itself, nor in the real economy. Several reasons may explain such a fact. Firstly, until now, investment strategies of the financial system only focused on climate-friendly investment, confining themselves into the niche of green finance, and secondly, because until recently financial regulation was mainly limited to increasing transparency.

Climate policies wishing to fill the climate investment gap face then several challenges (Görlach & Martini, 2022). First of all, they should enable financial institutions to expand their climate strategies' focus from the niche of green finance to overall investment flows, they should facilitate the contribution of financial institutions in the phasing-out of incumbent fossil technologies, and above all, they should force financial institutions to only finance companies that have a convincing strategy to align their business with a transformative pathway compatible with climate goals. To do that, the climate policies should also focus on financial institutions' governance issues and internal processes in order to help them to better integrate climate issues into their operations.

As they are focusing on banking institutions' internal processes and strategy, climate stress-tests may have then an indirect impact on transition financing, even though it is not their final objective. That is why this present study studies the potential co-benefits climate stress tests may have on transition financing.

The impact study on climate stress-test will mainly provide insights on two of the four I – *Investment* and *Integration*:

- Investment: the case study mainly focuses on how and to what extent climate stress-tests conducted by financial supervisors on banks succeed in accelerating the redirection of financial flows toward a greener economy.
- Integration: the case study evaluates the role of climate stress-test exercises in climate mainstreaming within banking institutions and financial supervisors and how did they enable banking institutions to better integrate climate issues in their activities.

2.3 Methodology

2.3.1 Definition of the methodological framework

The objective of this study is to analyse the potential co-benefits generated by the implementation of climate stress tests on banks' transition financing, as well as their limits. To this end, the analysis takes up the different stages of the climate stress test process, from the data collection to the modification of banks' strategic decision-making and the prudential consequences, in order to assess the positive impacts for transition financing in each of these different stages.

2.3.2 Perimeter

In the context of this study, two climate stress test exercises were analysed in greater detail: the pilot exercise conducted by the ACPR on nine French banks in 2021 (ACPR, 2021) and the regulatory exercise conducted by the ECB in 2022 on euro area banks directly supervised by the ECB (ECB, 2022e). These two exercises were selected because they were *bottom-up* exercises, i.e. they implied an active participation of banks (see section 3.1) in the process. It is primarily this active participation by banks that has the potential to generate co-benefits for financing the transition from these exercises. The ECB exercise was taken onboard in the Supervisory Review and Evaluation Process (SREP) of the main banks in the euro area – although to a limited extent due to the learning nature of the exercise.

The study will analyse the impact of these two exercises on French banks. As French banks have participated in two climate stress test exercises, they have had sufficient hindsight to understand the impact that these exercises may have had on their activities. Although the ACPR pilot exercise also included insurance companies in its scope, this study will only focus its analysis on banks. Focusing on banks is relevant as banks play an extremely significant role in financing the real economy in the euro area. They account for more than 30% of financial assets, and loans contribute to more than 30% of the financing of the economy (ECB, 2022d). The prudential instruments put in place by supervisors for banks can therefore have a significant impact on the financing of the transition.

2.3.3 Data collection

To carry out this analysis, the study is based on semi-structured interviews, conducted qualitatively with the main French banks that participated in the two exercises as well as with their supervisors, the ACPR and the ECB (see annex), between June 2022 and December 2022. The interview grid traces the different impact sections analysed and presented above. The research analysis also relied on a deep analysis of all the methodologies that have been developed by both the ACPR and the Banque de France (ACPR, 2020; Allen et al., 2020) and the European Central Bank (ECB, 2021b, 2022c) for the implementation of the climate stress test exercises, as

well as their results (ACPR, 2021; ECB, 2022e) . Finally, the study drew on a broader literature review on climate stress testing, climate risk management and the role of financial institutions in financing the transition.

2.3.4 Limitations of the study

Limitations related to the scope

This study did not analyse the impact that the potential variation in financing and investments carried by banks could have on the decarbonisation trajectories of the real economy. The first reason is that, to date, the study has not been able to attribute that changes in the financing and investment decisions of banks could be a result of the climate stress tests. The second reason is that analysing the impact of financing in the real economy is a different field of research. The objective of this study was more to investigate the indirect impacts of a prudential regulatory instrument on banks' financing strategies.

The study did not examine the relevance of the modelling methodologies used in the climate stress test exercises, nor the relevance of the scenarios deployed for this type of exercise. The study sought to analyse the qualitative impact that these exercises may have had on banks' practices and not the quantitative exposure of banks to climate-related risks.

Finally, the study only analysed the impacts related to the stress test exercises alone and did not examine the impacts related to other supervisory processes (such as the thematic review conducted jointly with the stress test exercise) or to internal dynamics within the banks.

Limitations related to the results

The results of the study only concern the French banks. The French banking market is mainly composed of large non-specialised banking groups financing the whole economy. The conclusions of this study are therefore specific to the main French banks. The results of this study could vary from one country to another depending on the structure of its banking market, and from one bank to another depending on its positioning, its mode of governance and its strategy.

3. Results

3.1 Main characteristics of the studied climate stress tests

3.1.1 From prudential stress tests to climate stress tests: the development of a new tool by supervisors

3.1.1.1 The choice of a new supervision tool: the climate stress test

Stress tests are risk measurement tools used by supervisors and financial institutions. They are designed to measure the sensitivity of financial institutions to scenarios simulating severe but plausible macroeconomic and financial shocks. The results of these exercises can determine the capital requirements for financial institutions to cope with these different shocks. Stress tests emerged in the late 1990s in the wake of the Asian financial crisis and expanded widely after the 2008 financial crisis.

Applied to the climate, they consist of changing several variables, such as the carbon price or the occurrence of natural disasters affecting infrastructures and sectors, and quantifying the impact on the banks' balance sheets, while analysing the strategies adopted by banks to cope with these changes. The latter specificity is peculiar to climate stress tests. The risks that the stress test seeks to measure are twofold: the transition risks, linked to the financial losses caused by the transition to a low-carbon economy, and the physical risks, linked to the financial effects of climate change (reduced productivity, material damage, etc.).

Using this type of exercise to measure the impact of climate risks on financial institutions is still in its infancy, however several supervisory authorities have started to carry them out, such as the Bank of the Netherlands (Vermeulen et al., 2018), the Bank of England (Bank of England, 2019), the Banque of France and the ACPR (ACPR, 2021) or the ECB (Alogoskoufis et al., 2021; ECB, 2021b).

3.1.1.2 Specific features compared to traditional prudential stress tests

Compared to traditional stress testing exercises, climate stress tests have certain specific characteristics (Clerc, 2020):

- The time horizon can be longer, as climate risks are expressed over decades and the models should then take different time horizons, from 1 year to 30 years, into account.
- Climate risks are characterised by radical uncertainty where past data can be absent and often irrelevant.
- A very high level of granularity is required, both at a sectoral level and geographically.

- The effects of climate risks are difficult to predict in terms of feedback loops between political and economic choices and climate change.

These characteristics represent challenges for supervisors to develop this type of tool and methodological developments are still ongoing.

3.1.1.3 Several methodological choices are available to supervisors

In carrying out climate stress test exercises, supervisors can choose to develop several types of approaches, which already exist in traditional stress test exercises.

A *top-down* or *bottom-up* approach

In *top-down* stress tests, the supervisor assesses the systemic nature of climate-related risks across the selected financial system, using its own models, its own assumptions, and data (from an inhouse or an external database). This type of stress test does not involve the participation of banks. The ECB, for instance, carried out a first *top-down climate* stress test exercise in 2021, based on a database containing information on more than 4 million companies worldwide and 1,600 banking groups in the euro area (Alogoskoufis et al., 2021).

For the *bottom-up* stress tests*,* banks assess the climate-related risk exposure of their portfolios with their own internal models based on data and scenarios provided by the supervisor that conduct the exercise. The supervisor then presents the results. In the case of climate stress tests, supervisors usually present aggregate results of the banks that have been tested.

The two exercises studied, that are the pilot exercise carried out by the ACPR in 2021 and the prudential exercise carried out by the ECB in 2022, were both *bottom-up* exercises*,* involving the participation of banks in the exercise.

A static or dynamic balance sheet

Supervisors may choose that financial institutions keep a static balance sheet, i.e. maintaining their current balance sheet when making the exercise projections. The use of a static balance sheet is particularly relevant when the projection horizon is relatively short (< 3 or 5 years). This practice is used in traditional stress tests.

Supervisors may also opt for a dynamic balance sheet, where institutions may have the choice to change their portfolio allocation over the time horizon according to the different scenarios. This change in balance sheet allocation may, however, be accompanied by constraints. This may include not having balance sheet growth completely disconnected from GDP growth (ECB, 2021b) or having a balance sheet structure that is not too far removed from the overall structure of the economy (ACPR, 2020). The use of a dynamic balance sheet can be useful when the time horizon is relatively long to allow banking institutions to adapt their strategy to the different scenarios.

Sectoral and geographical granularity

As climate-related risks can materialise at a very granular level, whether sectoral, infra-sectoral or geographical, supervisors need to make a choice about the level of granularity at which they wish to assess the impacts of climate-related risks.

The choice of scenarios

The choice of scenarios is crucial for assessing the degree of vulnerability of financial institutions to climate-related risks.

To help regulators and supervisors, as well as financial institutions, to better understand and integrate these issues into risk management practices, the Network for Greening the Financial System (NGFS) has developed several sets of scenarios (NGFS, 2020, 2021, 2022). The NGFS has used data from climate research to develop different transition scenarios for 2050 and 2100. They provide a common reference point for understanding how climate change (physical risk) and climate policy and technology trends (transition risk) might evolve in the future[3] . IAM - Integrating Assessment Models – are the foundation of these scenarios.

