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Main results of the climate exercise for the insurance sector

Summary

Building on the pilot exercise conducted in 2020, the results of which were published in 2021, the ACPR conducted a second climate stress test over the period 2022-24.

This second exercise is exclusively focused on insurance undertakings.

The second climate stress-testing exercise was conducted according to a "bottom-up" approach, in which the ACPR provided the main assumptions and scenarios and it was up to the insurers to assess impact on their respective balance sheets. This iteration spurred stronger involvement from the financial sector, as 15 insurance groups participated, comprising 22 entities and accounting for 90% of French insurers' balance sheet total, to be compared with 75% during the pilot exercise.

The ACPR would like to thank participants for their continued commitment throughout this exercise.

Main findings derived from climate stress-testing results

This climate exercise considers the impacts of climate change by taking into account both physical and transition risks, at long-term horizons (2050), as did the pilot exercise, but also, and for the first time, factoring in a shorter-term horizon (2027), with the aim of measuring the impact of climate change on the solvency of insurance undertakings. Furthermore, this short-term scenario was implemented in advance of the NGFS work, the network of central banks and supervisors for the greening of the financial system.

Short-term scenario

The short-term scenario relies on a sequence of extreme weather events, which are combined and compounded: two consecutive episodes of severe drought in 2023 and 2024, coming after historic drought in 2022, and followed by heavy flooding in southern France in 2025 due to a severe convective storm event, resulting in an embankment dam failure. It is also assumed that this sequence of extreme weather events, which is in line with a trend observed worldwide, strengthens the markets' conviction that transition policies have become unavoidable. This growing awareness results in sudden market correction and impairment losses on financial assets, especially brown assets and real estate, in keeping with the asset stranding phenomenon. This financial shock also incorporates contagion mechanisms consistent with those observed during previous financial stress events, and affecting the entire portfolio of insurers until 2027. The combined effect of these physical and transition shocks adversely affects the solvency of insurers. The SCR coverage ratio thus went from 230% at end-2022 to 170% at end-2027, a 60-point drop. Financial shocks affect solvency the most, and lead to a 28% decrease in own funds in 2025, compared with a baseline scenario that does not factor in climate change.

Claims in relation to the dam failure and other climate change effects incurred in 2025 result in a 48 point dip in the SCR coverage ratio. This overall impact on solvency is measured under a "static balance-sheet" assumption, under which insurers are not able to implement measures to mitigate the effect of these various shocks.

Long-term scenario

In the long term, it is instead assumed that insurers will have the ability to adapt their business and balance sheet to mitigate the effects of climate change (the "dynamic balance sheet" assumption). As such, the exercise focuses less on the impacts on solvency than on the strategies implemented by insurers. The cost of climate change is measured by comparing a fictional baseline scenario, which does not include physical and transition risks, with two adverse scenarios from the NGFS: one assuming an orderly transition, and the other a disorderly transition, while both factor in an increase in the frequency and magnitude of extreme weather events (drought, flooding and coastal flooding). Another defining feature of the ACPR's analyses is the integration of the impact of climate change on health risks (spread of vector-borne diseases such as dengue fever and chikungunya, air pollution and respiratory diseases, and mortality induced by an increase in the frequency and duration of heatwaves). The analysis of findings shows a 105% increase of total claims in the adverse scenario of a disorderly transition by 2050, compared with 2022, as well as a 42% increase in weather-related claims compared with the baseline scenario. The results also highlight significant geographical disparities, depending on the various types of hazard (drought, submersion and flooding). However, in the course of this stress test, insurers made rather limited use of management action (such as geographical reallocations, or even the termination of policies in the most hazard-prone areas, as well as the restructuring of their balance sheet) to mitigate the impacts of adverse scenarios. According to our findings, between 2022 and 2050, just over half of the deterioration observed in claim costs is attributable to an increase in physical risks, the remainder being due to inflation as well as to an increase in insured values.

For the first time, as part of long-term scenarios, insurers have delved into insurance gap risk both quantitatively and qualitatively. This risk is analysed from a dual perspective: that of the policyholder, who would no longer be able or willing to insure property, given the increase in premiums induced by climate risk; and that of the insurer, for whom the increase in the cost and frequency of extreme weather events would make property uninsurable in certain areas. In their answers to the questionnaire used for this exercise, insurers state that they consider this risk would be highly differentiated according to the location considered, and that they plan to set up in-house policyholder support mechanisms to combat the consequences and costs of climate change.

In terms of investment, in line with the proposed scenarios, assets linked to fossil fuel business and real estate suffer the most significant impairment losses by 2050. However, these effects do not appear to lead participating insurers to reallocate portfolios.

Whether it be in the short term or the longer term, the findings of this second climate stress test show that insurance undertakings are significantly exposed to climate change-related shocks, thus confirming the need for them to promptly integrate these risks in their strategy, their governance and their respective internal models, if applicable.

Insurers must therefore sustain their efforts, first towards fulfilling the commitments they made in 2019 in favour of combating climate change and reaching the carbon neutrality target by 2050, but also towards initiating asset and liability management action to withstand the anticipated consequences of tail risks on their claims and financial assets.

Main results of the climate stress-testing exercise in the insurance sector

Key words: climate change; short-term projections; long-term projections; scenarios; stress testing

JEL codes: G22, G28, H23, Q48, Q54

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All the authors would like to extend their sincere gratitude to Thierry COHIGNAC (CCR), the late David MONCOULON (CCR), Yannick DRIF (AON) and Pierre VALADE (AON) for their help in implementing this exercise

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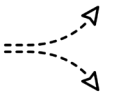
Widespread mobilisation: 90% of the market covered



2 long-term scenarios
1 short-term scenario

"Nat Cat"[1] claims in the short-term scenario: +141% in 2025
Loss ratio for health activities: +13% increase in health claims in 2025
Financial impact: -13% due to asset impairment in 2025

Short-term solvency: 60 pt decrease in SCR ratio coverage across the market between the stressed scenario and the baseline in 2027

Long-term Nat Cat claims: +105% in 2050 compared to 2022 according to the most adverse scenario
+42% in 2050 between the most adverse scenario and the baseline scenario

Life insurance claims stemming from pollution and vector-borne diseases: +89% in 2050 compared to 2022 according to the most adverse scenario
+11% in 2050 between this scenario and the baseline scenario

Financial impact: -3.5% due to asset impairment in 2050 between the delayed transition scenario and the baseline scenario

Estimated cost of climate change: rise in claims from natural disasters would increase two to five-fold in the most affected departments, and premiums would increase by 130-200% over 30 years to cover these losses

[1] Natural Disasters

Introduction

Building on the pilot exercise conducted in 2020-21[2], the ACPR conducted a second climate stress test in 2023-24, this time focusing solely on the insurance[3] sector.

In the same way as the first exercise, this stress-testing iteration was prepared within the framework of a marketwide working group led by the ACPR and bringing together major insurance industry players. Preparatory work began at the end of 2021, and discussions continued throughout 2022 to draw key lessons from the first exercise and suggest substantial methodological changes. For instance, the addition of a short-term adverse scenario over a five-year horizon was suggested in order to better align with insurers' strategic decision-making horizon and assess its consequences in terms of solvency.

The main objectives of this second exercise are defined as follows:

- strengthening insurers' ability to anticipate the impacts of climate change and the ecological transition on their business, both in the short-to-medium term and in the long term, as well as their ability to adapt their strategies accordingly.
- improving the analytical tools available to insurers and supervisors. The assumptions provided are based on more granular data, allowing for a better sectoral and geographical differentiation of risks. The scope of risks considered has also been broadened, taking better account of the macroeconomic and financial consequences of chronic physical risk. This work was carried out in collaboration with insurance undertakings, with the Caisse Centrale de Réassurance (CCR) for the modelling of physical risks on the liabilities side of insurers' balance sheets, and with AON for the assessment of the health impact of climate risk. This iteration also benefited from the contribution of Banque de France experts in the modelling and quantifying of scenarios.
- Lastly, the stress test aims to explore new dimensions of risk assessment, including:
  - for the short-term scenario, an analysis of the impact of extreme but plausible assumptions on claims, profit and loss, and solvency of insurance undertakings;
  - For long-term scenarios, a quantitative and qualitative analysis of the insurance gap risk[4] and of the prevention of climate change impacts.

[2] https://acpr.banque-france.fr/sites/default/files/medias/documents/20210602_as_exercice_pilote.pdf

[3] In the wake of the pilot exercise, the European Central Bank conducted a similar stress test on the European banking sector in 2022.

[4] In this climate stress test, the insurance gap risk is analysed from two angles: that of the policyholder, who would no longer have be able or willing to insure property given the increase in premiums induced by climate risk; and that of the insurer, for whom the increase in the cost and frequency of extreme weather events would make it impossible to insure property in uninsurable areas.

The climate-change scenarios and the associated claim scenarios factor in the most recent projections by the IPCC[5] and the NGFS, the network of central banks and supervisors for the greening of the financial system[6].

The short-term scenario is one of the new features of this exercise, as well as a major step forward. This work is notably being implemented ahead of schedule in relation to NGFS work, on which we rely in other respects. It is based on the assumption of a highly exceptional climate-related loss, causing a sudden, spontaneous correction of financial markets which in turn affects the entire portfolio of insurers through spillover effects.

Two long-term scenarios, derived from the work conducted by the NGFS, capture the economic and financial impacts of two transition paths, one orderly, and the other disorderly and delayed, assorted with a target for global warming containment below 2°C by 2050. They are assessed in terms of deviation from a "fictitious" baseline scenario involving no climate risk. The economic and financial impacts of long-term scenarios affect insurers' balance sheets, and are combined with an escalation of physical risk, which materialises through natural disaster phenomena (drought, flooding and coastal flooding) and health risks. The physical and transition risk scenarios are therefore consistent with respect to the global warming path to 2050.

Box 1 - Main changes compared with the pilot exercise

- Inclusion of a highly adverse short-term scenario involving widespread physical shocks (drought) and localised shocks (severe convective storm and localised floods causing a dam failure), leading to a financial shock. It is designed to provide insurers with a scenario that includes both physical and transition risks, over a timeframe that is compatible with their strategic planning and decision-making.
- First estimate of the consequences of climate risk on the solvency of insurers, based on a static balance-sheet assumption, meaning one that excludes management or mitigation action, under this short-term scenario.
- For the long term, inclusion of 2 scenarios (i) one of orderly transition (Below 2°), (ii) the other of a disorderly transition (Delayed transition), both derived from the most recent work by the NGFS, and analysed as deviations from a fictitious baseline scenario without any climate risk.
- Integration of an identical temperature path in the two long-term scenarios (RCP 4.5) and a better consideration of the macroeconomic and financial impact of chronic physical risk.
- Under this temperature path, assessment for long-term scenarios of extreme loss, at the 98th percentile, which also serves to incorporate the uncertainty surrounding these projections.

[5] IPCC: Intergovernmental Panel on Climate Change
[6] See especially: https://www.ngfs.net/node/553173

- Quantitative "*ad hoc*" and qualitative assessment of insurance gap risk using a questionnaire filled out by insurers.

1. Improved methodology to meet more ambitious targets

1.1. A collaborative approach with participating insurers

Following the publication of the results of the pilot exercise in May 2021, and with a view to preparing for the second climate stress testing exercise, the ACPR relied on the work of a marketwide group comprising the main stakeholders and France Assureurs to improve the scenarios, clarify the set of required macro-financial and climate variables, and work towards better consideration of physical risk.

This group met for six meeting sessions in 2022, in keeping with the collaborative approach of the pilot exercise.

The key focus of these sessions was the integration of physical risk, including the associated modelling challenges, the scope of information provided by the supervisor, and how to factor insurance gap risk into long-term projections. These sessions led to priority guidelines, such as enhancing the granularity of damage projections or designing a short-term scenario.

Provisional assumptions were then submitted for public consultation, before being published in their final version in July 2023. Immediately afterwards, as was done during the previous stress testing exercise, a question-and-answer procedure was initiated with the participating insurers, which ended in November 2023.

A the end of November 2023, participating insurers were invited to send the ACPR a first intermediate set of data, covering only the list of financial assets, broken down by type and sector of activity for the long-term scenarios. The aim of this first step was to analyse the consistency of individual answers and assess their compatibility with the sectoral projections provided by the ACPR.

Final submissions, including all the requested results, a methodological note and a qualitative questionnaire on insurance gap, were then sent in the second half of January 2024. Lastly, these submissions gave rise to bilateral exchanges with insurers, in order to check the quality of their remittances and obtain additional information.

A total of 22 insurers took part in the exercise, representing 15 insurance groups and accounting for nearly 90% of the total assets of French insurers (see list appended in Annex A).

1.2. Significant improvements compared with the pilot exercise

The improvements introduced as part of the second exercise focused on three key areas

1.2.1. Strengthening insurers' ability to anticipate the impacts of climate change and adapt their strategies accordingly

The pilot climate exercise sought to raise awareness, among the French banking and insurance sectors, of climate risk and its financial repercussions, specifically by encouraging them to incorporate a longer-term perspective into their strategic decisions through the dynamic balance sheet assumption.

This assumption, which was used again for long-term scenarios in the second exercise, allows insurers to take management action and adjust their balance sheet to address the various dimensions of climate risk. It also enables the ACPR to assess the extent to which insurers are implementing the commitments made in the fight against climate change or as part of their voluntary transition plans as part of this test, as well as to measure the robustness of these commitments, especially in the most adverse scenarios.

With regards to the liability management action taken by insurers, the ACPR provided *ad hoc* assumptions concerning policyholder reaction to potential premium increases, in order to factor in, in quantitative terms, the insurance gap risk.

Furthermore, this exercise explores the short-term horizon, in line with insurers' wishes to combine physical and transition shocks with a time horizon that is compatible with that of their strategic planning.

1.2.2. Enhancing the analytical tools available to insurers and supervisors

Following on from the pilot exercise, the 2023 exercise seeks to improve the ability of insurance undertakings -which are now required to include sustainability risk in their own risk assessment (ORSA)- to integrate climate risk into their ongoing measurement, assessment and management of financial risks. It should also enable the ACPR to improve its tools for assessing the impacts of climate change on the stability of institutions and the financial system.

These analytical tools aim to achieve, among other things:

- better consideration of physical risk, in particular through (i) the integration of chronic physical risk into insurers' assets -the new NGFS scenarios now integrate the impact of physical risk into macroeconomic scenarios in a more satisfactory manner than the initial scenarios; (ii) a more refined analysis of physical risk on the liabilities side, that offers a distinction between factors driving an increase in claims (hazards, changes in insured values, inflation) and provides more granular damage projections, while also taking into account the potential reaction of policyholders to premium increases;

- an assessment of the impacts of a short-term scenario combining extreme events both in terms of (i) acute physical risk -including, given its prominence in France, an impact

on life and health risk- and (ii) transition risk, with an asset devaluation shock linked to a sudden and correction of financial markets.

This second stress-testing exercise is also based on the latest version of NGFS scenarios published in September 2022, and therefore benefits from its methodological advances, such as the inclusion of chronic physical risk on the asset side of insurers' balance sheet. In addition, the macroeconomic assumptions of these scenarios -on which the financial assumptions are based- have been updated with the latest NIESR[7] projections, to reflect a less favourable macroeconomic environment following the war in Ukraine and its consequences, including in terms of inflation.

In addition to these developments, the 2023 exercise relies on projections provided for a fictitious baseline scenario that includes no physical or transition risk, based on NIESR projections. The impact of financial and physical shocks is assessed against this scenario, both in the short and in the long term. For longer-term scenarios, this methodological change from the previous exercise makes it possible to agree on a counterfactual for which insurers will also be required to provide projections, and thus to clearly isolate the impact of climate change according to the scenarios considered.

1.2.3. Exploring new dimensions of risk assessment

While it is in the long-term that the impacts of climate change will be most material, considering the impact of *ad hoc* short-term scenarios brings the approach closer to the rationale behind stress testing, which consists in measuring the impact of highly adverse events according to a static balance-sheet assumption and over a short- to medium-term horizon, close to the one used by insurers for their strategic planning.