These scenarios have been used in the majority of the climate stress test exercises carried out by the supervisors until now.

3.1.2 Objectives and methodological choices of the ACPR and ECB exercises

3.1.2.1 The ACPR pilot exercise: a first step towards the development of a methodological framework for climate stress tests

Context of the exercise

In 2020, the ACPR undertook its first climate stress test, called *pilot exercise*, for the French financial sector (banks and insurance companies). This exercise was not mandatory but most of the larger banks and insurers participated (9 banks and 22 insurers). This was a really new exercise for both financial institutions and the ACPR. The ACPR developed an analytical framework with the teams of the Banque de France (Allen et al., 2020), based on the work of the NGFS, in order to propose detailed scenarios to financial institutions.

The exercise was carried out with a bottom-up approach: the different scenarios were submitted by the ACPR to the banks and insurance companies so that they could carry out a qualitative and quantitative analysis of the impact of these scenarios on their portfolios. The results were then aggregated by the ACPR (ACPR, 2021).

The objective of this first exercise was not to quantitatively determine the need for additional capital for French banks to face climate risks, but rather to mobilise and raise awareness of

[3] https://www.ngfs.net/ngfs-scenarios-portal/

climate-related risks among financial institutions and to help them develop a strong framework to better manage climate-related risks.

The choice of transition scenarios

The reference scenario chosen by the ACPR was an 'orderly' transition scenario, assuming a significant increase in the price of carbon from 2020. Two other scenarios were 'disorderly' transition scenarios. The first variant implies a late ('delayed') policy response, with the introduction of a carbon price increase in 2030, the second, more adverse than the scenarios proposed by the NGFS, describes the introduction of an unanticipated carbon price as early as 2025, complemented by negative productivity shocks due to the immaturity of renewable energy production technologies. The last scenario, used to determine the physical risks for insurance companies, implies a continuation of current policies, and thus a transition-free trajectory (see Figure 2).

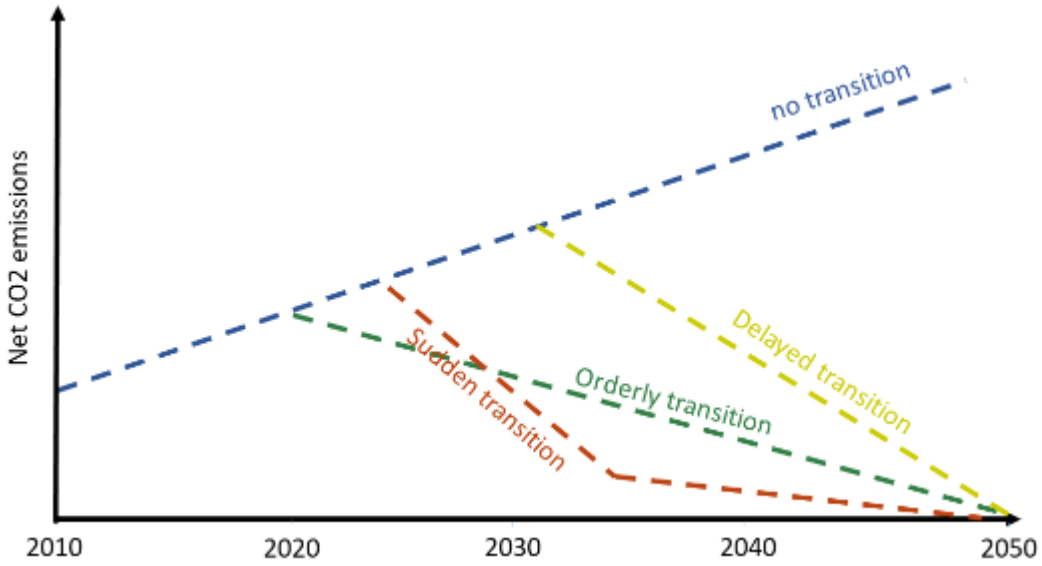

Figure 2: Proposed scenarios for the ACPR pilot exercise in terms of emission profiles
Source: Climate-Related Scenarios for Financial Stability Assessment: an application to France, Allen et al, 2020

Methodological choices

The exercise was carried out over a 30-year period, up to 2050, with exposure to four geographical areas (France, the rest of the EU, the United States and the rest of the world). In order to increase the granularity of the analysis and capture higher sensitivity of certain sectors to the different scenarios, it included a sectoral dimension, covering 55 sectors of activity. The analytical framework also proposes a static balance sheet up to 2025, and then a dynamic balance sheet up to 2050, to allow financial institutions to adjust their portfolios according to the different transition dynamics at work. The exercise also included 'second-round effects' to measure the indirect exposure of banks to physical risk (Allen et al., 2020).

The rest of the structure of the exercise was conducted by working groups bringing together the ACPR and the main players in the banking industry and insurance groups. Hence, the exercise gave rise to strong collaboration and numerous exchanges and discussions between the financial institutions and the supervisor.

Modelling techniques

The ACPR exercise involved several steps of modelling (see figure 3), generating paths for several variables which were then communicated to the banks.

The IAM models generated different paths for variables such as GDP, carbon prices and greenhouse gas emissions depending on the chosen scenarios. These variables were then combined with the NIGEM macroeconomic model and a sectoral model of the Banque de France to obtain a full set of macroeconomic and sectoral variables for the 55 studied sectors. These data were then incorporated into the financial models of the Banque de France generating a number of financial variables (PDs, market valuation, etc) (see Figure 3).

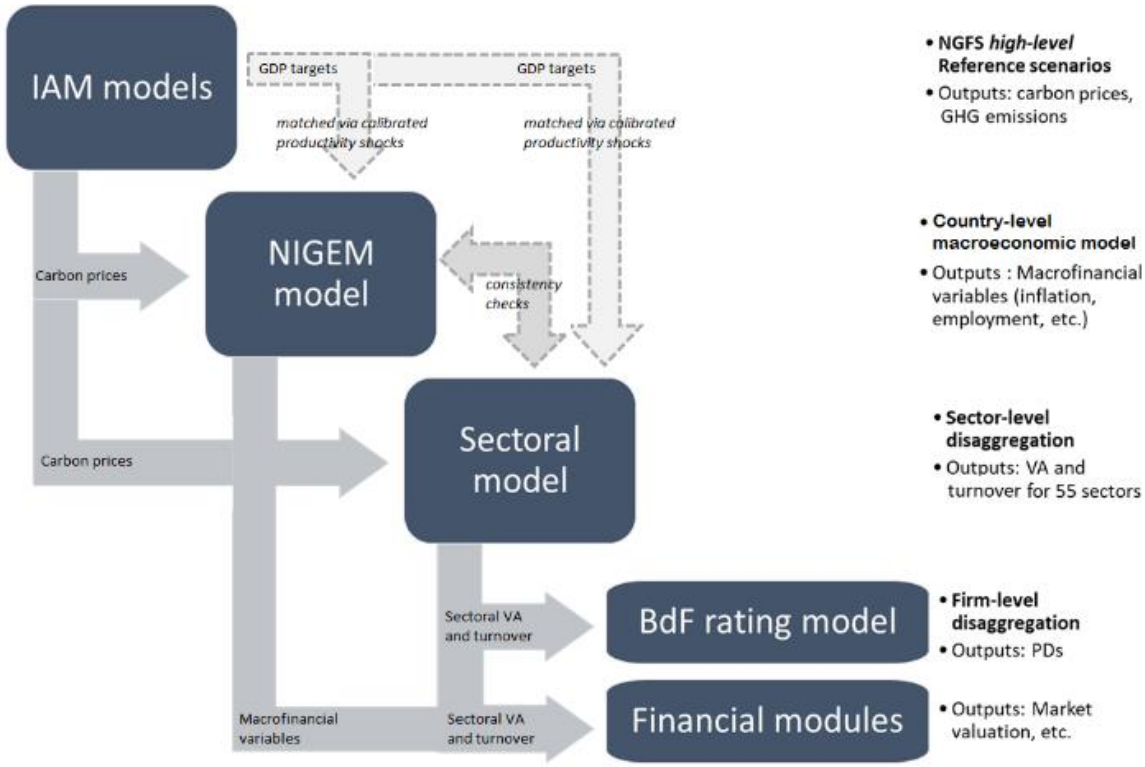

Figure 3: The modelling structure of the pilot exercise conducted by the ACPR

Source: Climate-Related Scenarios for Financial Stability Assessment: an application to France, Allen et al, 2020

These different variables were then communicated to the financial institutions so that they could incorporate them into their own risk assessment models.

Results

According to the results of the exercise, this first measure of the climate risks to which French financial institutions are exposed, showed overall 'moderate' exposure and vulnerabilities. The transition risks were then 'relatively low' for banks and insurers. However, the ACPR specified that this conclusion must be put into perspective in view of the uncertainties about the impact of climate change linked to the assumptions and scenarios used.

3.1.2.2 Climate stress tests: a key tool in the European Central Bank's climate roadmap

Context of the exercise

In 2019, the European Central Bank identified climate-related risks as one of the key risk drivers in the risk mapping carried out by the Single Supervisory Mechanism (SSM). As a result, the ECB decided to publish in 2020, its first guide on climate-related risk management for banks - the 'Guide' (ECB, 2020). The Guide describes how the ECB expects banking institutions to consider climate-related and environmental risks when formulating and implementing their business strategy and governance, and risk management frameworks. The publication of the Guide was followed in 2021 by an initial assessment of the alignment of the European banking sector with the ECB's expectations (ECB, 2021c), and in 2022, by a first wide climate stress test with euro area banks (ECB, 2022e) and a broad thematic review on the integration of climate-related risks into banks' practices (ECB, 2022f). All these supervisory processes are part of ECB's climate roadmap (see Figure 4).