The pilot exercise did not assess the impact on the solvency of financial institutions, due to the novelty of the models, metrics and methodologies used, and because the 30-year projection horizon under the dynamic balance sheet assumption was ill-suited to the evaluation of this impact.

In the 2023 exercise, the short-term horizon allowed for an initial estimate of the impact of climate risk on insurers' solvency, using a methodology consistent with that used in the context of stress-testing exercises conducted by the European Authority of Insurance and Occupational Pension Authority (EIOPA).

Lastly, in order to take better account of the uncertainties associated with climate change, the ACPR sought to factor in extreme claims, by measuring the impact of long-term scenarios at the 98th percentile of the distribution, focusing on the most extreme 2% of cases.

[7] National Institute of Economic and Social Research

2. Analysis of the short-term scenario

In the short-term scenario, although the projected droughts in 2023 and 2024, following on from the real droughts observed in 2022, lead to significant claims (more than EUR 3 billion cumulative for those two years compared with the baseline scenario), it is the financial shock arising from transition risk and occurring from 2025 to 2027 that has the most detrimental impact on insurers' solvency and capital position.

Indeed, the financial shock affects all insurers' assets.

Thus, from 2025 onwards, the balance sheet total under the adverse scenario drops by -10% compared with the baseline scenario, then by -12% in 2026 and 2027. The level of excess of assets over liabilities bottoms out in 2025, with relative loss standing at -32% in the adverse scenario compared with the baseline scenario. The impact on own funds and solvency ratio coverage is also quite substantial, especially in 2025: -28% in own funds in the adverse scenario as a deviation from the baseline scenario, representing EUR -67 billion, for an average deviation at -48 solvency ratio coverage points.

Unless otherwise specified, amounts given for the short-term scenario are expressed in current euro.

2.1. A short-term scenario combining extreme physical shocks and a severe financial shock

The short-term scenario relies on a succession of acute physical risks, one of which is highly localised, but associated with compounding and amplifying effects.

During the initial stages, acute physical shocks (droughts/heat waves and localised flood shocks due to a severe convective storm) trigger higher claims for insurers from 2023 to early 2025.

- In the first two years of the scenario, in 2023 and 2024, the assumption is made of a prolonged drought and heat wave event that is identical to the one observed in 2022 (Chart 1).
- In the first quarter of 2025, the exercise assumes very heavy rainfall owing to a severe, localised convective storm. Runoff water on land that is dried up by droughts causes a historic flood of the Durance river, leading to the failure of an embankment dam located in the French Alps, which in turn generates a localized flooding hazard (Chart 2). This type of unlikely but plausible event is similar to the dam bursts observed in Northern Europe and Germany in 2021 and in Libya during the summer 2023.

These extreme events have consequences for both life and non-life claims. For the life insurance business, mortality and healthcare expense assumptions in relation to the 2022 heatwaves were provided by AON.

For non-life insurance activities, the impact on claims was assessed by the Caisse Centrale de Réassurance (CCR) according to the same procedures used for the Nat Cat flooding claims in the long-term scenario.

Chart 1: Drought in France (2023-24)

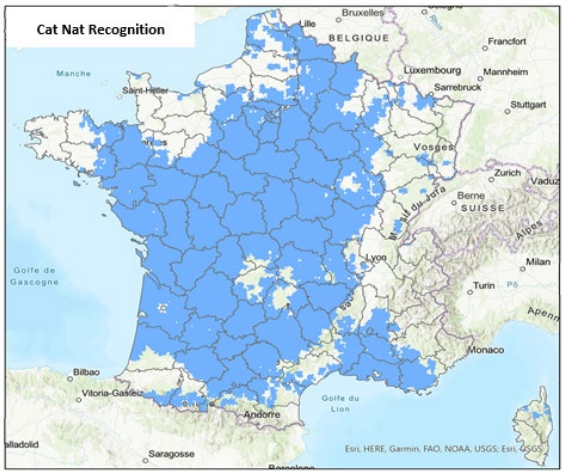
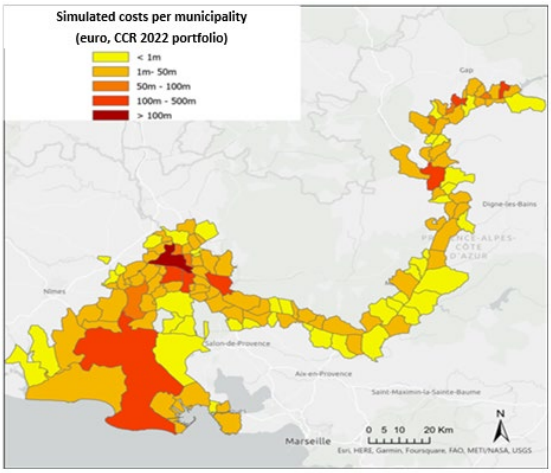


Chart 2: Localised flood risk due to heavy rainfall and a dam failure (2025)



The second stage assumes that the exceptional events occurring in France are followed by a sudden correction of financial markets in anticipation of the swift implementation of carbon regulations in several major economies (EU, United States). Under this assumption, the valuation of companies belonging to the most carbon-intensive sectors collapses, resulting in a steep increase of their funding costs. Contagion mechanisms then lead to rising interest-rate spreads and lower asset valuation across all activity sectors, including sovereign debt, until the end of the period considered (last quarter of 2027).

Euro area GDP is also affected by this episode of stress, and goes down by 1.6% compared with the baseline scenario as early as the end of the first year following the shock. Inflation is also down against this recessionary backdrop.

The impact assessment relies on the definition of two scenarios:

- A **baseline scenario** (Baseline), including the 5-year paths (from early 2023 to late 2027) for GDP growth and inflation, revenue and value added according to the activity sector considered, all matching the baseline scenario by the NIESR for each country or economic area under assessment (e.g. France).
- An **alternative** scenario with GDP, inflation, turnover, sectoral value added, spread and asset price paths (see Charts 3 and 4 below) deviates from the baseline scenario starting in the second quarter of 2025.

Chart 3: Impact on Euro area GDP and inflation (as a % difference from the baseline scenario)

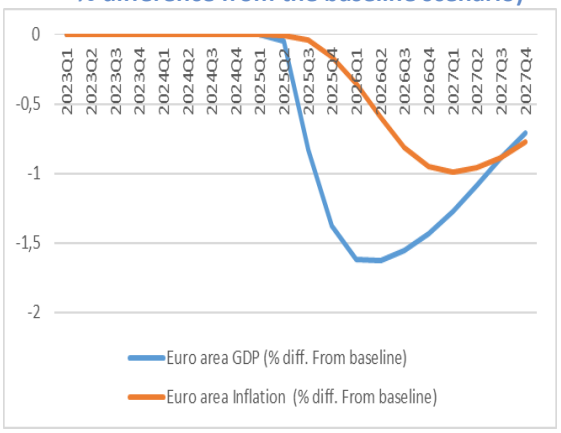
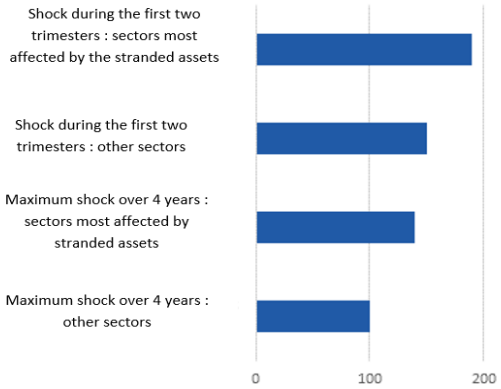


Chart 4: Corporate spread shocks (basis points)



2.2. Impact of the combination of acute and localised perils

2.2.1. Nat Cat claims

2.2.1.1. Key figures

In mainland France, total claim deviation between the adverse scenario and the baseline scenario stood at EUR +1.5 billion in 2023 (the claims increased by 86%) and EUR 2.23 billion in 2024 (representing a 128% increase). In 2025, the year of the dam failure under the adverse scenario, the increase in the total claims compared with the baseline scenario reaches EUR 3.51 billion (+141%).

Table 1 and Table 2: Key figures for the rise in claims (expressed as a % and in EUR billion)[8]

		Adverse scenario (amounts and % compared with 2022)			**Baseline scenario (amounts and % compared with 2022)**		
Year	Event	Total claims	Flood-related claims	Drought-related claims	Total claims	Flood-related claims	Drought-related claims
2022		€2.24 billion 100%	€0.38 billion 100%	€1.68 billion 100%	€2.24 billion 100%	€0.38 billion 100%	€1.69 billion 100%
2023	**Severe drought event**	€3.37 billion 150%	€0.63 billion 166%	**€2.66 billion** 159%	€1.82 billion 81%	€0.51 billion 133%	€1.27 billion 75%
2024	**Severe drought event**	€3.96 billion 177%	€0.64 billion 168%	**€3.24 billion** 193%	€1.74 billion 77%	€0.52 billion 135%	€1.19 billion 70%
2025	**Dam failure event**	€6.0 billion 267%	**€4.35 billion** 1138%	€1.57 billion 93%	€2.49 billion 111%	€1.2 billion 313%	€1.25 billion 74%

[8] Scope of the sample: 13 undertakings

	Claim variations (adverse - baseline) (in amounts and as a deviation % from the baseline scenario, at each set year)		
Year	Total claims	Flood-related claims	Drought-related claims
2023	€1.56 billion	€0.12 billion	**€1.39 billion**
	86%	24%	**109%**
2024	€2.23 billion	€0.13 billion	**€2.05 billion**
	128%	25%	**173%**
2025	€3.51 billion	**€3.15 billion**	€0.32 billion
	141%	**262%**	25%

The higher claims observed in the adverse scenario is spread over mainland France with significant heterogeneity owing to:

- different assumptions and insured values for drought-related claims depending on the geographical area considered;
- the very localised nature of the dam failure in one region, which causes the flooding hazard.

Chart 5: % Difference in drought-related claims in 2023 and 2024 between the adverse and baseline scenario[9]

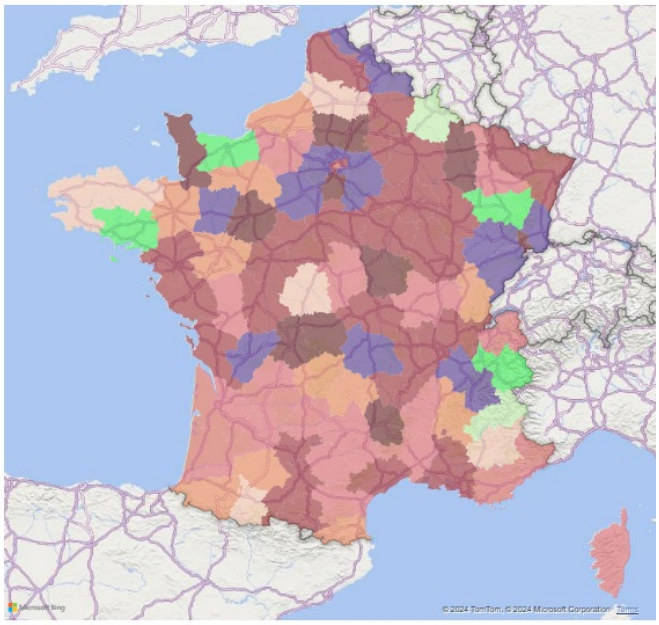
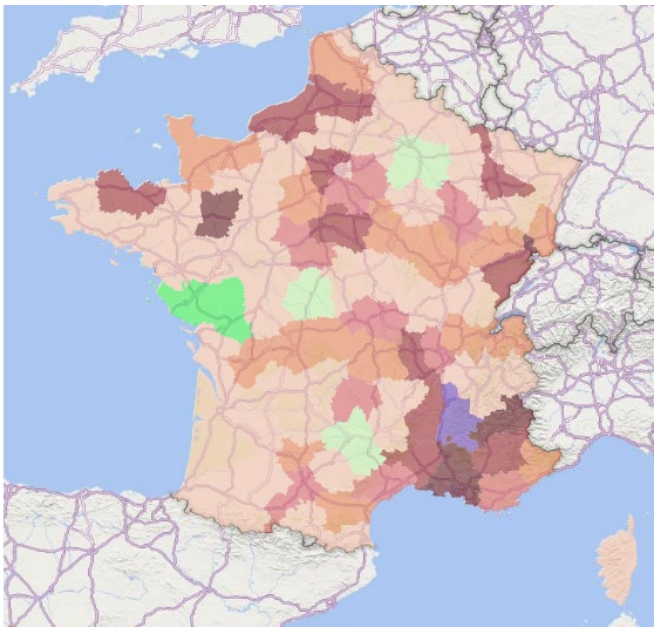
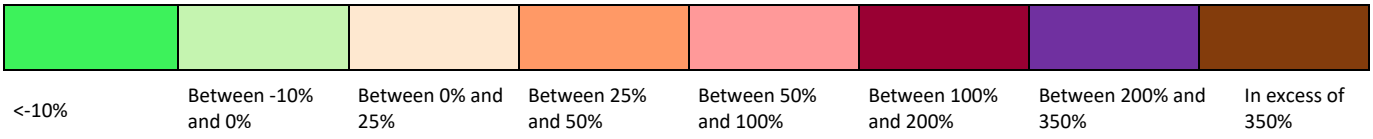


Chart 6: % Difference in flood-related claims in 2025 between the adverse and baseline scenarios[10]





[9] Scope of the sample: 12 undertakings
[10] Scope of the sample: 12 undertakings (idem)

2.2.1.2. Gross loss (claims to premiums) ratio (before reinsurance amounts)

Because insurers are unable to implement management action, in line with the assumptions of the short-term scenario, and because the proportion of Nat Cat premium in the property and casualty premium is set by ministerial decree, the premiums projected by insurers are generally quite stable over the entire period covered by the short-term scenario. Thus, the claims over premiums ratio gross of Nat Cat reinsurance for all risks, defined as:

$$\frac{\text{claims}}{\text{premiums}}\text{Nat Cat ratio gross of reinsurance} = \frac{\text{Nat Cat claims (all risks combined)}}{\text{Written Nat Cat premiums}}$$

shows more or less the same deviations, in proportion, from the reference scenario as the total claims in each of the departments in mainland France, throughout the 2022-2027 period.

Moreover, the evolution of the Nat Cat claims ratio gross of reinsurance, per participant and over time, varies significantly depending on the scenario considered. In the baseline scenario, the loss ratio gross of reinsurance for the Nat Cat category is very stable over time, while in the adverse scenario it increases in 2023 and 2024 for the majority of insurance undertakings (years that include severe drought episodes), peaks in 2025 (year of the dam failure event), before decreasing in 2026.