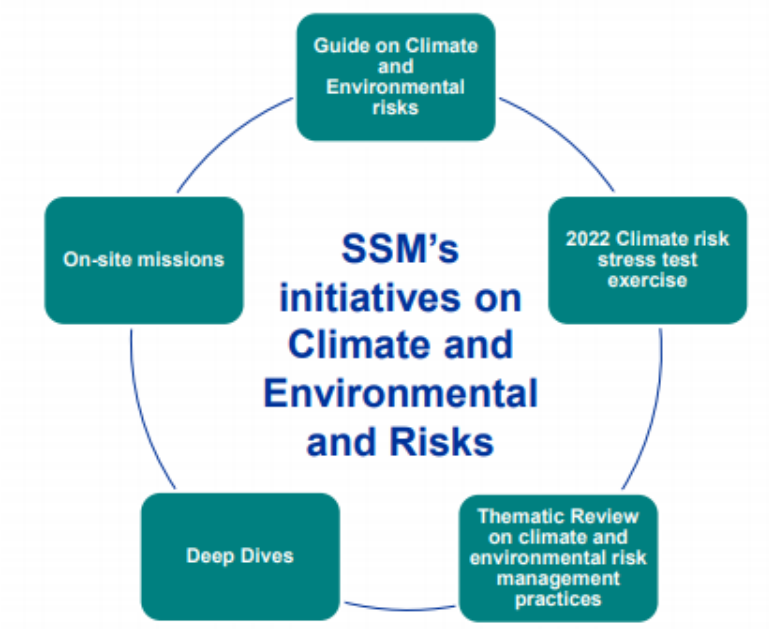

Figure 4: The ECB's climate roadmap

Source: ECB, Climate Risk Stress Test 2022, Final Results, 2022

The importance of climate stress tests is also emphasised both in the European Commission's Sustainable Finance Strategy (European Commission, 2021a) and in the ECB's strategic priorities for 2022-2024 (ECB, 2022b).

A supervisory exercise integrated into the SREP supervision process

The ECB's climate stress test exercise is included in the Single Supervisory Mechanism (SSM), as a thematic stress test[4]. The SSM is the European banking supervisory system and the first pillar of the Banking Union. It is supervised by the Joint Supervisory Teams (JSTs) composed of teams from the ECB and teams from the national authorities of the participating countries.

In this context, the results of this climate stress test contributed to the *Supervisory Review and Evaluation Process* (SREP) analysis within Pillar 2 of the prudential regulation, but only qualitatively. However, it was announced from the beginning by the ECB that the results of this exercise would not have a direct impact on banks' capital through the Pillar 2 Guidance (P2G) capital requirements (ECB, 2022e).

According to the supervisors, it is still too early for the climate stress tests to lead directly to an increase in banks' capital requirements (P2G) for several reasons. Firstly, they consider that the methodologies for analysing climate-related risks are still in their infancy. Secondly, they estimate that banks are still far from having developed a sufficiently solid risk management framework. Finally, the results of climate stress tests are likely to be underestimated (see below), making it difficult to estimate capital requirements quantitatively.

Climate stress tests could however, nurture some sub-elements or scores of the SREP, like conventional stress tests. If there are severe shortcomings, the SREP score could potentially lead to pillar 2 adds on or to binding supervisory measures, such as the request to strengthen banks' risk management frameworks or to review their strategies and policies (EBA, 2018).

As a result of the supervisory exercises on climate issues in 2021 and 2022, and based on banks' compliance with the supervisory expectations from the Guide, the ECB reported that it had imposed binding qualitative requirements on more than thirty euro-area banks in its annual SREP assessment. The results of these supervisory exercises also affected the SREP ratings of a few banks, thereby affecting their Pillar 2 capital requirements (ECB, 2022f)[5].

Following the completion of these exercises, the ECB also required banks to fully align with the recommendations of its 2020 Guide by the end of 2024. This includes the development of their internal stress testing framework. The ECB announced that if these deadlines and recommendations were not met, binding supervisory measures would be taken (ECB, 2022f). To this end, numerous discussions between supervisors and banks will take place in the meantime to allow banks to further develop their climate risk analysis methodologies.

[4] https://www.bankingsupervision.europa.eu/banking/tasks/stresstests/html/index.fr.html
[5] As the thematic review covered 11 of the 13 expectations of the Guide, it carried more weight in the calculation of the SREP scores than the climate stress test.

Methodological choices

The ECB exercise (ECB, 2021b) consisted of three different modules that banks had to deal with:

- Module 1: A qualitative questionnaire on banks' capacity to develop a sound internal climate risk stress testing framework. The questionnaire includes an assessment of governance, modelling practices, risk appetite and the integration of climate issues into the banks' business strategy, etc.
- Module 2: An analysis of banks' current exposure to 22 sectors identified as the most carbon intensive[6]. Banks were asked to provide their revenues and the total amount of associated loans for each of these sectors. Banks were also asked to provide the amount of greenhouse gas emissions (Scope 1, 2 and 3) of their 15 largest counterparties for each of these sectors to obtain an overview of the emissions financed by the banks via their corporate portfolio.
- Module 3: Bottom-up projections of banks' balance sheets under different scenarios and time horizons. Only the most significant banks in the euro area participated in this last module (41 banks).

Choice of scenarios[7]

In its third module, the ECB chose to assess banks' exposure to climate-related risks for a number of transition and physical risk scenarios. These were either derived from the NGFS scenarios or developed by the ECB, over different time horizons and risk areas (see Figure 5).

	Exposures	Scenario	Projections[1]	Horizon	Credit risk	Market risk	Operational risk
Transition risk	Global	Short-term stress	Baseline	3 years (2022-2024)	Corporate loans (incl. SME, CRE) + mortgages	Bonds + stocks issued by NFCs[2] (incl. accounting and economic hedges)	Operational and reputational risks to be assessed via a qualitative questionnaire
			Stress				
		Long-term paths	Orderly	30 years (2030, 2040, 2050)	Corporate loans (incl. SME, CRE) + mortgages		
			Disorderly				
			Hot house				
Physical risk	EU countries	Drought & heat risk	Baseline	1 year (2022)	Corporate loans (incl. SME)	1.All projections with the exception of the long-term paths will be based on a static balance sheet. 2.The parent company needs to be an NFC, e.g. bonds issued by car financing company X are in scope.	
			Stress				
		Flood risk	Baseline	1 year (2022)	Mortgages + CRE loans		
			Stress				

Figure 5: The different scenarios of the ECB's climate stress test exercise

Source: ECB, 2022 climate risk stress test, 2022.

[6] These sectors represent 90% of Scope 1 emissions in Europe.
[7] For more details on the scenarios used in the ECB's exercise, see ECB, Macro-financial scenarios for the 2022 climate risk stress test, 2021. https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.macrofinancialscenariosclimateriskstresstest2022~bcac934986.en.pdf

Notes: CRE stands for commercial real estate; NFC stands for non-financial corporation; SMEs stands for small and medium-sized enterprises.

The ECB chose to also analyse the physical risks within these scenarios, by assessing the impact of two physical risks, drought and heat waves, as well as floods over a one-year horizon timeline.

Results

The results of Module 1 of the ECB exercise showed that the number of banks that had properly integrated a climate stress testing framework was far too low (less than 40% of banks) and that there was still a lot of room for improvement.

The results of Module 2 showed that banks were highly exposed to the most emissive sectors in terms of revenues and assets. For example, more than 60% of the banks' interest income from non-financial companies comes from greenhouse gas intensive industries.

Finally, the results of module 3 indicated mixed impacts of climate-related risks on estimated bank losses. For example, the short-term scenarios (physical and transition) generated total losses of 70 billion euros for all the banks that participated in this module. The ECB indicates, however, that these results are very likely to be underestimated. This is due in particular to the fact that the scenarios used are not sufficiently adverse, that the modelling techniques still need perfecting and that the banks' exposures tested within this module only represented one third of the total exposures[8].

Table 1: comparative summary of the two exercises

	ACPR pilot exercise	ECB prudential
Jurisdiction	ACPR	ECB
Entities involved	9 banks and 22 insurance companies	Significant institutions of the eurozone
Date of the exercises	January to April 2021	March to July 2022
Prudential framework	Voluntary 'pilot' exercise	Thematic stress test of the ECB Contribute to the SREP
Exercise horizon	30 years	Transition risk scenarios: 3 and 30 years Physical risk scenarios: 1 year
Balance sheet development assumption	Static until 2025 then dynamic until 2050	Static for short-term scenarios Dynamics for long-term scenarios

[8] The exposures tested in the ECB climate stress test only include mortgages loans and corporate loans for credit risk exposure and corporate bonds and stocks in the trading book for market risk exposure. It did not include for instance other loans to individuals or loans to other financial institutions.

Risks involved	Credit and market risk	Credit risk, market risk and operational risk
Geographic exposures	4 geographical areas: France, EU, USA, and rest of the world	Banks' exposures up to 5 countries
Methodology	Projection of the exposure of banks' and insurances companies' portfolios to climate risks under each scenario over the studied time horizon.	3 analysis modules - Module 1: Questionnaire on banks' capacity to develop a sound internal climate risk stress testing framework - Module 2: Collection of climate data on major counterparties - Module 3: Projection of the exposure of bank's portfolios to climate risks according to each scenario over the studied time horizon

3.2 The major benefit of climate stress test: a process that mobilises banks and supervisors around climate-related issues

3.2.1 The processes that followed the implementation of climate stress tests has given credibility to climate issues among banking institutions

Key messages:

Supervisors have integrated climate-related risks into their supervisory processes and have developed thematic stress tests on climate-related risks.