Chart 7 and Chart 8: Year-on-year change in loss ratios gross of reinsurance[11]

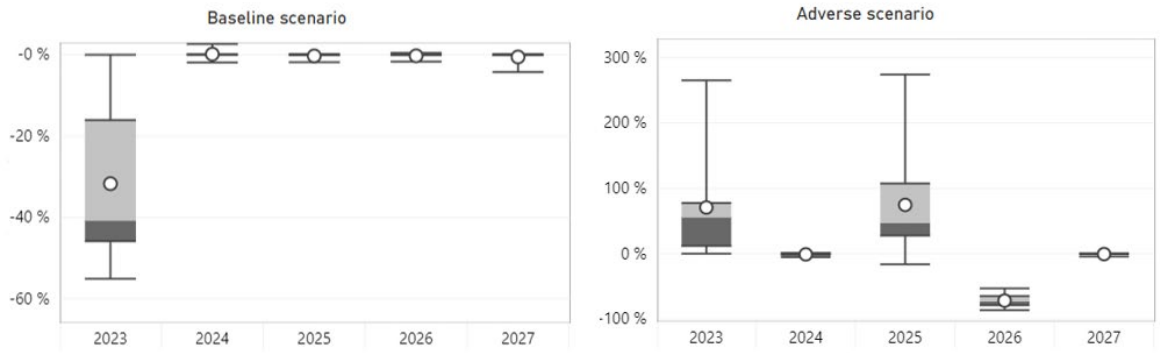
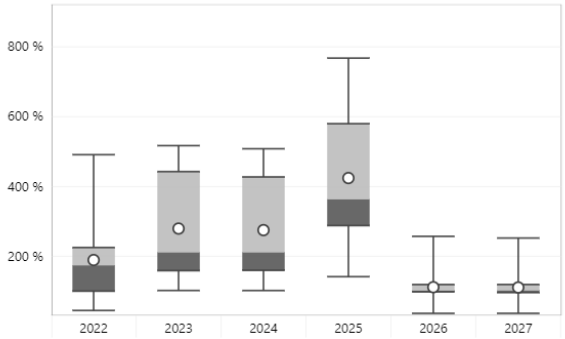


Chart 9: Loss ratio gross of reinsurance in the adverse scenario[12]



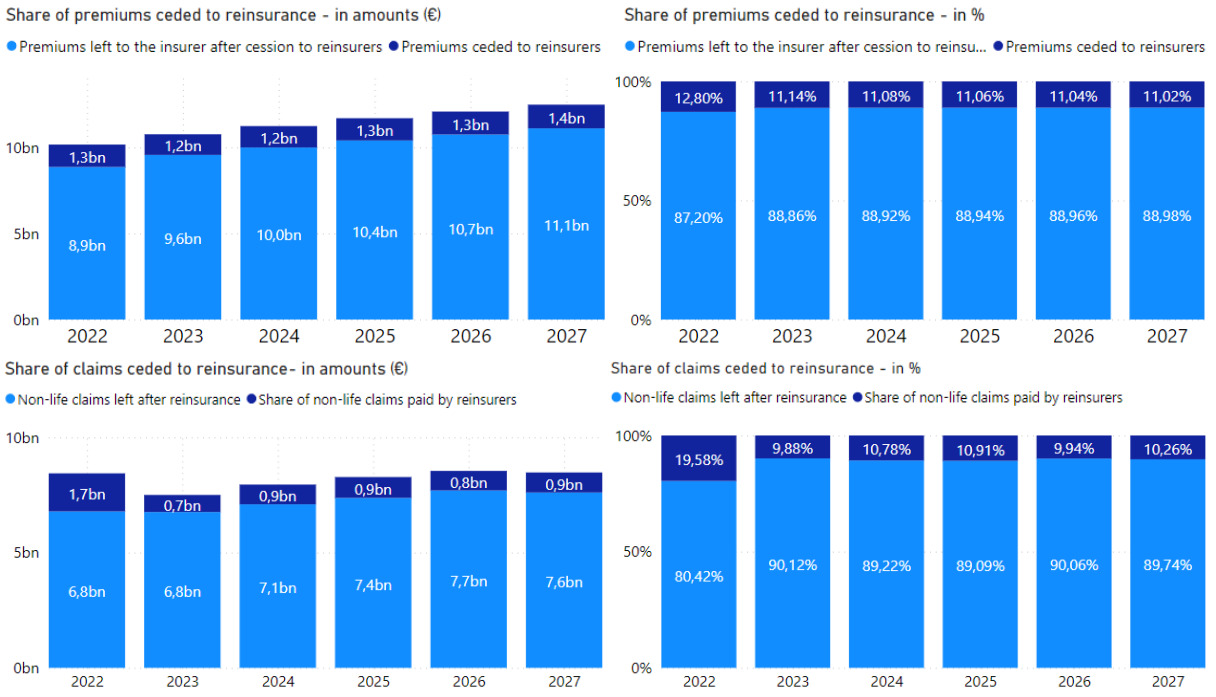
[11] Scope of the sample: 11 undertakings
[12] Scope: 11 undertakings

2.2.1.3. Weight of reinsurance on Nat Cat claims in the adverse scenario

Insurers generally use reinsurance as a way to mitigate Nat Cat risk, due to the sometimes extreme costs and unpredictable frequency of natural disasters.

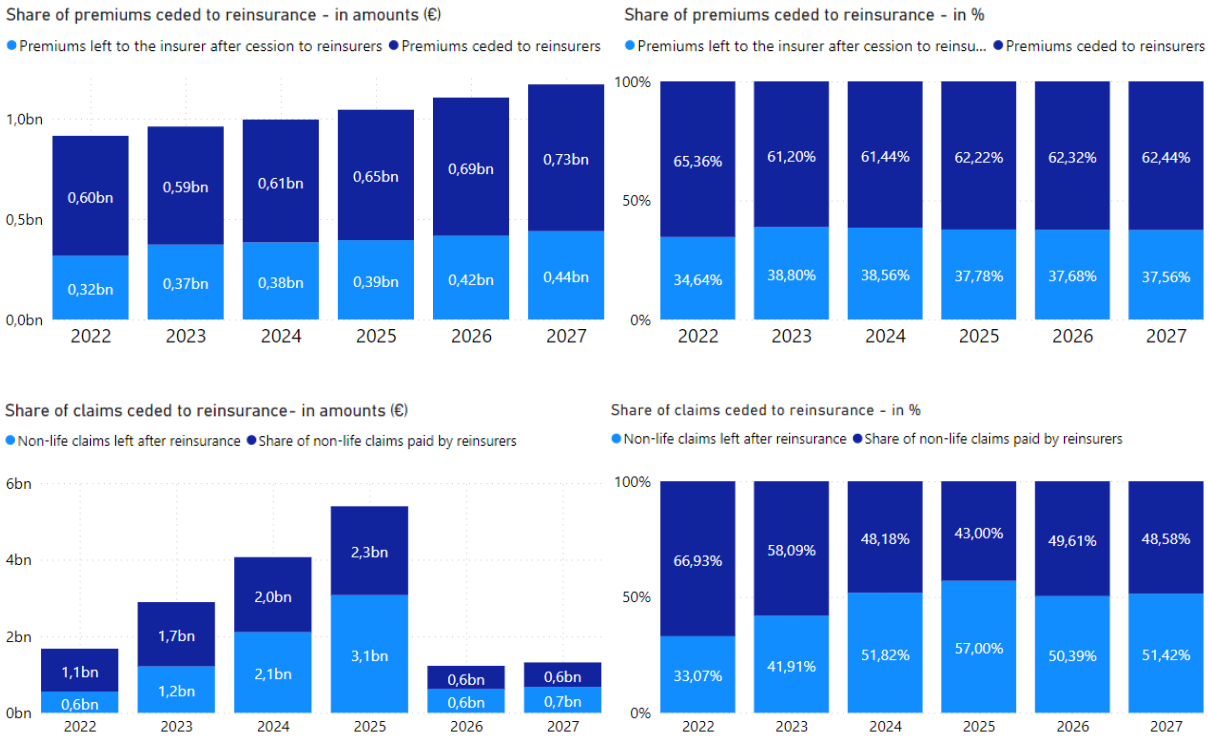
In the adverse scenario, for the "Natural disasters" category, the share of claims paid by reinsurers from 2023 to 2025 can be seen to increase in value (from EUR 1.1 billion to EUR 2.3 billion), but decreases as a percentage of total claims paid by insurers (thus going from 58% in 2023 to 43% in 2025). The share of premiums ceded to reinsurers remains stable, standing at around 60%, for the entire period considered (see Chart 11). The share of claims and premiums ceded to reinsurers is much more significant for the natural disaster class than for the broader property damage class to which it belongs (see Chart 10).

Chart 10: Share of claims and premiums ceded to reinsurance for property damage classes (for both private and professional contracts) in the adverse scenario[13]



[13] Scope: 10 undertakings

Chart 11: Share of claims and premiums ceded to reinsurance for the Nat Cat class, expressed in EUR billion in the adverse scenario[14]



The loss ratio for Nat Cat reinsurance, defined as:

$$\frac{\text{claims}}{\text{reinsurance premiums}}\text{Nat Cat} = \frac{\text{Share of reinsurance in claims paid, incl. provision variations}}{\text{Premiums ceded to reinsurers}},$$

is an indicator of the significance of the risk transfer between insurers and reinsurers. In the adverse scenario, on average, it stands well above 100% for the entire 2022-2025 period, with a peak at +375% in 2025, and only returns below 100% in 2026 and 2027 (88% in 2026) (see Chart 13)

At market level, the path is identical, as the reinsurance loss ratio of sampled undertakings[15] peaks at 357% in 2025 and returns closer to 100% in 2026 and 2027.

Comparatively, at market level, the loss ratio gross of reinsurance reaches similar levels, at 354%, in 2025 (over a slightly different scope of insurers).

[14] Scope: 10 undertakings

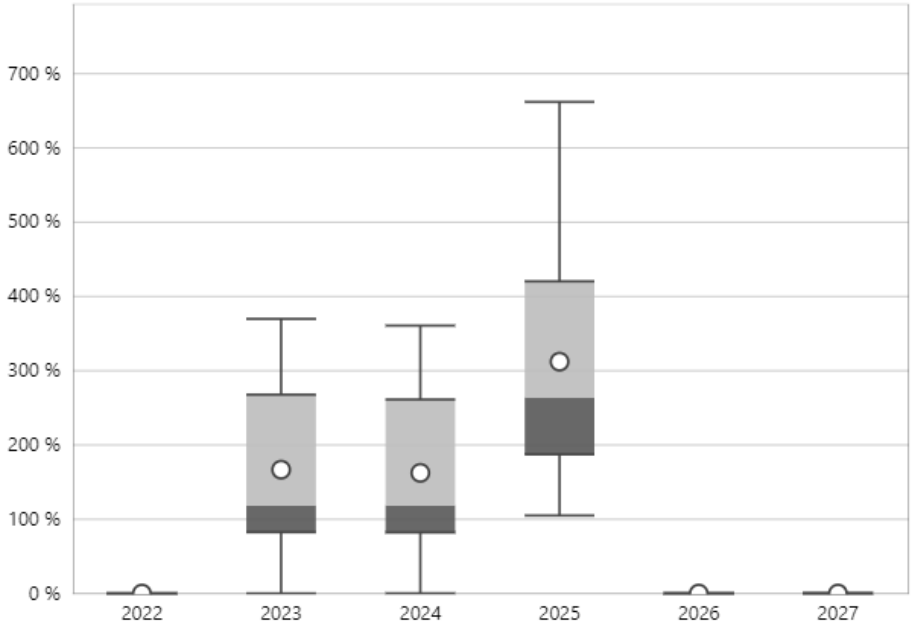
[15] In the sample considered, the loss ratio for reinsurance corresponds to the sum of claims ceded to reinsurance by all insurance undertakings, divided by the sum of premiums ceded to reinsurance by all insurers included in the sample.

Table 3: Market view - adverse scenario - overall ratios (as a %)[16] (different scope)[17]

Year	Nat Cat loss ratio gross of reinsurance	Reinsurance loss ratio for the whole sample
2022	162.62%	187.53%
2023	248.58%	285.75%
2024	244.36%	320.39%
2025	354.28%	356.93%
2026	108.39%	88.44%
2027	107.27%	87.45%

The dispersion observed in Nat Cat loss ratios gross of reinsurance is highest in the year during which the Nat Cat-related is at its highest level, namely in 2025 with the dam failure (see Chart 12).

Chart 12: Deviation observed for the gross Nat Cat loss ratio: between the adverse and baseline scenario at each set year, broken down by participant[18]:



[16] Scope studied for loss ratio gross of reinsurance: 11 undertakings. Scope studied for reinsurance loss ratio: 10 undertakings. 9 undertakings are included in both scopes.
[17] Scope studied for loss ratio gross of reinsurance: 11 undertakings. Scope studied for reinsurance loss ratio: 10 undertakings.
[18] Scope: 11 undertakings

Chart 13: Boxplots (with extreme values) of reinsurance loss ratios per participant[19]

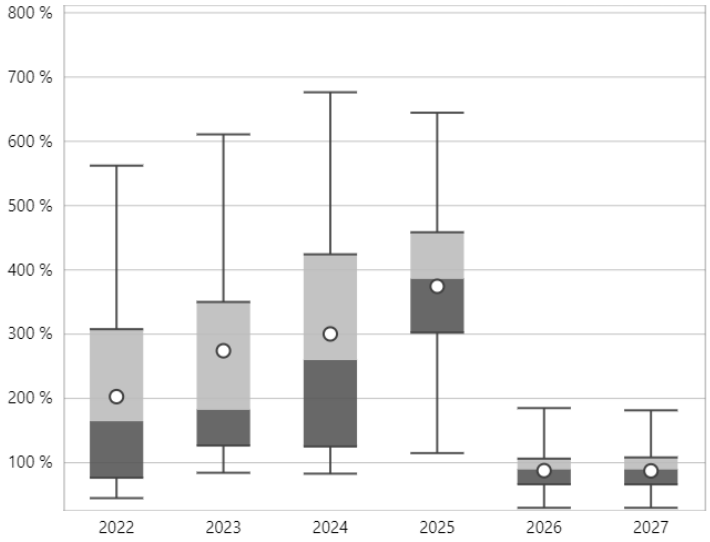
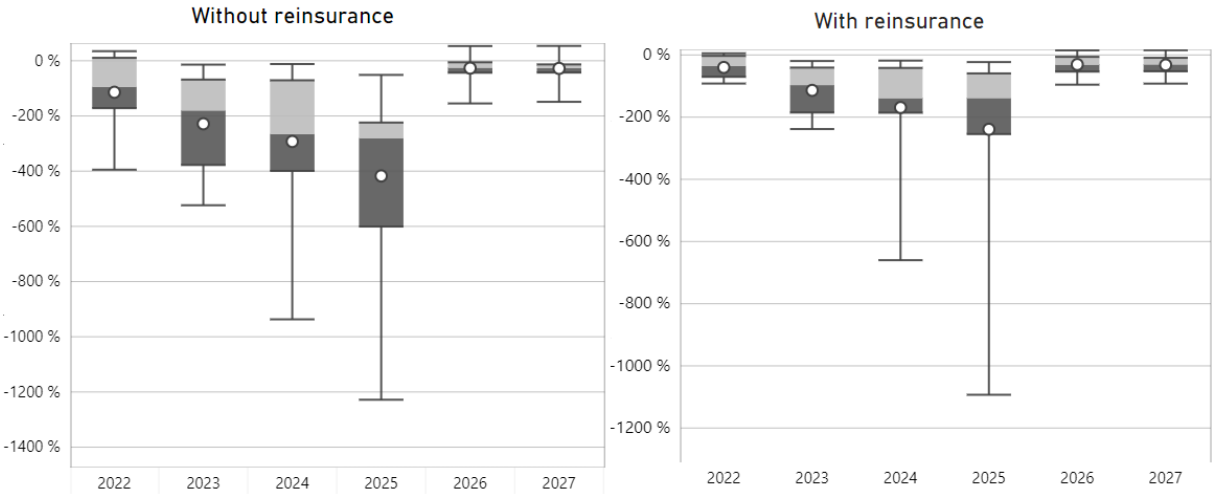


Chart 14: Underwriting income for the Nat Cat class with and without reinsurance, in the adverse scenario[20]

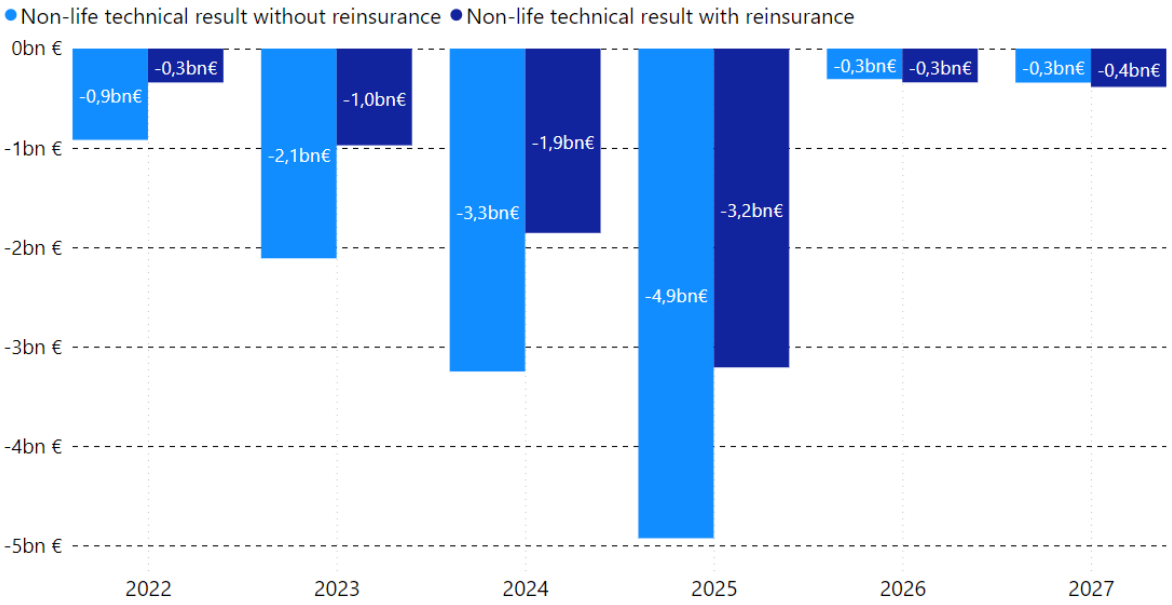


Reinsurance plays a major part in improving underwriting results in the natural disaster class, both at aggregated market level and at that of individual participants. However, under the adverse scenario, underwriting income figures remain very weak despite reinsurance, totalling, for instance, -239% in premiums on average in 2025. The loss ratio for reinsurance also deteriorates significantly and stands at 375% on average in 2025.