This momentum showed that supervisors were paying attention to climate issues and that financial institutions should do the same.

Climate issues have thus gained credibility within financial institutions.

Co-benefits for transition financing: The more credible climate issues are considered by financial institutions, the more they are likely to consider them in their decision-making processes. The positive impact on transition financing will be determined by how climate issues are considered in these decision-making processes. In France, the

first regulations on climate risk transparency requirements (article 29 of the Energy Climate Law[9] in 2019 in France or the revision of the NFRD[10] at European level in 2017), imposing extra-financial reporting requirements, as well as the voluntary commitments of banks (FBF & Finance for tomorrow, 2019), have resulted banks' awareness on climate issues beginning to rise.

However, the introduction of climate stress tests by supervisors, first by the ACPR in France and then by the ECB, has really made it possible to give credibility to the materiality of climate-related issues and risks for banks, by integrating them directly into the Pillar 2 of the prudential regulation.

The publication of the ECB's 2020 guide on climate-related risk management for banks (ECB, 2020) also gave initial credibility to these issues among banking staff and indicated the ECB's desire to integrate climate-related risk management into Pillar 2. However, the introduction of climate stress tests (collectively with the 2022 thematic review) has greatly accelerated this process by forcing banks to put into practice several expectations of the guide.

The completion of these exercises has enabled the responsibility for analysing climate issues to be extended from the banks' CSR – Corporate Social Responsibility – department to the Risk department. Until then, climate reporting and strategy were mainly handled by the CSR department in most banks, with a few people from the Risk department specialising in climate risk. The publication of the ECB guide and the 2021 and 2022 supervisory processes, including the climate stress test, has enabled a larger number of teams within the Risk department to become familiar with the subject.

This extension of the subject from the CSR department to the Risk department shows how important climate issues have become internally. In fact, several banks interviewed reported that the fact that climate stress test exercises are an initiative from the supervisors had changed their perception of climate risks, and that interest in these types of risks had increased significantly, including among teams outside the Risk Department.

The credibility given to climate-related risks concerns both transition risks and physical risks. Greater attention given to transition risks could generate an increased awareness of the effects of the transition for banks. This could then enable them to better understand the dynamics at work and thus take decisions accordingly. The same applies to physical risk, which is also included in the analysis of the ECB exercise (see box 1). This integration of physical risks into the ECB exercise has been central to making the materiality of physical risks more credible for banks. Increased awareness of physical risks and their impacts on their business is also a first step in enabling banks to understand that an orderly transition is essential to limit their overall exposure to climate-related risks. However, the concrete link between their exposure to physical risks, and the need to finance an orderly transition to avoid them is not yet fully developed in banks' internal strategies.

[9] LAW No. 2019-1147 of 8 November 2019 on energy and climate, https://www.legifrance.gouv.fr/dossierlegislatif/JORFDOLE000038430994/
[10] DIRECTIVE 2014/95/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 October 2014. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0095&from=EN

The more credible climate issues are considered by financial institutions, the more importance they are able to give them in their decision-making processes. However, while giving credibility to climate-related risks may be necessary for banks to take the subject seriously, it is not sufficient for them to act positively on transition financing. It will depend on the strategy they adopt based on this information.

Box 1: Climate stress tests have accelerated the integration of physical risks into the climate risks analysis framework for banks, but improvements are still to be made

The ACPR pilot exercise did not develop a framework for analysing the exposure of banks' counterparties to physical risk, mainly because the global frameworks for analysing banks' climate-related risks were still too infantile for banks to develop relevant results for both types of risk. Transition risk had therefore been prioritised. Only one bank indicated that it had also sent results for physical risks.

The ECB integrated physical risks into its exercise, notably by developing short-term scenarios modelling the impact of two physical risks, droughts and heat waves, and floods, on banks' counterparties (corporate and household portfolios).

Estimating the impact of physical risks on their portfolios has meant that banks have had to collect data on the geographical location of their exposures, at a NUTS3 level of granularity[11]. While the collection of this initial data was a start, the NUTS3 level is still insufficient to really enable banks to estimate the impact of physical risks on their counterparties' assets.

Physical risks can materialise at a very granular level, practically at the asset's address. For buildings, and in particular for housing, this data exists in the banks' databases at the level of the retail network entities, but had not been brought up to group level until now. Most of the banks interviewed indicated that they had started to implement a system to collect this data. Some of them have also scheduled internal stress test exercises on physical risks to improve their understanding on what data they would need.

However, if the location of assets in France could be easily collected in the future, gathering the data to determine the full exposure of banks' counterparties to physical risks represents a much greater challenge. Physical risks can materialise

[11] The Nomenclature of Territorial Units for Statistics (NUTS) is a territorial division within the European Economic Area, divided into statistical units structured on 3 levels per country, defined by minimum and maximum population thresholds. Thus, for the NUT3 level, the population threshold must be between 150 000 and 800 000 inhabitants. For more information on the NUTS regional classification system, see NUTS MAPS on the Eurostat website.

across the entire value chain of companies, on assets located in geographical areas where the location is difficult to recover (especially for assets outside Europe). Yet, this data is often sensitive and confidential, and may not necessarily be transmitted to banks. It therefore seems difficult for banks to estimate the full materiality of the physical risk on their counterparties.

Ultimately, it is still difficult for banks to assess their exposure to physical risks in a relevant way. As a consequence, it may be difficult for banks to understand the challenges of adaptation and how to provide appropriate financing for it. It also makes it difficult for them to make the link between their exposure to physical risks and the need to finance an orderly transition to avoid them.

3.2.2 The climate stress tests provided a justification for allocating financial and human resources to the analysis of climate issues.

Key messages:

The climate stress tests mobilised a large number of internal bank teams from several different departments.

The banks' internal teams have been trained in climate issues and for one bank dedicated recruitments have been made.

The implementation of climate stress tests has thus justified the mobilisation of financial and human resources to work on these subjects.

Co-benefits for transition finance: The more banks internal teams are trained on climate issues, the more they are likely to understand the dynamics of the transition and the more they are able to better accompany their counterparties in the transition.

The fact that climate stress tests are prudential exercises, particularly the ECB exercise, made it possible to mobilise a large number of people within the banking teams, obliging them to train on the subject. This was demonstrated by the change in the number of people involved in the exercise between the ACPR exercise and the ECB exercise. The banks interviewed indicated that the mobilisation of teams was much greater for the ECB exercise than for the ACPR. The ACPR exercise had mainly mobilised a few people in the CSR department and a few people in charge of climate risk in the Risk department. The fact that the ECB exercise is a regulatory exercise within

the SREP supervision process, with wider sets of scenarios, led the banks to mobilise far more people internally.

In most of the banks interviewed, the Risk department teams carried out this exercise in collaboration with their CSR department, which was responsible for ensuring that the bank's climate strategy and sectoral trajectories were taken into account in the exercise. Some banks also directly involved their business teams, particularly in the development of sectoral analyses, which was a novelty for these people who had never before carried out a regulatory stress test. The Economic Research teams were also sometimes involved. As a result, the average number of FTEs (Full-Time Equivalent) involved in the ECB exercise on a full-time basis approximatively 10 people per bank over the entire duration of the exercise. A much larger number of people were partially involved in the exercise however. In one bank, up to 100 people were partially involved in the exercise, demonstrating the importance of the subject within banks and the standardisation of it.

Most of the banks did not necessarily recruit people specialised in climate issues, but focused more on training their staff. However, one bank specified that the implementation of the ACPR pilot exercise had led to several dedicated recruitments.

For banks that had already begun working on climate risks, this also enabled the teams who had previously been responsible for climate-related risks and issues to legitimise their ongoing work, both with operational teams, as well as, above all, with top management, thus justifying additional resources. Before these exercises were carried out, the analysis of climate-related risks within financial institutions was still at an exploratory stage, and the resources allocated to this analysis were not necessarily proportionate to the challenges. The climate stress test exercises have confirmed the need to allocate resources to these issues.

The more banks' internal teams are trained on climate issues, the more they are likely to understand the dynamics of the transition. This will enable them to better accompany their counterparties in the transition. Once again, it will depend on how they will take these issues into consideration.

3.2.3 The climate stress tests have helped banks to strengthen the coordination among their teams on climate issues

Key messages:

The implementation of climate stress tests has prompted a number of bank departments to coordinate more formally to address climate issues.

Co-benefits for transition financing: Better coordination between teams allows for better communication on climate issues, and thus enables skills and information sharing on these issues between teams. A coordination between the Business, the CSR, and the Risk team is the ideal way of having an integrated management of both risks and environmental impacts.

The implementation of these exercises, and in particular the ECB exercise, also made it possible to strengthen coordination between the various teams on climate issues, and especially the Risk department team, the CSR department team, the Business department team and the top management. For example, for one of the banks, the implementation of the ACPR pilot exercise led to the creation of a Climate Risk Committee and the creation of cross-functional committees between the Risk department and the CSR department.

Although in several banks, these different teams had been able to work together before carrying out climate stress tests, these exercises helped reinforced this dynamic. As the ECB exercise was a regulatory prudential exercise, the banks followed the same organisational processes as for traditional prudential stress tests. These processes involve a large number of internal meetings and validation of the results by the various departments involved. It made it possible to institutionalise discussions between the different departments on climate issues in a more official way.

The more the banking teams are coordinated, the more efficiently information on climate issues will circulate and the more the teams will be able to communicate and self-train on the different aspects of these issues according to their line of business. A coordination between the Business, the CSR, and the Risk teams is the ideal way of having an integrated management of both risks and environmental impacts.