Essentially, in the context of this exercise, while reinsurance does allow for the transfer of risks from insurers to reinsurers, this transfer would not be sufficient to offset, on the insurers' side, the increase in claims stemming from acute perils.

[19] Scope: 10 undertakings
[20] Scope: 10 undertakings

Chart 15: Comparison of underwriting income in the Nat Cat class - with and without reinsurance; in the adverse scenario[21]



By comparing the aggregate Nat Cat underwriting income of the baseline and adverse scenarios, we observe that the non-life Nat Cat underwriting income of the studied sample, which was already negative in the baseline scenario, deteriorates sharply in the adverse scenario until it reaches a negative peak in 2025. These figures are attributable to the very significant amounts of non-life claims, in line with the acute perils modelled, which are not adequately offset, in particular, by additional natural disaster premiums. From 2025 onwards, in the adverse scenario, underwriting income growth in the non-life segment picks up in 2026, before stagnating in 2027.

However, these findings need to be considered in light of the fact that insurance against natural disasters is never purchased as a stand-alone insurance product, but is always included as part of insurance coverage for other property damage risks. It should also be kept in mind that the natural disaster premium surcharge adopted in December 2023, from 12% to 20% as of January 2025, was not integrated into the assumptions of this exercise, which was designed at an earlier date.

[21] Scope: 11 undertakings

Chart 16: Non-life underwriting income for the Nat Cat segment - baseline scenario (in amount and as a % of premiums)[22]

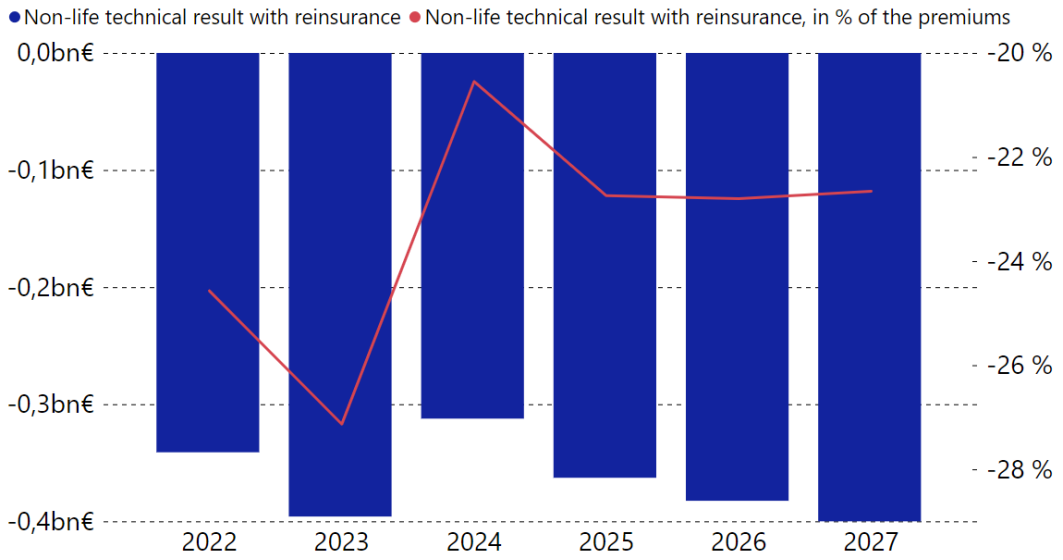
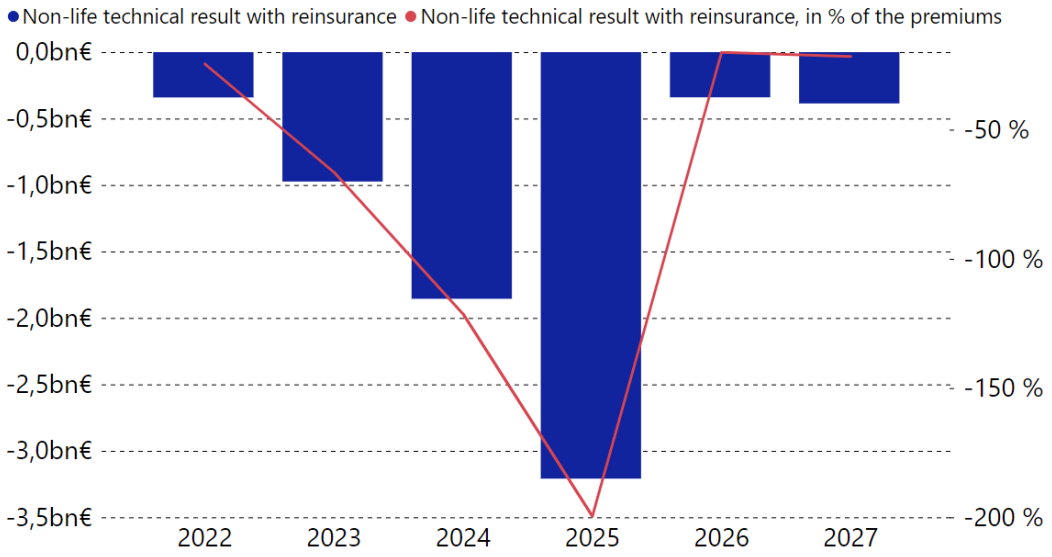


Chart 17: Non-life underwriting income for the Nat Cat segment - adverse scenario (in amount and as a % of premiums)[23]

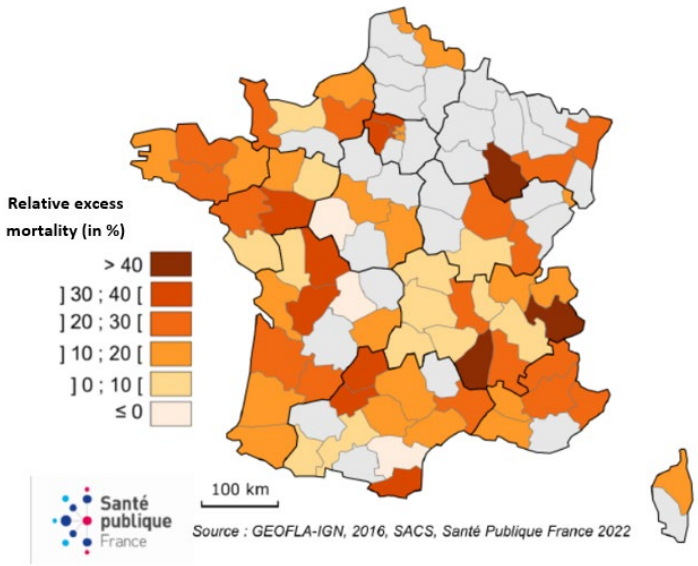


2.2.2. Key figures for health and disability insurance

AON's contribution to the determination of health claim assumptions has made it possible to introduce finer regional granularity, both in the assessment of the consequences of a dam failure in 2025 and in that of the consequences of heat waves occurring in 2023-2024, on par with the regional heterogeneity observed in excess mortality attributed to drought events in mainland France in 2022.

[22] Scope: 11 undertakings
[23] Scope: 11 undertakings

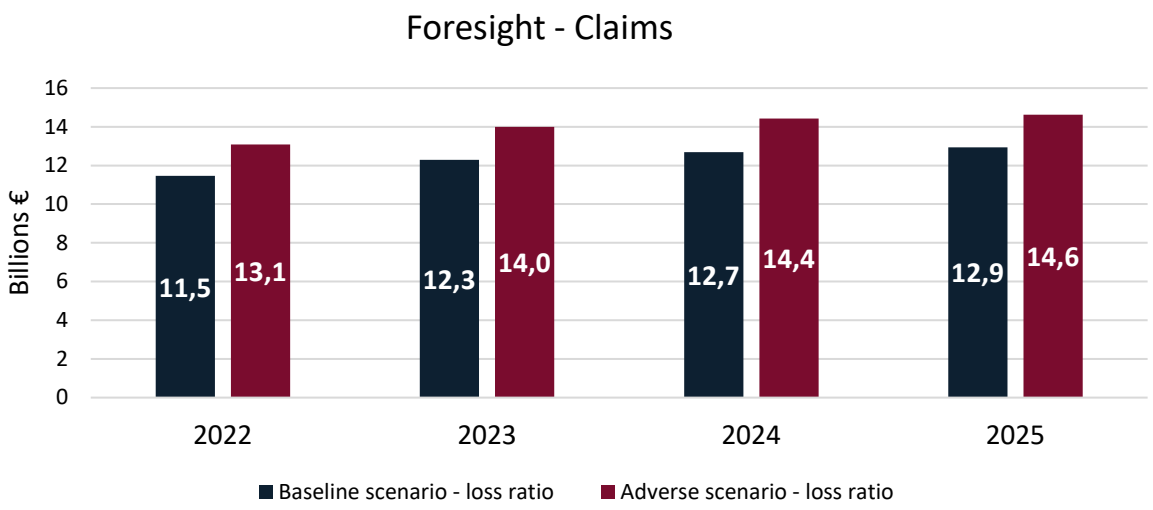
Chart 18: Map of relative excess mortality during the heatwaves of summer 2022



However, due to poor data quality and the lack of granularity at regional level of several insurers' submissions, this analysis of claims in the health and disability segment (healthcare expenses, other bodily injury and all-cause death coverage) only relies on the figures provided for mainland France.

Despite a substantial increase in health and provident claims compared to the baseline scenario, the impact of health claims on loss ratio gross of reinsurance is extremely low. This is partly attributable on the one hand to the relatively low magnitude of the applied shocks, and on the other to the increase in health premiums reflecting the associated increase in benefit payments. In addition, the fact that the French social security system covers a portion of healthcare costs accounts in part for the low impact of adverse scenario shocks on the loss ratio in healthcare.

Chart 19: Comparison of claims and premiums in the baseline and adverse scenarios for the Health and disability insurance lines[24]



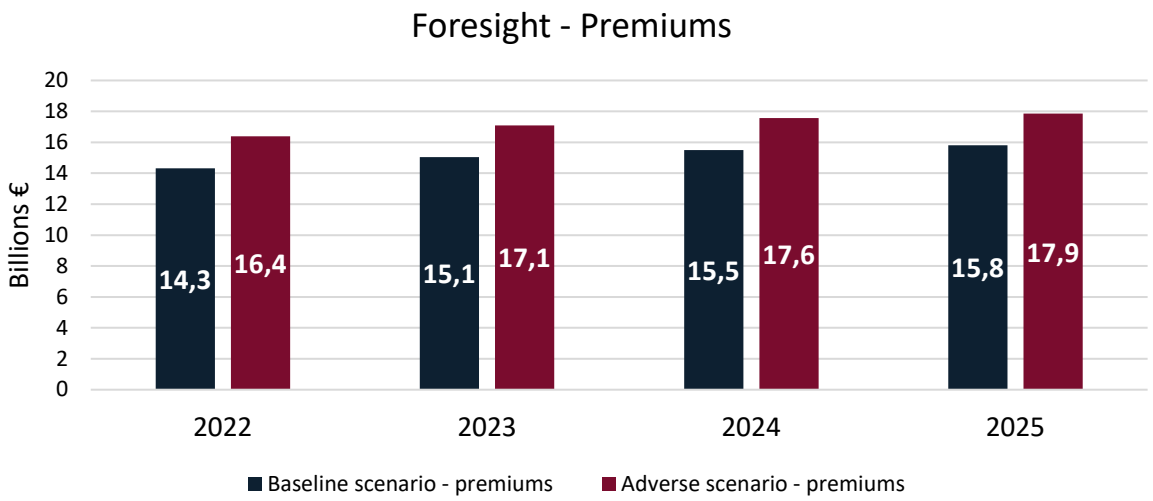


Table 4: Short-term loss ratio for health and disability insurance gross of reinsurance[25]

Year	Health and disability loss ratio gross of reinsurance according to the baseline scenario	Health and disability loss ratio gross of reinsurance according to the adverse scenario
2022	80%	80%
2023	82%	82%
2024	82%	82%
2025	82%	82%

[24] Scope: 6 undertakings
[25] Scope: 6 undertakings

2.3. Impacts of the financial shock associated with transition risk

2.3.1. Overview

The financial shock has a direct impact on the economic value of investments on the asset side of insurers' balance sheets. More specifically, the value of equity and property assets respectively shrinks by 27% and 32% in 2025, in the adverse scenario compared with the baseline scenario. Due to contagion effects, both sovereign and corporate bonds lose 8% of their value on average. Overall, the devaluation of investments stands at around 13% in 2025.