3.2.4 An increased involvement of banks' top management on climate issues

Key messages:

The climate stress tests, and in particular the ECB stress test, involved a significant investment by the top management.

Co-benefits for the financing of the transition: The more the top management of banks understands the climate issues, the more they are able to integrate them into the development of the bank' global strategy. If these strategies integrate environmental materiality, it could ultimately lead to a better financing of the transition.

The climate stress tests made it possible to strengthen the involvement of top management in climate issues. Unlike the ACPR exercise, top management was very involved in the ECB exercise. The prudential nature of this exercise strongly encouraged the banks' top management to actively participate, from the design of the methodology to the validation of the results which were presented to the regulators. The involvement of top management was similar to the usual stress tests conducted by the EBA.

This demonstrates both the increased importance on how climate issues are considered internally, as well as the influence that the European supervisor can have on banks. Although it was mentioned from the beginning that the ECB exercise would not have direct consequences on the regulatory capital requirements of banks, it could still affect the SREP rating of banks and ultimately lead to consequences in terms of supervision. On the other hand, as the ranking of banks according to their SREP rating was communicated, the fear of obtaining a lower ranking than their competitors was also a lever for change and a motivation for top management to get involved in the exercise.

The more banks' executive committees understand climate issues, the better they will be able to integrate these issues into their overall strategies. These strategies could potentially lead to better financing of the transition if they accurately take into account the specificities of climate issues and the environmental materiality of their counterparties. In addition, the more top management sends signals on the importance of analysing climate issues and risks within the banks, the more likely internal staff will buy into this, and thus take decisions accordingly.

3.2.5 An opportunity for supervisors to learn about climate issues

Key messages:

The climate stress test exercises have helped to improve supervisors' knowledge on climate stress testing issues, and thus on climate issues in general.

Co-benefits for transition finance: The more trained supervisory teams are, the better they will be able to integrate climate issues into their supervisory processes and decisions. These supervision measures could have a positive impact on transition financing, but also a negative one depending on how they are used (see section 3.5).

The climate stress tests have also led to a significant increase in the skills of the supervisory teams, for both the ACPR and the ECB, regarding climate-related issues and risks. For each of the two supervisory authorities, only a few specific recruitments have been made, as the authorities have instead chosen to train their teams internally.

The ACPR exercise was built with the teams of the Banque de France and the financial institutions that participated in the exercise. Several workshops were organised between the various stakeholders during the exercise. These workshops enabled the various teams to build up their common skills. A question and answer procedure between the banks and the ACPR was also set up on a weekly basis, as well as several bilateral meetings (ACPR, 2021). The Banque de France also acts as the secretariat for the NGFS, which enabled them to capitalise on the work carried out within the framework of the NGFS for the construction of the scenarios and, more generally, the methodological framework of the pilot exercise. Training sessions have also been organised for several teams within the ACPR.

In carrying out its climate stress test exercise, the ECB also organised a number of training sessions for its teams. They organised a number of working groups, which included experts, on the issue of data, scenarios and modelling. The ECB teams have also set up discussion groups with several other central banks around the world to discuss the improvement of methodologies and scenarios. Finally, training opportunities and topical webinars are offered to all staff, for instance by the Climate Change Centre (ECB, 2021a).

Climate awareness and training on climate issues are essential if regulators and supervisors are to integrate climate issues and risks into their supervisory processes in a meaningful way. More generally, the more regulators and supervisors understand the specificities of climate issues, the better they will be able to deal with them. The impact of these supervisory decisions on transition financing however will depend on the instrument chosen (see section 3.5).

3.3 Analyses arising from climate risk modelling exercises, in the context of climate stress tests, have had limited co-benefits on banks' ability to finance the transition

Key messages:

Understanding the dynamics of the transition to a low-carbon economy requires analysing the impacts of the transition at a very granular sectoral level.

The scenarios used in the framework of climate stress tests do not have a sufficiently good sectoral granularity.

Most of the banks interviewed have yet to fully capture the sectoral dimension of the transition dynamics in their internal models.

The modelling exercises carried out in the context of climate stress tests present numerous limitations to the evaluation of the impacts of climate-related risks in

the real economy. It therefore makes it difficult to assess the financial impacts of these risks for banks.

Co-benefits for the financing of the transition: If the modelling techniques used today in climate stress tests have difficulty assessing the impact of the transition in the real economy, banks would not be able to improve their understanding of the dynamics of the transition and offer relevant financing solutions accordingly.

3.3.1 The importance of modelling the sectoral impacts of the transition over different time horizons

As part of the transition risk analysis to ensure the resilience of the financial system, banks should understand their concrete exposure to the changes in the economic system that will be required in the context of the low carbon transition. This basis for risk analysis could also help increase the capacity of banks to finance the necessary restructuring of the economy in the context of the transition.

Specifically, this win-win approach implies identifying the complex dynamics of transition at various scales, initially at least at the scale of economic activities and their interconnections (Calipel et al., 2021; Hubert et al., 2022).

Understanding the dynamics of sectoral restructuring must essentially be based on a vision of long-term objectives and their short-term consequences. Therefore, the restructuring of the economic apparatus in line with long-term objectives must go through milestones. These steps may be necessary in the medium term or even in the immediate future, depending on the sectoral issues and the characteristics of the companies involved in these activities (Hubert et al., 2022).

3.3.2 Understanding transition dynamics by improving risk models: a laborious undertaking

The understanding of sectoral dynamics, and their ability to reflect short to long term issues, can be involved in different parts of the stress test exercise. Stress tests lead to several levels of modelling which may present opportunities for financial actors (banks and supervisors) to better understand the specificities of climate change issues.

The first level of modelling corresponds to the exercises that develop the transition scenarios distributed by the supervisors to the banks. These scenarios, in the context of the ACPR and ECB stress tests, were derived from the NGFS scenarios, which are themselves the result of complex modelling exercises generated by the *Integrating Assessment Models* (IAMs).

The second level of modelling corresponds to the modelling of financial risks by the banks, which integrate the data generated by the supervisors' scenarios as input data.

However, these two different levels of modelling seem to have difficulties capturing all the dynamics and risk factors associated with the transition. These factors hamper the ability of banks to understand the impact of their counterparties on the transition, and thus slow down their ability to finance it.

3.3.2.1 Partial lessons learned from the NGFS transition scenarios

These various modelling exercises have enabled banks to ask themselves a number of questions in order to understand the specificities of climate-related risk drivers and transition scenarios. Most of the banking teams took the step of trying to understand the underlying assumptions of the scenarios, whether technological or macroeconomic, by evaluating in detail the modelling carried out by the IAM models.

A number of banks interviewed indicated that they had difficulty in understanding the scenarios assumptions, and many pointed out that there was still room for improvement in the development of the scenarios. For example, one bank was surprised that the carbon prices increase in some of the NGFS scenarios does not lead to a recession in some sectors. This situation demonstrates that there is still room for improvement in the modelling of impact transmission chains to the real economy and then to the financial system. One of the banks interviewed indicated that they have undertaken expert working groups on transition issues to build new internal transition scenarios, in order to better model these transmission chains.

The more difficult it is for the banks to understand the assumptions underlying the transition scenarios, the more they will struggle to understand the impact that the transition may have on their counterparties as they would not understand the different transmission channels of transition risks. Understanding the impact of the transition in the real economy is fundamental if banks want to understand which counterparty is really exposed to transition risks, and how they could accompany them in their transition.

3.3.2.2 Banks' internal models do not succeed to fully capture the specificities of the transition risk drivers

Regarding the integration of climate-related risk drivers into banking models, supervisors noted progress between the ACPR exercise and the ECB exercise. The banks were thus led to reflect on how they could model climate-related risks, either by using their current models and adapting them to the specificities of these risks, or by creating new models that better enable to take these specificities into account. These different methodological choices could vary from one bank to another, but overall, all banks had to carry out this methodological reflection.

The supervisors also considered that some of the French banks had a better understanding of climate-related risk drivers than the average of the other European banking institutions that participated in the ECB exercise, primarily because they had already carried out an initial climate stress test. This was also the case for banks from other countries, such as the Netherlands, which

also took part of a climate stress test exercise. Therefore, the fact that French banks have carried out a climate stress test exercise several times has enabled French banks to develop internal skills.

The ECB exercise revealed in particular, however, that banks still have difficulties incorporating long-term climate-related risk drivers into their models. The results of the ECB exercise (ECB, 2022e) indicate that the majority of banks have tended to use existing risk assessment models to carry out long-term projections, whereas the latter are better suited to capturing the effects of short-term projections in traditional stress test exercises . The main consequence of this is that banks' models are relatively less sensitive to climate risks in long-term scenarios than in short-term ones. Moreover, many of these models do not fully capture all the sectoral specificities of the transition, as they were not designed for this purpose. These statements must be again qualified according to the banks, some of which have more advanced models than others.

It should be noted here that it is not easy for banks to adapt their models quickly. It has taken several years for banks to adapt and improve their models since the introduction of Basel II (BIS, 2004) then Basel III (BIS, 2011, 2017). This could slow down banks from developing models that are better adapted to the analysis of climate-related risks and their transmission chains.

However, while banks have been thinking about improving their internal models, few have done enough work to enable their models to understand the dynamics of transition sector by sector. Understanding these dynamics remains yet crucial if banks are to be able to finance the transition efficiently.

3.3.2.3 The limits of climate stress test in understanding transition dynamics

In general, the question of the relevance of climate stress testing and risk management models for understanding all the granular specificities of transition dynamics may arise. Indeed, conventional stress tests are instruments that usually model economic shocks at a macro level. However, climate risks occur in transition contexts where it is necessary to observe the dynamics and transmission channels at a much thinner granular level. Although climate stress tests have developed methodologies with a sectoral approach, they are not tailored to fully capture all transition dynamics. Including all the climate-related risk drivers, which may differ by sector, affect the players in the same sector in an extremely varied manner, and may overlap, would imply the development of extremely complex scenarios. Introducing these scenarios into banks' modelling exercises could be extremely laborious (Calipel et al., 2021).

The scenarios used in the climate stress tests could still be perfected, but it seems unlikely that they will ever allow banks to capture the essence of the transition dynamics for the reasons mentioned above. Yet, for banks to be able to participate in the financing of the transition, it seems very important that they have fully integrated all the specificities of these dynamics, particularly at a sufficiently granular sectoral level, so that they can make decisions with knowledge of these different dynamics.

3.4 The collection of key indicators by banks can have important co-benefits for transition financing, provided they are relevant

3.4.1 The importance of a counterparty-level analysis to better understand the risks and opportunities of the transition financing

Collecting climate data from counterparties is an essential step if banks want to be able to understand the current exposure of their portfolios to climate-related risks, but above all, if they want to develop a robust decarbonisation financing strategy. For this, the relevance of the indicators to be collected is essential.

For example, risk analysis and financing needs analysis should include an assessment of whether the counterparty's activity or assets are climate-damaging, both now and in the future. These activities may give rise to a risk of financial loss in the event of a transition. The reduction or transformation of these harmful activities may thus potentially motivate the banks to finance the investments that are needed.

Understanding its harmfulness on climate and its prospects for evolution requires a counterparty-wide view, in addition to an understanding of sectoral issues. This may depend on counterparty-specific parameters such as the company's production apparatus, its business environment, its national context, its own innovation capacity, its strategy, etc.

Generally, financial actors do not automatically have access to multiple sources of information at the level of their counterparties. This is a difficulty observed in previous work, particularly in the context of transition risk analysis tools developed by external service providers that explicitly seek to perform a granular analysis of portfolios (Hubert et al., 2022). For the time being, this seems to be pushing supervisors to focus the information gathering effort required of banks on a few GHG-type indicators, considered as proxies for counterparty risk exposure.

3.4.2 The collection of EPCs in the real estate sector: a complex but improving exercise

Key messages:

As part of the ECB exercise, banks were required to collect Energy Performance Certificates of buildings of their counterparties.

Banks have had great difficulties in collecting this data and have mostly used proxies.

Many banks have taken steps to put processes in place to collect these data in the future.

Co-benefits for financing the transition: Knowing the EPC exposure of their portfolios could allow banks to propose financing offers more adapted to housing renovation.

3.4.2.1 An ECB request of interest to understand the real estate sector's financing risks and opportunities for banks

In carrying out its exercise, the ECB asked banks to collect the Energy Performance Certificate (EPC) of the buildings underlying mortgages made to their counterparties and all exposures where the collateral was a real estate property.

As explained in Box 2, the real estate sector is highly exposed to transition risks through its greenhouse gas emissions, and climate-related regulations put a major decarbonisation effort on the sector in France, particularly through the obligations to renovate thermal sieves. Therefore, the sector represents for banks an exposure to transition risk, but also an opportunity to finance the transition, notably through the thermal renovation of housing.

Box 2: The importance of real estate for banks' transition risks and transition financing in France

Real estate is a significant part of banks' balance sheets. Real estate loans to individuals, for example, represent about 37% of French banks loans and euro area banks loans (excluding loans to other financial institutions)[12] .

The real estate sector is a sector particularly exposed to transition risks. The residential and commercial buildings sector represents 14% of greenhouse gas emissions (36% including indirect emissions linked to the production of the energy used) (EEA, 2022) and 40% of the European Union's energy consumption; and 18% of greenhouse gas emissions (Citepa, 2022) and 47% of energy consumption in France (MTE, 2022). The sector is therefore particularly sensitive to increases in energy prices.

It is also targeted by restrictive regulations for buildings with poor energy performance. In France, for example, the Climate & Resilience Law adopted in

[12] ECB, Statistical Data Warehouse, as of 31 December 2022. https://sdw.ecb.europa.eu/reports.do?node=1000003347

2021 implements progressive bans on renting and rent increases for the worst-rated housing[13], even though these represent more than 42% of the housing stock in France (housing with labels E to G of the Energy Performance Diagnostic) (French Ministry of Environment, 2022).

Within the European Union, the sector could be affected by the Energy Performance of Buildings Directive, proposed as part of the European Commission's 'Fit for 55' legislative package, which sets targets for significant reductions in the energy consumption of buildings by 2030 and by its potential integration to a new EU ETS (European Commission, 2021b).

EPCs are an interesting element for measuring the extent of a building's exposure to renovation obligations, and its GHG emissions. This information is a first step in analysing the financial risk borne by borrowing households. It also makes it possible to document the need to finance housing renovation, in line with the sector's transition objectives set by economic regulations in France.

This data can be extremely helpful for banks to plan transition strategies in this sector, beyond simply assessing their exposure to transition risk. For example, understanding the energy performance of the buildings on which their mortgages are based could enable them to make appropriate energy renovation offers to the households concerned, especially the lowest income households, who live in more than half of the thermal sieves in the European Union (Evain & Noguès, 2022). These offers could have a significant transformative effect as they would contribute to the financing of energy renovations, which are at the heart of the European Union's objectives of achieving carbon neutrality by 2050.

3.4.2.2 In practice, few banks have actually succeeded in collecting EPCs from their counterparties

According to the data collected by the ECB during the stress test, buildings rated from E to G would still account for 43% of the housing loan portfolio of banks in the European area and 17% would have an unknown EPC (ECB, 2022e). This demonstrates the potentially large exposure of banks to transition risks in this sector.

However, these data should be treated with caution, as banks have made extensive use of proxies when the information was not available. The ECB proposed a certain number of proxies for the banks: period of construction of the building, size of the building, energy related expenditures of the building. In the euro area, 65% of banks used proxies.

[13] LAW No. 2021-1104 of 22 August 2021 on combating climate change and strengthening resilience to its effects. https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000043956924

3.4.2.3 The exercise enabled banks to diagnose the difficulty of collecting information

Banks have had great difficulties in collecting EPCs for mortgages loans, especially at the stock level but also the new loans flows level. Either this data, and in particular data on stocks, was simply not available in the banks' information systems, or no structure for reporting had been put in place by the bank to collect this data, although it may be available at the level of the banks' local subsidiaries.

The extent to which the banks have made progress in this data collection process is heterogeneous. For example, one of the banks interviewed indicated that the energy performance of the building was not part of the discussions between the banker and the borrower when a new loan was taken out. On the contrary, another bank has introduced since 2021 a mandatory collection of EPCs for new financing flows. It now manages to obtain up to 25% of the EPCs within its outstanding property loans directly into its systems. This same bank is also developing an EPC collection methodology with an external service provider in order to complete this data within its portfolio.

3.4.2.4 The exercise has allowed some banks to accelerate their efforts, while others continue to show some reluctance

Most of the banks interviewed indicated that they continue the work of collecting EPCs from their loan portfolio after the climate stress test exercises have been carried out by installing in-house data collection information systems and systematising the collection of these data for new mortgages.

One bank reported, however, that each request for a new loan within a customer journey was timed and corresponded to profitability indicators for the bank. Thus, the more information requested when taking out a new loan, the lower the profitability of the operation. This factor could be an obstacle to the implementation of exhaustive information gathering by bank management.

3.4.3 Collecting GHG emissions data of banks' counterparties: a difficult first step but not sufficient to understand their transition potential

Key messages:

Banks had to collect GHG emissions of their counterparties in order to understand their exposure to transition risks.

Banks have had difficulties in reliably collecting these emissions indicators, especially scope 3 emissions.

Determining banks' counterparties GHG emissions is a first step, but this indicator presents some limits in evaluating both transition risk and environmental impact of these counterparties.

Co-benefits for transition financing: Counterparty GHG emissions indicators do not provide sufficient information on the transition potential of banks' counterparties and should be complemented by other indicators that enable banks to understand how they should support their counterparties in the low-carbon transition.

3.4.3.1 An ECB request to understand banks' exposure to high-emitting sectors

The ECB asked banks to collect a number of metrics aimed at calculating the sensitivity of banks towards the greenhouse gas industries and measuring the financing and emission levels of their high-emitting counterparties. Banks were asked to provide the amount of their total exposures and revenues for 22 NACE sectors[14] covering at least 80% of their revenues. They also had to provide the amount of their 15 largest counterparties' GHG emissions for each NACE sector, the amount of their associated exposure to these counterparties, and the average revenues of these counterparties' revenues over the last three years (2018 to 2020).

For example, the seven sectors with the highest greenhouse gas emissions accounted for a median share of 29% of reported exposure related to the studied counterparties operating in the 22 sectors. However, this share of exposure varied greatly between banks' different business models.

3.4.3.2 Banks have encountered difficulties in collecting reliable data on their counterparties GHG emissions

The GHG emissions data for banks' counterparties should also be treated with caution given the difficulty that banks have had in collecting them, particularly Scope 3 emissions, even though these represent the main driver of counterparties' carbon intensity (ECB, 2022e).

While financial data by sector and counterparty could be easily provided by the banks, collecting greenhouse gas emissions, and especially scope 3 emissions, from their largest counterparties was much more difficult. Data collection methodologies have been heterogeneous between banks

[14] The General Industrial Classification of Economic Activities within the European Communities (NACE) was adopted in 1970 to establish a common classification of economic activities in the European Community and ensure the comparability of national and European classifications and therefore of national and European statistics.