Chart 20: Investment total by asset class (in EUR billion)

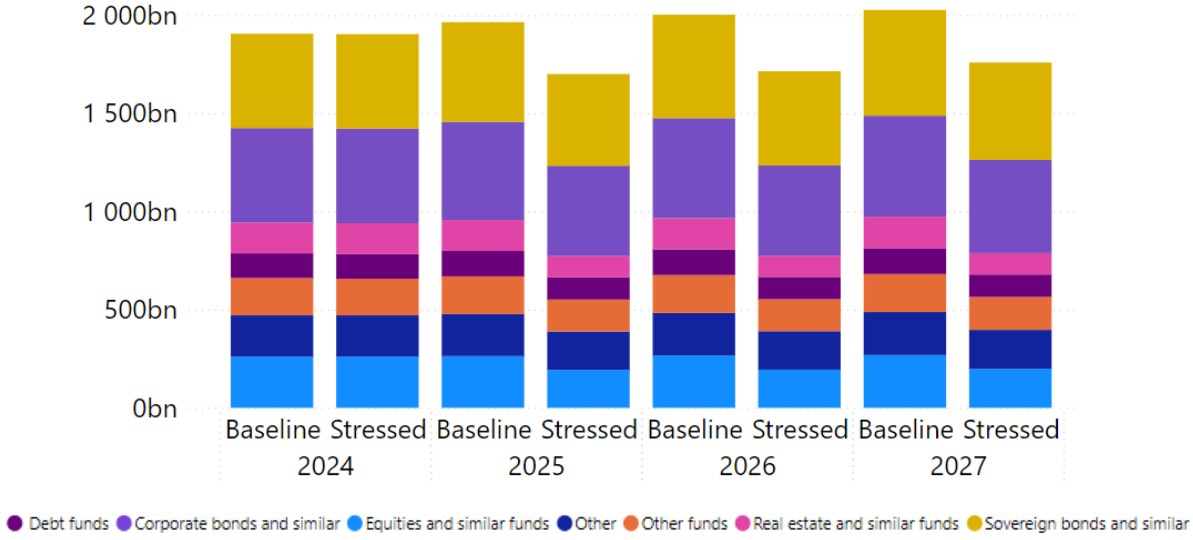
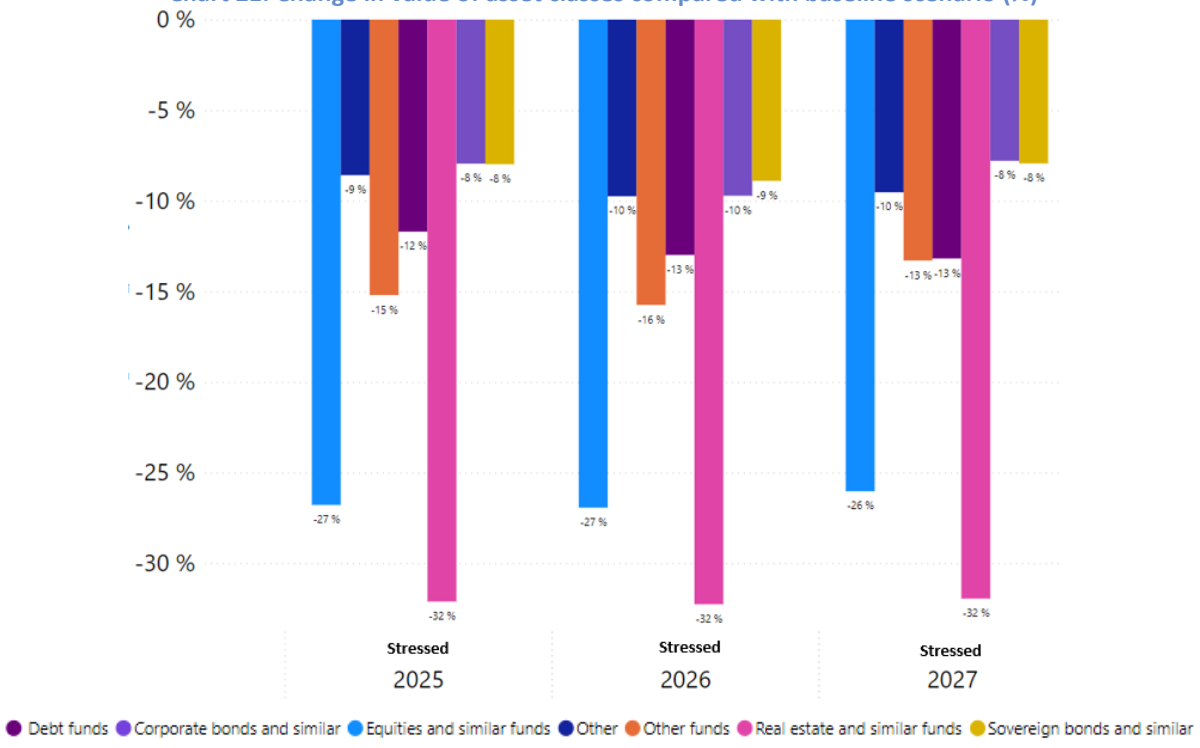
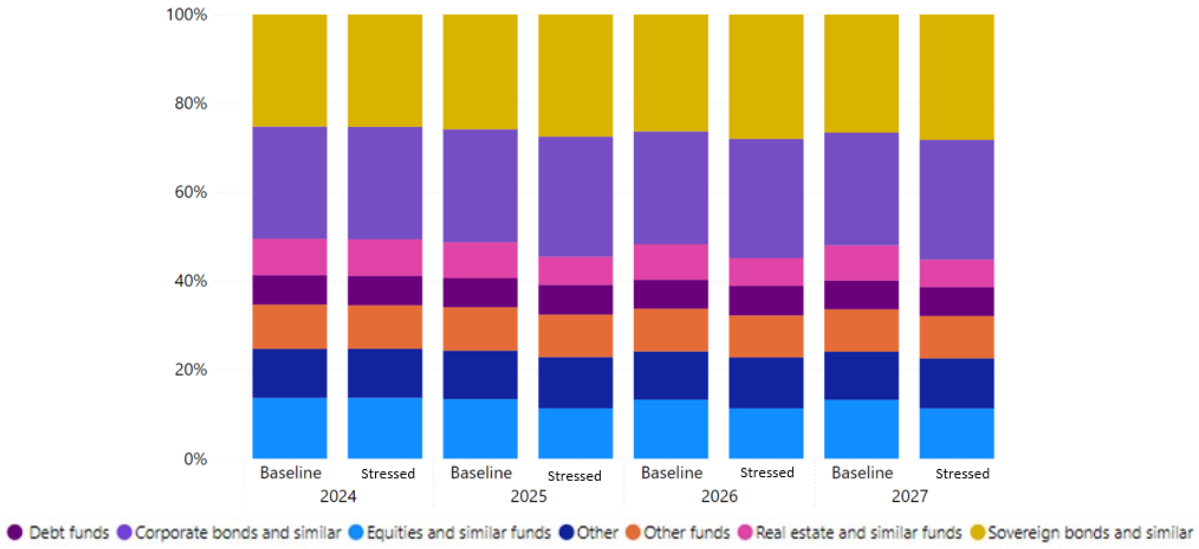


Chart 21: Change in value of asset classes compared with baseline scenario (%)



The impact of these variations on the relative share of each asset class is consistent over time and according to the scenario considered. As sovereign and corporate bonds are proportionally less affected, their relative share in insurers' balance sheets increases (by around 1.5 percentage point in 2025 in the stressed scenario compared with the baseline scenario, see Chart 22) while the share of equity and property assets records a relatively sharp decline.

Chart 22: Share of investment broken down by asset class, scenario and year considered (%)



2.3.2. Sovereign bonds

Contagion to the sovereign portfolio depends both on correlations between financial assets and on the respective dynamics of the various economies according to the scenarios considered. In this exercise, the shock applied to sovereign bonds in 2025 affects US bonds the most, the value of which falls by almost 15% in 2025 compared with the baseline scenario, as well as the credit standing of other sovereigns, with a drop in value in the order of 10% for countries like Italy and Germany. French sovereign bonds are comparatively less affected.

Chart 23: Sovereign bonds according to issuing country (in EUR billion)

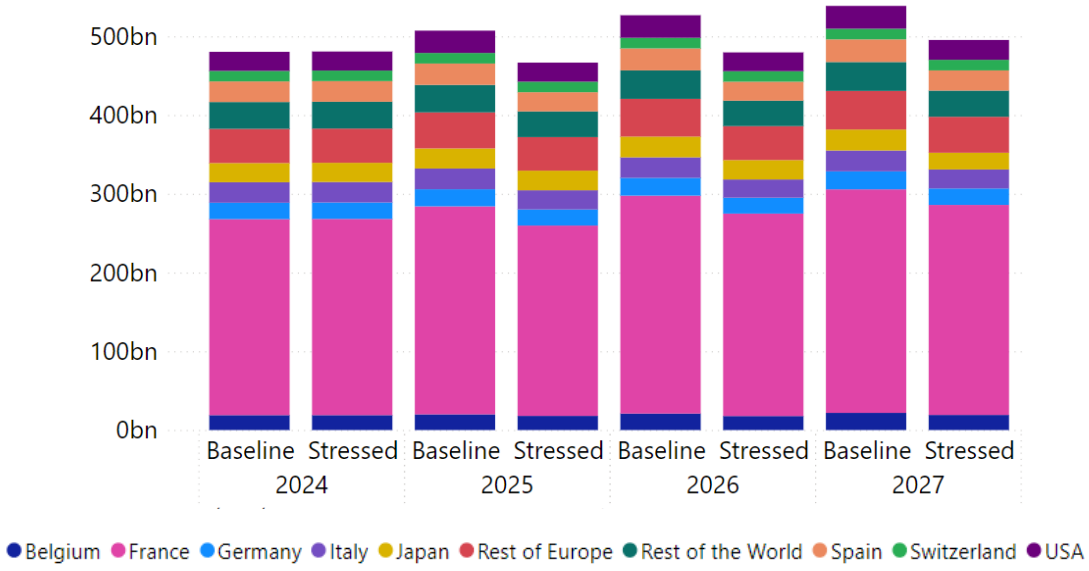
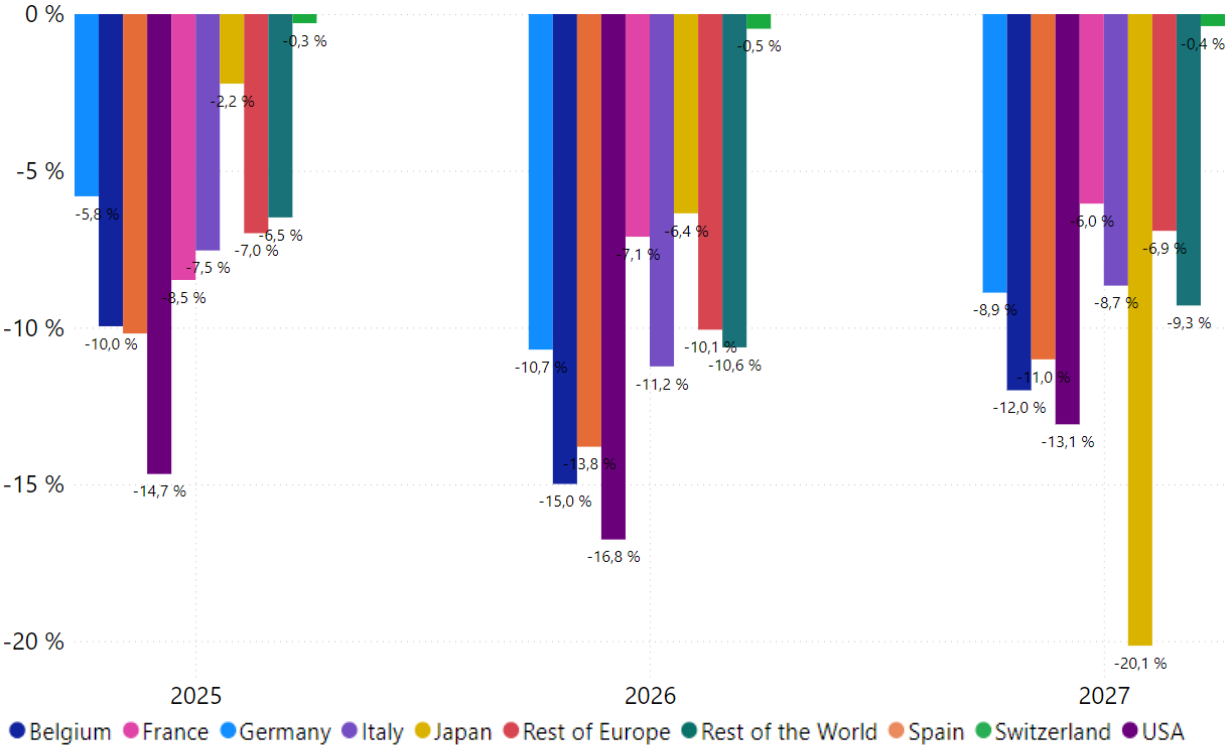


Chart 24: Change in sovereign bond value per country in 2025 (%)



2.3.3. Corporate bonds

In 2025, corporate bonds show varied rates of contraction depending on the sector considered, in line with the shocks defined in the assumptions of the adverse scenario. The Energy and Basic Materials sectors, for instance, are the most heavily affected, value dropping by approximately 11% compared with the baseline scenario in 2025. The Technology and Industrial sectors are also severely affected (-10% and -9% respectively), while the financial sectors are less affected (banks and other financial institutions lose 7% of their value in 2025 compared with the baseline scenario).

Chart 25: Corporate bonds broken down according to GICS classification (in EUR billion)

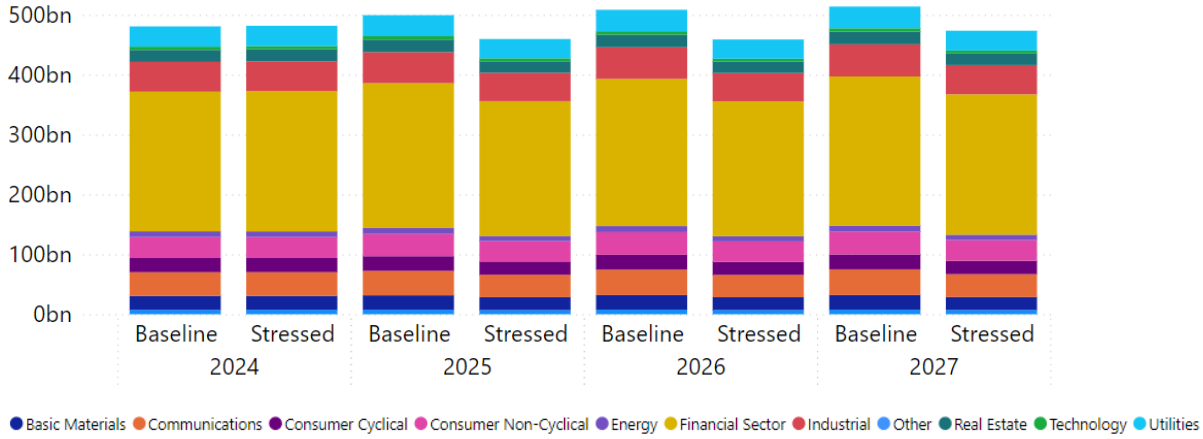
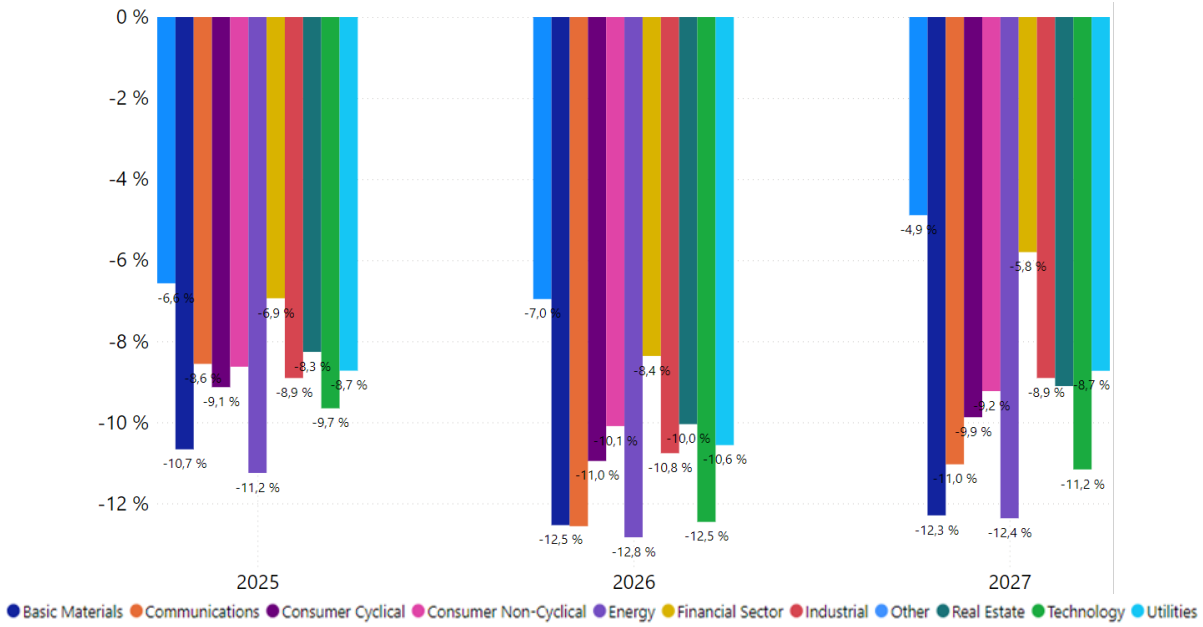


Chart 26: Change in the value of corporate bonds for each sector compared with the baseline scenario (%)



2.3.4. Shares and equity funds

Shares are the assets most affected in the short-term scenario, in line with the shocks included in the technical specifications. In 2025, the sharpest downward trends are observed for the Industry and Utilities sectors (-35%) and the Basic Materials sector (-33%).

Chart 27: Breakdown of equity according to GICS classification (in EUR billion)

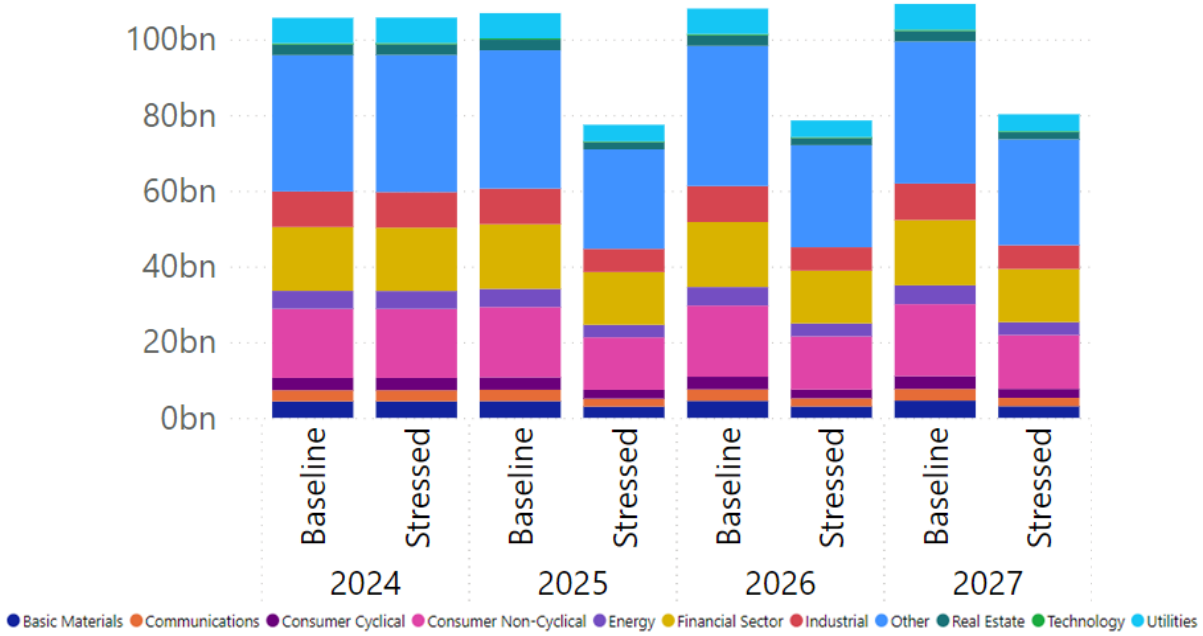
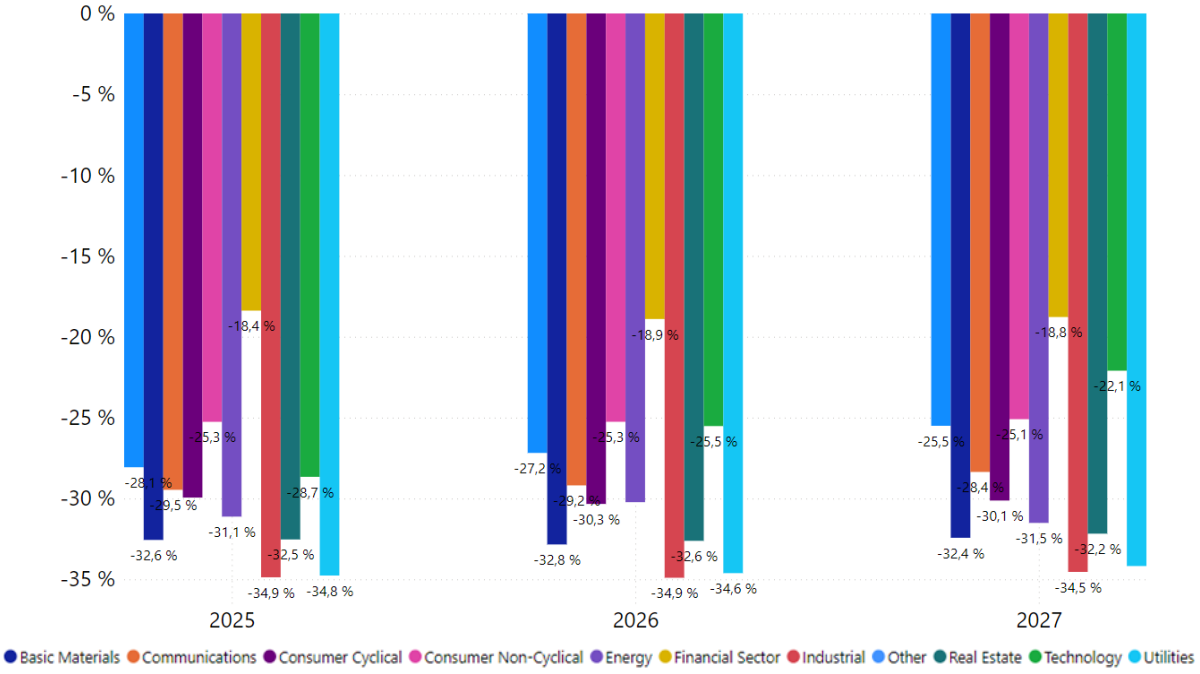


Chart 28: Changes in the value of shares by sector in 2025 (%)

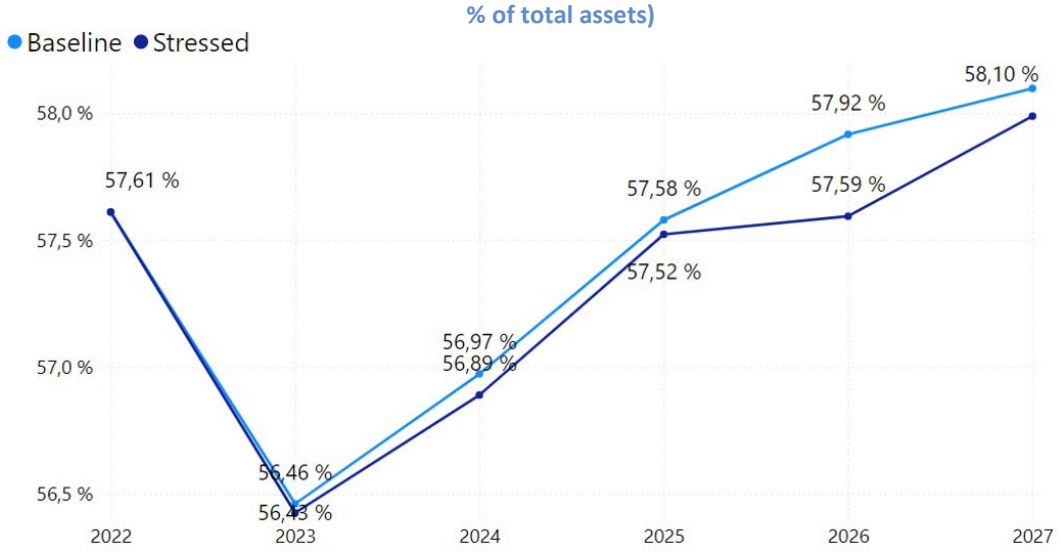


2.4. Consequences of adverse scenario shocks on balance sheet and solvency

2.4.1. Impacts of adverse scenario shocks on underwriting income

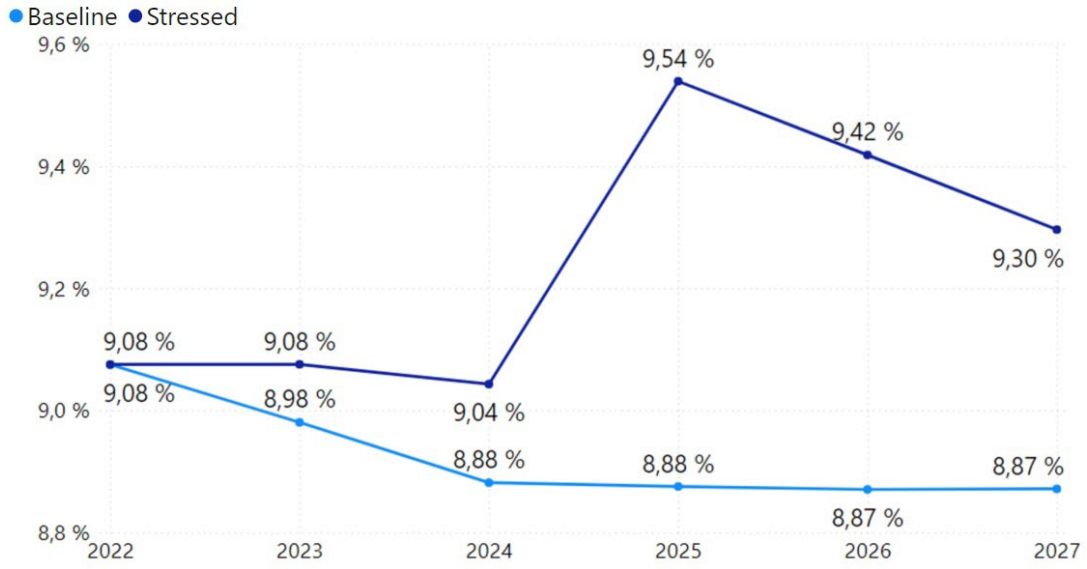
As a result of these various shocks, insurers' total liabilities fall by 10% in the adverse scenario compared to the baseline scenario at the end of 2027. Life insurance technical provisions covering unit-linked life insurance policies and index-linked products are down as a result of the financial shock, affecting the investments used to cover these contracts. The amount of other life technical provisions also decreases. According to the insurers surveyed, this is mainly attributable to higher discount rates and, to a lesser extent, to higher mortality rates.

Chart 29: Life technical provisions (excluding unit-linked contracts) per year according to each scenario (as a % of total assets)



Moreover, it is worth pointing out that non-life technical provisions increase in the stressed scenario in 2023 and 2024, reaching a record high in 2025 as a result of the dam failure shock, only to drop below the same reserves under the central scenario. At end-2027, technical provisions are 6% lower in the stressed scenario than in the baseline scenario (representing €11.3 billion).

Chart 30: Non-life technical provisions for each year and according to each scenario (as a % of balance sheet total)



As for the reinsurance mechanism, the analysis shows that the ratio of life technical reserves ceded to life technical provisions remains constant at 3% and use of reinsurance remains marginal until 2027 under both scenarios. However, this ratio is higher for non-life technical provisions, where it stands at 17% in the central scenario, compared with 18% in the stressed scenario.

2.4.2. Changes in balance sheet size and excess of assets over liabilities

The impact of the adverse short-term scenario on the balance sheet, and the excess of assets over liabilities and over own funds of all participants is very apparent from 2025 onwards.

Indeed, from 2025 -the year during which the financial shock is triggered- onwards, the balance sheet total under the adverse scenario is down by -10% compared with the baseline scenario (EUR 2,056 billion versus EUR 2,323 billion). The deviation of the adverse scenario compared to the baseline scenarios widens further in 2026 and 2027, reaching -12%.

While the excess of assets over liabilities under the baseline scenario increases from EUR 205 billion to EUR 236 billion (rising by EUR 31 billion, 16%, equivalent to a 16% increase) over the 2022-27 period, in the adverse scenario it deteriorates, from EUR 205 billion down to EUR 174 billion over the same period (a EUR 30 billion decrease, down by -15%).

The excess of assets over liabilities under the adverse scenario reaches its lowest level (EUR 152 billion) in 2025, down by EUR -53 billion, or -26% compared with 2022, and a relative loss estimated at EUR -73 billion compared with the baseline scenario in 2025, down -32%.

Chart 31: Balance sheet size by year and for each scenario (in EUR billion)

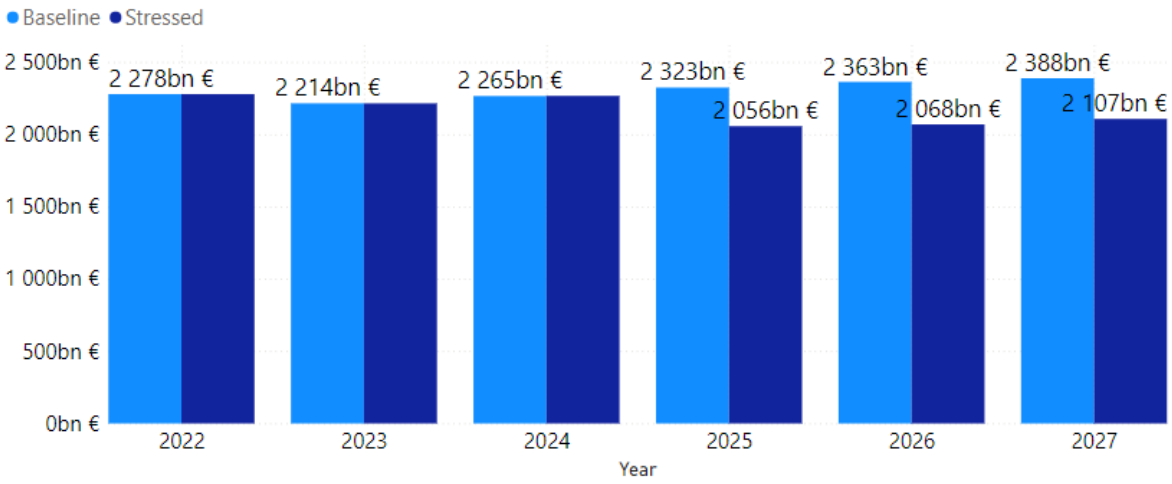
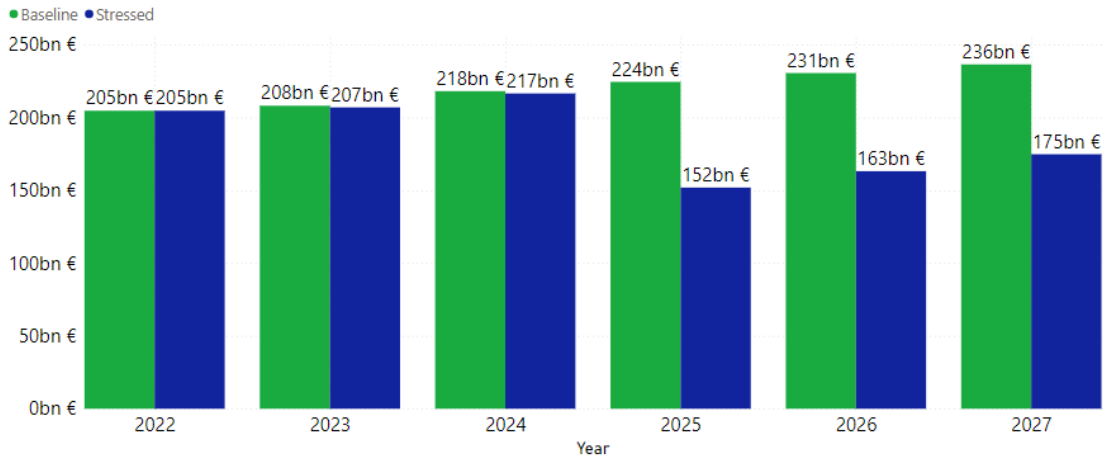


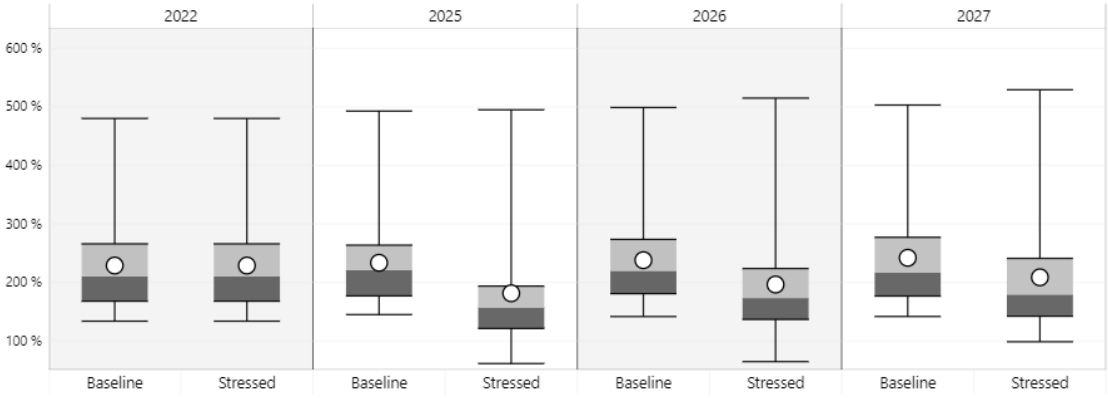
Chart 32: Excess of assets over liabilities by year and for each scenario (in EUR billion)



2.4.3. Solvency and changes in own funds

An analysis of the solvency of participating insurers (through their capital requirements, SCR and the SCR coverage ratio over own funds) shows a significant decrease of the SCR coverage ratio by own funds from 2025 onwards (see Chart 21), mainly owing to the impact of the financial shock.