Many of them have developed internal methodologies, trying to analyse the annual reports of their larger counterparties in detail. It was, however, often difficult for them to separate the emissions generated by the parent company and subsidiaries, for example if the bank only financed the subsidiary. Most of the time, they combined these internal methodologies with data provided by external providers in order to compare the data with each other. It turned out that there was considerable heterogeneity between the data collected, which could be as much as double for the same counterparty, particularly for Scope 3 emissions.

This data collection has generated a lot of frustration among banks, who felt that this data was unusable and their reliability difficult to ensure. As a result, many of them advocated strengthening regulations on large companies' reporting of climate data in order to ensure greater transparency and quality of this information.

3.4.3.3 Counterparty GHG emissions: a limited indicator for banks to finance the transition

The collection of this data on their large counterparties is a first step to allow banks to have a first overview of the carbon footprint of their portfolios. However, and as stated by the ECB in the report on the results of the exercise (ECB, 2022e), they do not fully allow banks to assess their exposure to transition risks. They are also insufficient if banks wish to participate more actively in transition financing.

The indications of corporate emissions provide banks an overview of the current impact that their counterparties may have on the environment, but they do not predict the transition potential of these same counterparties. Nor do they provide information on how banks can support their transition and which assets they should finance, when and how.

Counterparty transition plans, for example, will become mandatory with the implementation of the *Corporate Sustainability Reporting Directive* (CSRD)[15] for large companies[16]. Corporate transition plans, if robust, will enable banks to better understand their transition potential and support them in their financing needs (Evain & Noguès, 2022).

[15] DIRECTIVE (EU) 2022/2464 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022L2464&from=EN

[16] The companies concerned by the CSRD mainly follow the following criteria: listed companies or companies with at least two of the following criteria: turnover exceeding 40 million euros, a balance sheet exceeding 20 million euros, average number of employees exceeding 250.

3.5 Climate stress tests: a limited role in the strategic and decision-making processes of banks

Stress tests results can have consequences for banks' internal risk management strategies. They may lead them to review their overall risk management framework, to modify their asset portfolios and financing strategy, to modify their capital allocation accordingly, etc (Konietschke et al., 2022). Banks' desire to reduce their exposure to climate-related risks could potentially lead them to change their financing and investment allocation strategy and thus possibly increase their financing in favour of the transition.

This assumption may or may not be confirmed depending on how banks actually adapt their climate risk management strategy to the results of the climate stress tests.

3.5.1 The climate stress tests have prompted some strategic thinking on climate issues within banks without any major change in their objectives and strategic plans

Key messages:

The climate stress test exercises enabled banks to assess their climate strategy through the dynamic balance sheet exercise.

These exercises have led banks to question their market positioning and, more generally, their ability to meet their climate commitments.

Co-benefits for financing the transition: These strategic reflections are still at an embryonic stage and it is still too early to assess the impact of these reflections on potential investments and financing decisions in favour of the transition.

Climate stress test exercises have forced banks to think about the strategic allocation of their portfolios over long-term scenarios. In the projection exercises of the climate stress tests, the use of the dynamic balance sheet enabled banks to project the exposure of their portfolios over a 30-year horizon. In particular, they were asked to reallocate their balance sheet according to the different scenarios, with intermediate targets in 2030 and 2040. To do this, the banks had to take into account both their specific strategy and their business environment when reallocating their portfolios. They had to project their various public commitments, think on their positioning, and take into account the possible sectoral changes of their counterparties in a low-carbon transition context.

Almost all the banks interviewed have attempted to translate their different commitments into the dynamic balance sheet. Some banks also used KPIs, such as the climate score, used internally for

their large counterparties to determine their allocations. For most banks, this was the first time they had the opportunity to concretely understand the impact of their long-term strategies and objectives on their portfolios. It allowed both the CSR teams to understand the implications of these strategies in a more operational way and the Risk Management teams to become more familiar with them.

Translating their strategy into a dynamic balance sheet exercise for the first time enabled the banks to have some reflexions on their market positioning and, more generally, on their ability to meet their carbon neutrality commitments by 2050. Some of the banks interviewed have a systemic positioning, financing the entire economy. In their view, stopping financing certain sectors that emit too much, and would not allow them to achieve carbon neutrality by 2050, would force them to reduce the size of their balance sheet, and ultimately change their positioning by becoming a more specialised bank. In some banks, potential trade-offs between sectoral market share objectives and their transition objectives have been discussed internally. They realised that some of the objectives they had set themselves to maintain a certain market share threshold in several sectors were in fact incompatible with their carbon neutrality commitments.

Several banks also wondered about the sectoral investment needs to meet national climate targets in order to understand in which sectors they needed to invest.

The stress test exercises were not the only driver fuelling the banks' reflection on their strategy and positioning. It did, however, feed into existing thinking through a slightly more operational (even though theoretical) application of the banks' strategies and commitments.

This strategic thinking, however, is still in its infancy. The banks interviewed did not specify that these reflections had so far led to the formulation of strategic objectives internally, with a view to either reducing their exposure to transition risks or better financing the transition.. It is therefore still too early to assess the impact of these reflections on potential investment and financing decisions in favour of the transition.

3.5.2 Climate stress tests did not change the relationship banks had with their counterparties on climate issues

Key messages:

Climate stress tests have not led French banks to discuss climate issues with their counterparties, neither to collect data nor to present the results of the exercises.

Co-benefits for the transition: The banks did not necessarily take the opportunity of the completion of climate stress tests to introduce climate issues into their discussions with their counterparties. This was partly because they estimated that

the results of the stress test were not reliable enough. This can be seen as a missed opportunity of initiating dialogues with their counterparties on transition issues.

For most of the banks interviewed, the implementation of climate stress tests did not lead to more in-depth discussions of climate-related issues and risks with their counterparties.

This could have been an opportunity for the banks interviewed to benefit from this exercise by having more in-depth discussions with their counterparties. It could have been an opportunity for them to collect the data they were asked to collect in a more efficient manner, but also to understand more about the transition potential of their counterparties in order to be able to perform the exercise of projecting their portfolios more efficiently. For some banks that were already discussing climate issues with their counterparties, conducting these exercises does not seem to have deepened this dynamic. Although it is understandable that banks did not necessarily have the time to ask all the information needed during the exercise, it did not seem to have set the dynamic for future exercises.

Moreover, few of the banks interviewed appear to have communicated the results of climate stress tests to their counterparties. This can be explained by the lack of confidence in the results of the climate stress tests (see Section 3.3). Most banks found it difficult to introduce the results of climate stress tests for the sake of credibility with their counterparties.

All in all, these exercises could have been an opportunity, if the results had been considered more relevant, to introduce the climate issue in a more institutionalised manner into the banks' discussions with their counterparties. In fact, most banks currently have routine discussions with their counterparties on their overall financing strategies. Climate issues could have been included in these discussions thanks to the stress tests. While some banks have already taken this step, it has not been as a result of climate stress tests.

Integrating climate issues into banks' strategic discussions with their main counterparties is essential if they are to understand how to support them in their transition process.

3.5.3 Climate stress tests have had no direct impact on banks' investment and financing decisions

Key messages:

Climate stress tests have not led banks to change their financing and investment criteria that would take their results into account.

The main reason for this is that banks do not consider the results of climate stress tests to be sufficiently reliable to be incorporated into decision-making processes.

The stress tests have so far not led to binding supervisory measures for the majority of euro area banks.

Co-benefits for the transition: Climate stress tests play a limited role in financing the transition for now, for two main reasons:

It is difficult today to demonstrate the financial materiality of climate-related risks using current modelling techniques.

It is not clear whether demonstrating the financial materiality of climate risks and the supervisory consequences of stress tests will actually lead to positive decisions in favour of transition financing.

Although the climate stress test exercises have enabled banks to confront their various climate commitments with a slightly more operational reality, they have so far had little impact on banks' investment and financing strategies. Several factors may explain this.

3.5.3.1 Results of climate stress tests are considered unreliable to justify strategic decisions in favour of the transition

To date, the results of the climate stress tests have not been sufficiently severe for banks to justify, from a risk point of view, a change in their strategy. For example, the cumulative credit and market risk losses estimated in the short-term scenarios (over 3 years) amounted to 70bn euros for the disorderly transition and physical risk scenarios cumulated for the 41 banks assessed (ECB, 2022e). By comparison, the regulatory stress test exercise conducted by the EBA in 2021, on a sample of the 50 largest banks in the European Union and the European Economic Area, estimated credit and market risk losses in its adverse scenario at 382bn euros (EBA, 2021).

The ECB considers that these stress test results are likely to be underestimated, firstly because, unlike the usual stress tests conducted by the EBA, no GDP contraction was estimated in any of the scenarios and secondly because banks' models and data still struggle to accurately capture the specificities of climate-related risk drivers (ECB, 2022a). The underestimation of the stress test results was also observed by the ACPR during its pilot exercise for similar reasons (ACPR, 2021).

This observation was also shared by the banks interviewed, although they often pointed out more the lack of adversity of the scenarios as the main factor explaining the unreliability of the results. Some of the banks interviewed also stressed the lack of transparency in the underlying assumptions of the scenarios used.

This lack of confidence in the reliability of the results of the climate stress tests not only hindered better consideration of the bank's risk management strategy, but was also sometimes counterproductive. Some banks did not wish to communicate internally on the results of the stress test, precisely so as not to discredit the materiality of climate-related risks or the very relevance

of the climate stress test exercise. On the other hand, it was raised by some banks that a 30-year horizon was too far away to really push their internal teams to modify their strategy. This idea that the materiality of climate-related risks can only be achieved in a distant future is not necessarily true, however, as demonstrated by the materialization of certain climate-related risks already observed.