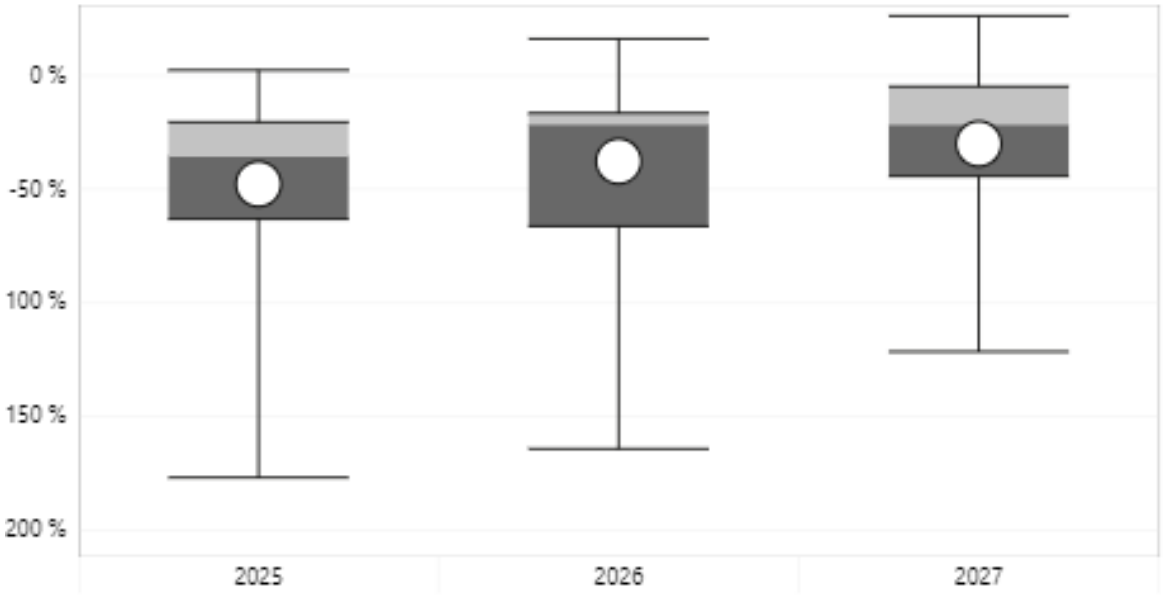
Chart 33: SCR coverage ratio according to scenario and year considered (expressed as a %)



The impact of the strictly climate-related component (drought, flooding) of the shocks is much less significant on prudential balance sheets than the impact of the financial shock, the effects of which continue until 2027.

As of 2025, stressed coverage ratios deviate from pre-shock coverage ratios by 48 ratio points (and 25% of insurer's record losses equivalent to more than -63 ratio points). Maximum loss is reached in 2025 by an insurer down by -177 ratio points (-163 points in 2026, -122 points in 2027).

Chart 34: Distribution of the relative difference between the Baseline SCR ratio and the adverse SCR ratio, by undertaking and by year (%)

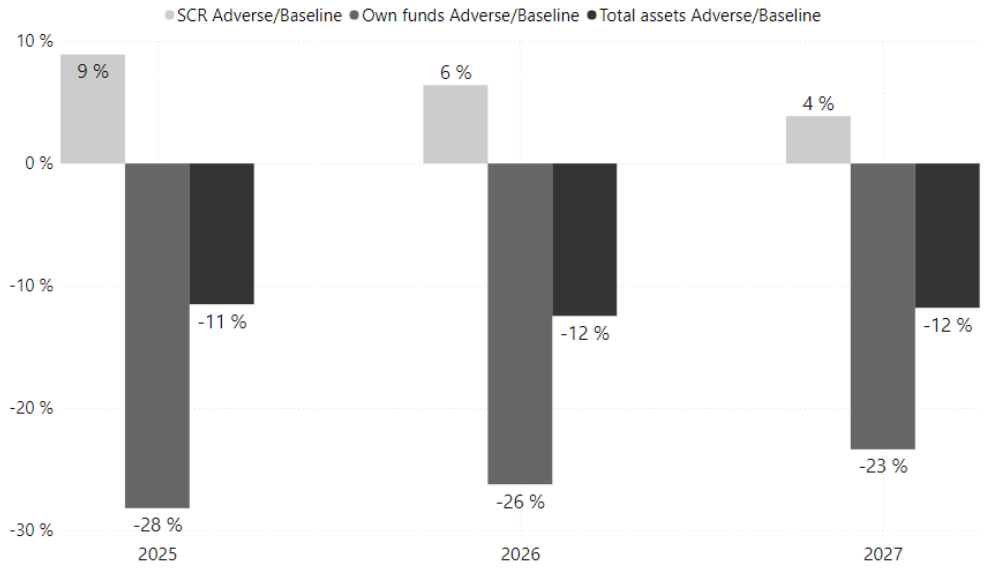


A breakdown of changes in SCR and own funds shows that the reduced capacity to cover capital requirements stems more from a sharp drop in own funds (-28% in 2025 in the adverse scenario compared with the baseline scenario) than from an increase in capital requirements (+9% in 2025 in the adverse scenario compared with the baseline scenario).

This capital depletion stems from:

- 11.5% impairment losses on assets, in the wake of the financial shock that occurs in 2025;
- this is partially offset by a smaller on the liabilities side (10%), which is itself mainly attributable to the reduction of:
    - technical provisions for unit-linked life insurance contracts, as a result of the financial shock affecting the unit-linked products held by insurers;
    - other life technical provisions, due to a higher discount rate and, to a lesser extent, to increased mortality.

Chart 35: Averse/Baseline differences in SCR, Own Funds and asset total by Year (as a %)



More specifically, the increase in the volume of capital requirements is mainly due to the increase in SCRs for life underwriting (+25% in 2025), despite a relatively less significant decrease in SCRs for operational risk, counterparty risk, non-life underwriting risk and market risk in the years of the financial shock.

Chart 36: SCR for market risk, SCR for non-life underwriting risk, SCR for operational risk, SCR for health underwriting risk, SCR for counterparty default risk and diversification SCR according to each scenario considered, in 2025 (in EUR billion)

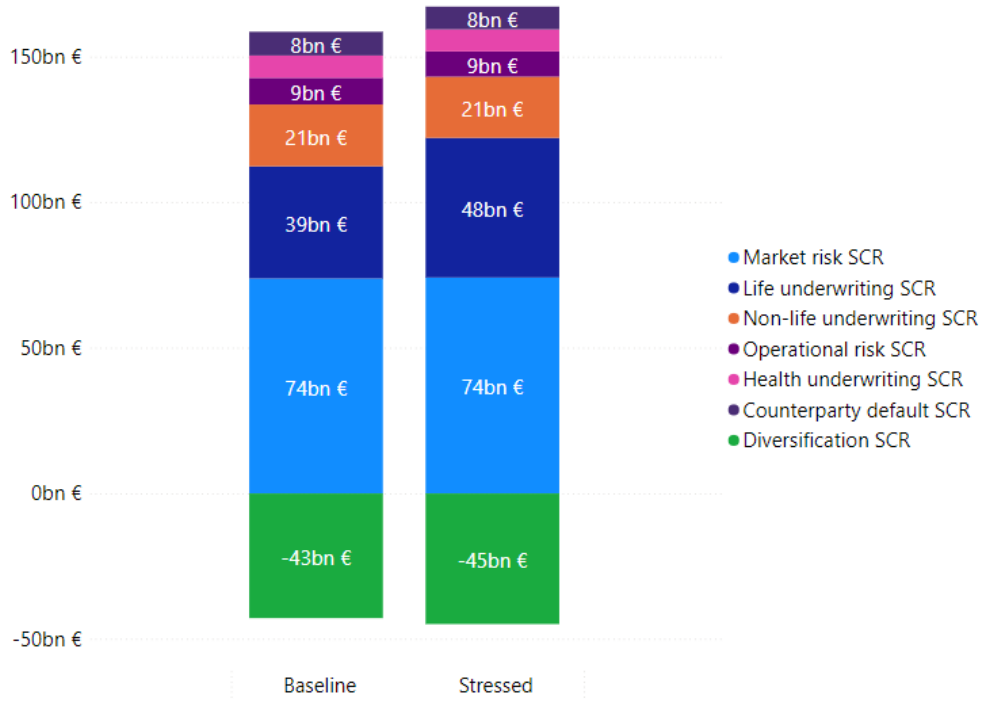
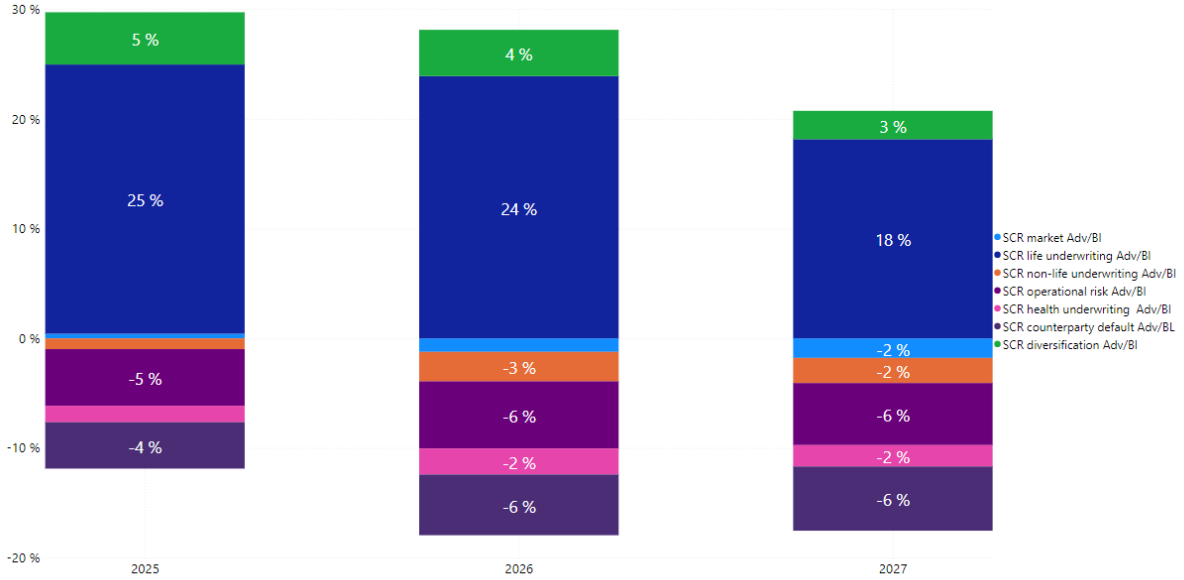


Chart 37: Stressed SCR ratio/baseline SCR ratio for market risk SCR, non-life underwriting risk SCR, operational risk SCR, health underwriting risk SCR, counterparty default risk SCR and diversification SCR, broken down by year (as a % of difference)



3. Analysis of long-term scenarios

Long-term scenarios are enlightening, especially concerning the impact of claims.

The deterioration in total Nat Cat claims under the adverse scenario (Delayed Transition) and by 2050 is estimated by participants at 105%, compared to 2022 levels, and the variation of the claims in 2050 compared with the baseline scenario stands at +42%. There are considerable geographical disparities depending on the risks considered.

Overall, insurers made fairly limited use of management action (such as geographical reallocations or discontinuation of coverage) to mitigate the impact of adverse scenarios.

In addition, for the first time in this kind of exercise, insurers have also explored insured gap risk, both quantitatively and qualitatively, namely the fact that some assets may no longer benefit from insurance coverage, due to excessively high insurance premiums. Insurers believe that this risk would be differentiated geographically, and are planning to set up in-house policyholder support mechanisms to combat the increase in claims that is attributable to climate change.

In terms of investment, in line with the scenarios, assets linked to fossil fuels and real estate experience the sharpest impairment losses by 2050. It seems, however, that participating insurers are not considering major portfolio reallocation.

Unless otherwise specified, amounts relating to long-term scenarios are expressed in current euro.

3.1. Reminder of long-term assumptions: an orderly transition scenario and a disorderly transition scenario

The long-term analysis includes two adverse transition scenarios, one orderly and the other disorderly, as proposed by the NGFS and which differ only on the asset side:

- the two scenarios measure the impact of climate risks on assets, in terms of both chronic physical risk and transition risk, based on a comparison with a fictitious baseline scenario that includes no physical or transition risk;
- for both scenarios, the assessment of the impact of acute physical risk on liabilities is carried out on the basis of the RCP 4.5 path

In contrast to the pilot exercise, which used an orderly transition scenario as its baseline scenario, this second stress-testing exercise takes the projected changes included in the NIESR baseline scenario as a reference. This is a fictitious scenario in which the economy is not exposed to climate change.

The adverse scenarios are based on the Below 2°C and Delayed Transition scenarios included in Phase III of NGFS work that was published in September 2022[26]. This new version differs from previous ones in that it takes into account national commitments made at COP26, as well as the latest technological advances in the field of renewable energies.

3.1.1. Integrating transition risk

The Below 2°C and Delayed Transition scenarios differ significantly in their level of exposure to transition risk: the Delayed Transition scenario includes more delayed and more disorderly action than the Below 2°C scenario. Differences in transition risks between the two variants are primarily found in carbon pricing variations: the Below 2°C scenario assumes a gradual increase in carbon prices (Chart 38), while the Delayed Transition scenario features a sharp increase in carbon prices in 2035, from US$15 to US$345/t CO2 and from US$6 to US$127/t CO2 respectively in Europe and worldwide over the period considered for the exercise.

Under the Below 2°C scenario of the NGFS, transition risk remains fairly low up to 2100, thanks to a growing awareness leading to the early adoption of environmental regulations that gradually get more stringent, with little divergence between regions and countries. Furthermore, in conjunction with the adoption and gradual increase of carbon prices in line with the transition targets as early as 2025, technological advances and carbon dioxide removal techniques[27] are assumed to lead to a decrease in carbon emissions at global level as early as 2025.