The difficulty in demonstrating the materiality of climate-related risks, generated by the uncertainties linked to the modelling of adverse transition scenarios and their impacts, currently hinders the direct use of climate stress test results in banks' investment and financing decisions. To date, no bank has modified its strategy following the climate stress test exercises. If some banks have been able to modify their investment or financing strategies in recent years, by using more climate criteria in their decision-making, this is generally not a consequence of the climate stress tests but rather a consequence of their internal commitments.

3.5.3.2 The impact of supervisory measures on transition financing is still uncertain

Prudential measures resulting from standard stress tests can have binding effects on banks. This can be either by imposing additional capital reserve requirements, thereby reducing their ability to lend to their counterparties, or through other supervisory measures under the SREP (EBA, 2018) which may also have an impact on banks' strategy.

The climate stress test exercises conducted by the ECB did not intend to lead to a change in banks' capital requirements in a direct way, as they were mainly learning exercises. However, the results of the ECB climate stress test, along with the 2022 thematic review have fed into the SREP assessment process of banks. The SREP assessment, for some euro area banks, have led to binding supervisory measures, such as the requirement for the bank to put in place a plan demonstrating the strengthening of the C&E risk management framework, with potential additional capital requirements (ECB, 2022f) (see section 3.1). All these measures could become more restrictive in future supervisory exercises on climate-related risks.

Questions may arise regarding what impact these measures might have on the incentive for banks to finance the transition. Overly stringent measures on banks' capital requirements could have potentially negative consequences on transition financing. If applied to a large number of carbon intensive sectors, such additional capital requirements could effectively cause a contraction of banks' credit supply, preventing them from having the resources to finance the transition (Chamberlin & Evain, 2021).

Other supervisory measures within Pillar 2 of prudential regulation could, however, have more positive effects on transition financing. These measures could be, for example, requests for general training of banking teams on climate issues, requests for changes in governance so that climate issues are systematically included at each level of decision-making, concentration limits or the capping of the variable remuneration (Evain et al., 2022).

These supervisory measures act more on banks' internal processes, which can be powerful levers for change, than on quantitative measures assessing the financial materiality of climate-related risks. This last point is particularly important since it is uncertain that the assessment of financial materiality of transition risks necessarily lead to a decision in favour of financing the transition. For example, a risk management strategy could lead banks to disinvest from certain assets, without seeking to support them in financing the transition. However, these assets would remain in the real economy and could be refinanced by other financial actors, less concerned with the environment (Hilke et al., 2021).

4. Transformative character of the studied case

Within the financial sector, a transformative policy as defined in section 2.3 is a policy that contributes to financing the low-carbon transition. The financing of the transition is essential if the European Union and its Member States want to achieve their climate objective.

As underlined in the last IPCC report (IPCC, 2022), delayed investment and financing will result in significant carbon lock-in, stranded assets and additional costs and will significantly hamper the ability of developed and developing countries to reduce their GHG emissions and meet their climate objective. The financial sector has a key role to play in helping the EU to attain its climate objective.

Since 2015, regulators and supervisors have progressively mobilised on climate issues, as these can pose a systemic threat to the whole financial sector (NGFS, 2019). Climate stress test is one of the flagship instruments put forward by the financial regulators to enable banks to take better account of climate issues in their activities. Several supervisory authorities have started to carry them out, such as the Bank of the Netherlands (Vermeulen et al., 2018), the Bank of England (Bank of England, 2019), the Banque of France and the ACPR (ACPR, 2021) or the ECB (Alogoskoufis et al., 2021; ECB, 2021b).

In the context of this study, two climate stress test exercises were analysed in greater detail: the pilot exercise conducted by the ACPR on nine French banks in 2021 (ACPR, 2021) and the regulatory exercise conducted by the ECB in 2022 on euro area banks directly supervised by the ECB (ECB, 2022e).

In order to assess the transformative nature of climate stress tests, this study sought to identify the possible co-benefits that these exercises may have had on transition financing, as well as their limits in this regard. It should be noted that this is not the original purpose of climate stress tests. The study makes the hypothesis that a better understanding and practice of climate risk management could modify banks' internal decision-making processes and thus potentially improve their ability to finance the transition.

The study identified several co-benefits, but also several limitations of climate stress tests on transition financing (see figure 1).

The successive climate stress tests implemented by the supervisors on French banks have had the most significant effect through mobilising the banks' internal teams around climate issues. They have been very useful in enabling an initial integration of these issues into the banks' organisational processes and governance. The more the banking teams are trained and coordinated on climate issues, from the bank's executive committee to the operational teams, the more they could potentially be in a position to take decisions in favour of financing the transition. It should be noted, however, that while the above conditions are necessary for the development of relevant bank strategies, they are not necessarily sufficient to actually trigger a shift in banks' financial flows towards transition finance. This will depend on whether banks are able to identify

financial opportunities in doing so, due to their improved understanding, or whether regulatory requirements provide incentives.

However, the climate stress tests enabled a fragmented analysis of climate-related issues, moderating or limiting the co-benefits of these exercises on transition financing. The processes of collecting climate data from banks on their counterparties, prompted by the climate stress tests, have been of partial use depending on the types of data requested.

Although the collection of data on banks counterparties' ECPs, is essential for banks if they wish to participate in the financing of the transition in the real estate sector, the collection of GHG emissions data on banks' largest counterparties has had however a limited impact on transition financing. This is mainly due to the fact that collecting this type of information reliably, especially regarding the Scope 3 emissions of their counterparties is very difficult. Furthermore, this data does not provide any insight into the transition potential of the counterparty in question or into the financing needs related to the implementation of the counterparty transition plan.

Finally, neither banks' internal models nor the transitions scenarios used for these exercises enable banks to completely capture the essence of the transition dynamics. They do not manage to sufficiently grasp the dynamics of the transitions and the various risk transmission channels. Yet, for banks to be able to participate in the financing of the transition, it seems very important that they have fully integrated all the specificities of these dynamics, in order to take decisions accordingly. This thus indicates the need for complementary assessments with regards to fostering transition finance.

As a consequence, climate stress tests have not yet led to major changes in banks' decision-making processes related to providing transition finance. They have therefore a limited transformative character on transition financing to date. This may change positively in the future as methodologies improve but it seems unlikely that they will ever succeed on their own in actually triggering an important shift in transition financing. To achieve this objective, stress tests should be accompanied by other instruments that allow banks to better understand the transition dynamics of their counterparties in order to better support them in the transition, such as for instance transition plans.

5. Conclusion

So far, climate stress tests are prudential instruments that have taken up a lot of space in the public debate. In addition to their initial objective of assessing the capacity of banks to deal with climate-related risks, they may have a more indirect role to play in financing the transition by enabling banks to remove a certain number of obstacles to this financing.

Certainly, climate stress tests have played an important role in making climate issues more credible and strengthening banks' capacity to understand these issues. The main co-benefit of these exercises for transition financing is that they have an important initial effect on the banks' organisational processes and on the training of their teams on climate issues. The more banks' organisational processes integrate these issues, and the more teams are trained, the more they may be able to make decisions in favour of transition financing.

However, to really have a beneficial impact on transition financing, these exercises should allow banks to really understand the transition dynamics of their counterparties, and should not only focus on their current exposure to climate-related risks. This is where climate stress tests have many limitations. Climate stress test methodologies have a limited role to play in enabling banks to understand the transition dynamics of their counterparties, as the scenarios proposed, and requested data is not yet fully adapted for this purpose.

Moreover, although they have triggered some strategic thinking within the banking teams, climate stress tests have so far not led to any changes in banks' financing and investment decisions in favour of the transition. On the one hand, it is still too early for these exercises to have modified the banks' climate strategies, and on the other hand, the methodological limitations of the exercise make it difficult to demonstrate the financial materiality of climate-related risks.

Finally, it is not clear that demonstrating the financial materiality of climate risks, and the supervisory consequences stress tests may have accordingly, will actually lead to positive decisions in favour of the transition financing. It will depend on how banks will actually take climate issues into account in their decisions-making processes and which instruments supervisors will decide to use to act on these processes.

Therefore, while climate stress tests have been an interesting first step for banks, notably through a significant integration of climate issues into their organisational processes, they are insufficient to trigger a real shift in the financing of the transition by banks.

In order to achieve this objective, stress tests should be accompanied by other instruments that allow banks to better understand the transition dynamics of their counterparties in order to better support them in the transition. Banking transition plans could be a good solution for that, as they should themselves rely on banks' main counterparties transition plans, and allow the banks to better understand how they can accompany their counterparties in the transition (Evain & Noguès, 2022). They could then play a significant role in filling the gap of what is really missing for banks to effectively start this shift to transition financing. Although the transition plans of large

companies are not yet currently publicly available, they are expected to become available as early as 2025 with the implementation of the CSRD. Banks will then be able to use these to build their own transition plans.

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Annex

Interviews

Banking sector:

- **BNP Paribas:** Antoine Bezat
- **Banque Postale:** Guillaume Biron, Zineb Tazi
- **Crédit Agricole:** Mikael Prebet
- **BPCE:** Delphine Bartre
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About the project

4i-TRACTION – innovation, investment, infrastructure and sector integration:
TRAnsformative policies for a ClimaTe-neutral European UnION

To achieve climate neutrality by 2050, EU policy will have to be reoriented – from incremental towards structural change. As expressed in the European Green Deal, the challenge is to initiate the necessary transformation to climate neutrality in the coming years, while enhancing competitiveness, productivity, employment.

To mobilise the creative, financial and political resources, the EU also needs a governance framework that facilitates cross-sectoral policy integration and that allows citizens, public and private stakeholders to participate in the process and to own the results. The 4i-TRACTION project analyses how this can be done.

Project partners

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement **No. 101003884**.