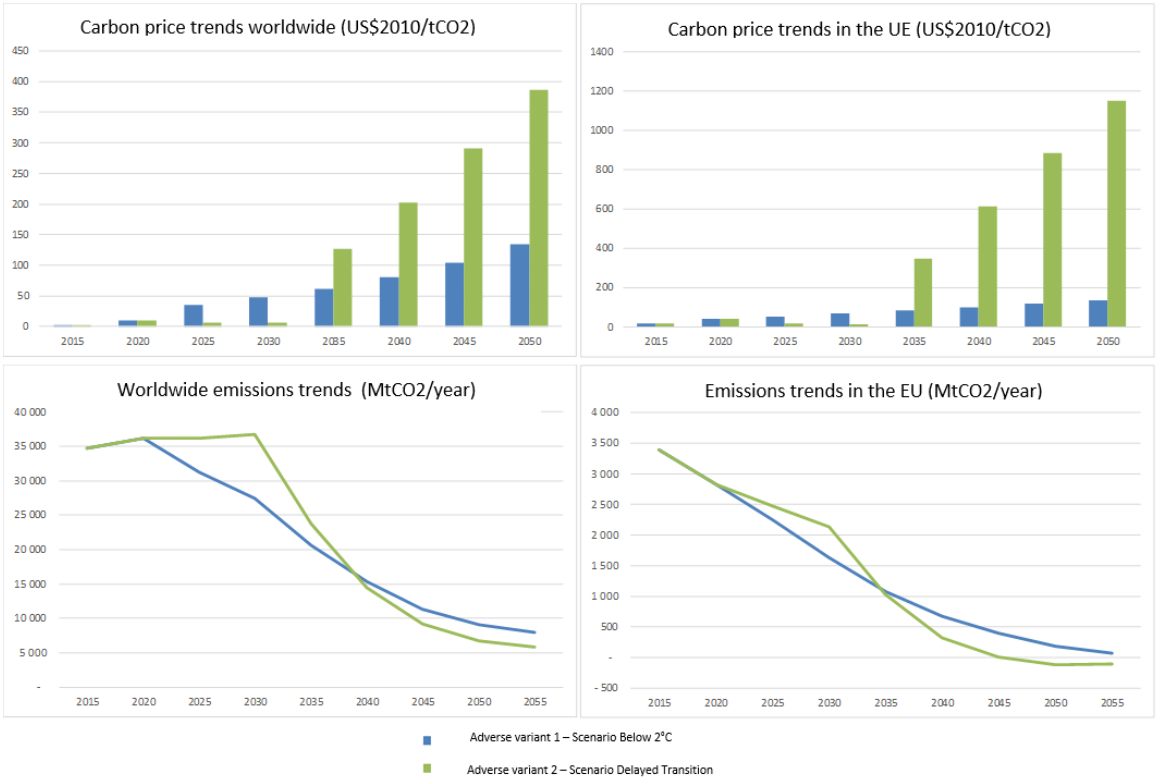
Under the Delayed Transition scenario, and primarily due to the delay in implementing transition policies, transition risks are higher than under the Below 2°C scenario[28] . Indeed, in this scenario, the average carbon price surges suddenly in 2035 to compensate for inaction during the previous years. Owing to disorderly nature of transition policies and to geographical disparities in technological advances aimed at eliminating carbon dioxide present in the atmosphere, global emissions would not start declining by any significant margin before 2040. However, as stringent measures are suddenly taken starting in 2035, the emission paths projected by the NGFS under the Delayed Transition scenario decrease faster than in the Below 2°C scenario (Chart 38); from 2040 onwards, the emission paths under the Delayed Transition scenario reach lower levels than those projected under the Below 2°C scenario: respectively standing at 16,860 Mt CO2/year and 18,069 Mt Co2/year at global level).

[26] Link to the overview of NGFS Phase III scenarios: https://www.ngfs.net/sites/default/files/medias/documents/ngfs_climate_scenarios_for_central_banks_and_supervisors_.pdf.pdf

[27] Carbon dioxide removal refers to all techniques used for the capture and sequestration of carbon dioxide in the atmosphere, which can be either natural (e.g. reforestation, changing agricultural practices) or technology-based (such as bioenergy with carbon dioxide capture and storage or BECCS, and direct air capture of carbon dioxide or DAC).

[28] It should be noted that, over the long term, both variants present similar levels of physical risk, and the main differences between the scenarios lie in their exposure to transition risk.

Chart 38: Changes in EU and global carbon prices and CO2 emissions under the Below 2°C and Delayed Transition adverse scenarios



Note: emission trajectories are derived from the REMIND-*MAgPIE model and are represented continuously, but the values per 5-year step are the only ones provided by the NGFS scenario.*

3.1.2. Integrating physical risk

The Below 2°C and Delayed Transition scenarios have similar levels of exposure to physical risk: they are calibrated so that the probability of reaching a temperature below 2°C in 2100 stands at 67%. In both cases, the impact of acute physical risk on liabilities is measured on the basis of the RCP 4.5 path. This marks a difference with the pilot exercise, in which physical risk on liabilities was assessed based on the RCP 8.5 scenario, which assumed a temperature increase comprised between 1.4°C and 2.6°C in 2050 (compared with 0.9°C and 2.0°C in 2050 for the RCP 4.5 scenario, for the 2046-2060 period[29]). RCP 4.5 was chosen based on the following grounds:

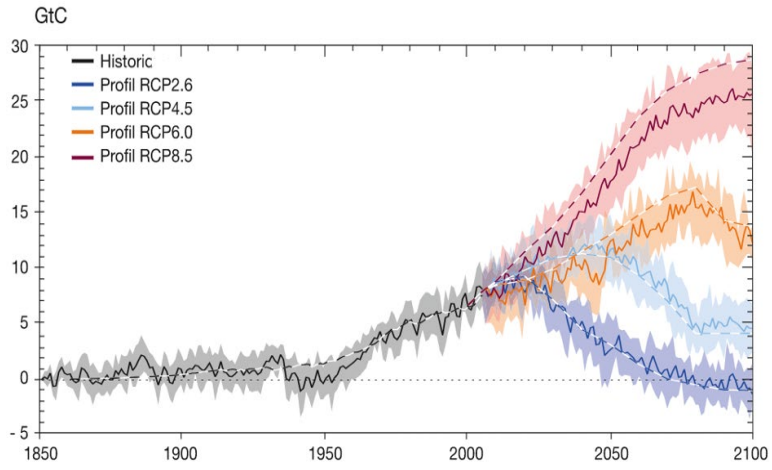
- RCP 4.5 provides greater consistency with the temperature paths of the NGFS "Below 2°C" and "Delayed Transition" scenarios up to 2050. The median temperature increase stands at +1.7°C in France in 2050 for the "Delayed Transition" scenario, compared with +1.4°C for the RCP 4.5 scenario; this 0.2 or 0.3°C variation is observed for all geographical areas;[30]

[29] Refer to the SPM.2 table in the summary for policymakers included in report by the first IPCC working group: WG1AR5_SPM_FINAL.pdf (climatechange2013.org)

[30] Climate Analytics — Climate impact explorer

- There are limited differences between RCP 4.5 and RCP 8.5 (and intermediary RCPs) up to 2050, including as regards the occurrence of extreme climate hazards. As regards river flooding, RCP 4.5 proves to be no less adverse for France than RCP 8.5 was in 2050 (see Chart 39). Where other perils are concerned (marine submersion, subsidence, storms), the RCP 8.5 scenario remains slightly more adverse.
- more adverse impacts can be considered within the same emission path. For the assessment of rise in claims under France's natural disaster compensation scheme, the CCR provides damage projections corresponding both to the average under the RCP 4.5 scenario and the 98th percentile of damage associated with this path, which made it possible to consider potentially more adverse impacts with a constant socio-economic trajectory, and thus to take into account uncertainties surrounding these projections.
- More generally, RCP 8.5 is also the matter of some debate as regards its achievability, due in part to the assumptions regarding the evolution of fossil fuel use on which it is based. Its relevance as a "business as usual» scenario is therefore open to question[31].

Chart 39: Fossil fuel-related emission projections according to four IPCC GHG pathways[32]



As was done in the pilot exercise, this iteration takes into account the long-term impact of physical risk on the property damage and death & disability business lines. These business lines are mainly affected by the physical risk arising from climate change, through an increase in the frequency and intensity of natural disasters as well as owing to the potential effects of environmental degradation on the health of the population. The impact of the changing patterns of natural disasters on the property damage (covering personal insurance, business insurance and motor insurance) business of insurers is assessed with the assistance of the CCR, based on work published in September 2018[33] and already

[31] For a discussion on the associated challenges, see: Explainer: The high-emissions 'RCP8.5' global warming scenario (carbonbrief.org)
[32] IPCC, first working group, 2013
[33] CCR (2018): Impact of climate change on the cost of natural disasters in France by 2050.

used during the pilot exercise[34]. In this exercise, CCR modelling of the forecast is performed for an RCP 4.5 scenario, rather than an RCP 8.5 one.

Concerning the assessment of the health impact, the assumptions involve changes in healthcare costs and mortality tables in line with the RCP 4.5 scenario. This trend reflects (i) the assumption of an increase in the probability of occurrence of pathogen transmission (viruses, bacteria, parasites, etc.), this probability varying according to the location of insured populations and their vulnerability to vector-borne diseases, (ii) the development of pathologies associated with the deterioration of air quality in urban areas, and the increase in the frequency and intensity of sustained hot weather and heatwaves, given that the elderly and young children are most vulnerable to these kinds of events.

In order to assess the impact of the spread of these pathologies, AON provided assumptions for this exercise on the evolution of mortality tables and health costs according to geographical area and age distribution, for each of the channels mentioned (pollution and vector-borne diseases). Average shocks for the entire French territory are also provided to allow for impact calculation without segmenting insurers' liability portfolios.

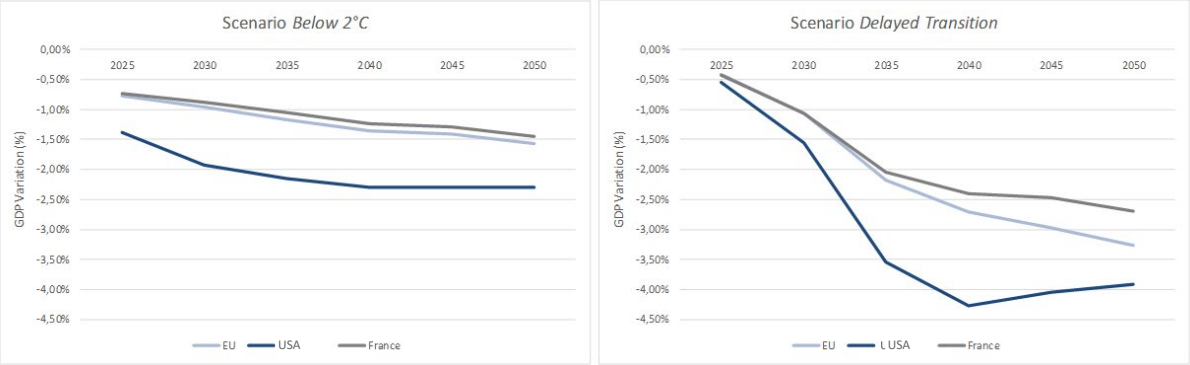
3.1.3. Macroeconomic assumptions

As for macroeconomic impacts, the data and trajectories used in this exercise match those published by the NGFS in September 2022, updated with data published by the NIESR in February 2023. They also take into account the effects of the war in Ukraine, including inflationary trends. While the GDP projections of the baseline scenario -which involves neither physical risk nor transition risk- show constant growth until 2050, the two adverse scenarios are marked by a drop in GDP levels until the end of the period, as compared with the baseline scenario.

The GDP fluctuations projected by the NGFS differ from one scenario to the other, reflecting the fact that mitigation measures are implemented with varying degrees of delay, depending on the scenario. While changes in GDP remain contained under the first variant, and do not exceed -2.5% across the regions considered for the exercise, they are more significant in the Delayed Transition scenario, where they reach -4.8% in the United States in 2040 and as much as -3.3% in Europe by 2050 (Chart 40).

[34] This work is based on projections made by Météo-France, which, with its Arpège Climat model, generated 400 possible years with the current climate and another 400 with the 2050 climate. Furthermore, Météo-France has implemented its SAFRANISBA-MODCOU (SIM2) hydrometeorological model for mainland France and Corsica. This local model is fed by ten climate parameters derived from climate simulations and interpolated 8-km resolution. Outputs from this model include the Soil Wetness Index (SWI) needed to assess drought risk, as well as various soil condition and river flow parameters. A soil wetness index derived from a SIM2 climate model with even clay soil concentration over France fed the geotechnical drought model for damage to buildings of the CRR.

Chart 40: GDP change trajectories according to the two scenarios retained by the ACPR



Over the short term in particular, the impact of physical and transition risks on France's GDP is lower in the Delayed Transition scenario than in the Below 2°C scenario (-0.4% and -0.7% respectively in 2025). However, from 2030 onwards, assuming a sharp rise in carbon prices within the European Union (from USD 15.04/t CO2 in 2030 to USD 345.02/t CO2 in 2035) in the Delayed Transition scenario would lead to a decrease in activity and lower GDP levels compared with the baseline scenario. As a result, the macroeconomic impacts of the Delayed Transition scenario would be more substantial than those of the Below 2°C scenario from 2030 onwards: by the end of the horizon, GDP would fall by -2.7% in the Delayed Transition scenario versus -1.4% in the Below 2°C scenario, compared with the reference scenario.(Table 5).

Table 5: Main macroeconomic variables in the baseline scenario and impacts of disorderly transition in adverse scenario variants

	2025	2030	2035	2040	2045	2050
NIESR baseline scenario						
GDP for the RoEU	2.6%	1.7%	0.9%	0.6%	0.5%	0.6%
GDP US	2.5%	2.0%	1.5%	1.3%	1.2%	1.0%
GDP France	1.0%	1.3%	1.6%	1.6%	1.7%	1.7%
Inflation France	2.0%	1.8%	1.8%	1.9%	2.1%	2.1%
Unemployment France	7.6%	8.6%	8.9%	9.0%	9.1%	9.1%
Shocks included in adverse variant 1 - Below 2°C scenario						
GDP France	-0.7%	-0.9%	-1.1%	-1.2%	-1.3%	-1.4%
Inflation France (p.p.)	0.2%	0.0%	0.1%	0.1%	0.1%	0.1%
Unemployment France (p.p.)	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
Shocks included in adverse variant 2 - Delayed Transition scenario						
GDP France	-0.4%	-1.1%	-2.0%	-2.4%	-2.5%	-2.7%
Inflation France (p.p.)	0.0%	-0.1%	0.6%	0.3%	0.1%	0.0%
Unemployment France (p.p.)	0.0%	0.1%	0.0%	-0.1%	-0.1%	0.0%

3.1.4. Sector-specific assumptions[35]

This exercise introduces two changes to what had been used during the pilot exercise:

- The Banque de France's sector-specific model and calibration data are now based on the 200 sectors included the Exiobase database, rather than on the 55 NACE sectors. This change allows for sensitive sectors to be assessed with increased granularity. Once the sectoral shocks have been obtained using the Exiobase classification, a conversion into NACE sectors is carried out. Ultimately, shock figures are provided for 22 NACE sectors, using a more granular approach for the sectors that are most exposed to transition risk (for example, the oil and gas extraction sectors are considered separately), and are intentionally aggregated for sectors that were identified as being less sensitive to transition risk, or even not affected at all at the end of the pilot exercise;
- the latest generation of NGFS scenarios captures the impact of chronic physical risk on at country level. In order to break down these impacts at sectoral level, the ACPR included productivity shocks that are partially differentiated according to the sector considered.

Therefore, for each scenario, the value-added paths by sector reflect the cumulative effect of chronic physical risk and transition risk.

3.1.5. Financial and real estate assumptions

The main financial assumptions sent to insurers included the following elements:

- the projected term structure of risk-free interest rates provided by the European Insurance and Occupational Pensions Authority (EIOPA), used notably for discounting insurers' liabilities;
- the projection of the sector-specific equity indices based on a valuation model based on the Dividend Discount Model (DDM) for the 22 NACE sectors or groups of sectors considered and for the main geographical areas considered -France, Europe (excluding France), the United States, the Rest of the World;
- the projection of corporate credit spreads, with maturities ranging from 1 to 5 years, broken down by geographical area (France, Germany, Italy, Spain, the United Kingdom, the euro area, the United States and Japan) and broken down by economic sector according to the BICS 12-sector nomenclature[36];

[35] For more detailed information on the sectoral, financial or property-related assumptions, see the Assumptions document on this second stress-testing exercise.

[36] According to the Bloomberg Industry Classification Standard (BICS), based on the Risk Management Institute database (rmicri.org).

- 6-month to 10-year sovereign interest rate projections, broken down by region (France, Germany, Italy, Spain, UK, the euro area, the USA and Japan).

The property market shocks projected for the climate stress-testing exercise are based on national real estate price trends as specified in the NGFS assumptions for the "Below 2°C" and "Delayed Transition" scenarios. Between 2030 and 2040, the shocks projected by the NGFS under the Delayed Transition scenario are more severe than those projected under the Below 2°C scenario across all regions considered. Conversely, from 2040 onwards, projections for the second adverse variant would lead to a positive revaluation of assets until the end of the exercise.

3.2. Impact of physical risk on loss

3.2.1. Natural disaster risks (Nat Cat)

3.2.1.1. Key figures

As was the case for the 2020 pilot exercise, the impact of an increase in the frequency and intensity of natural disasters on insurers' property damage business in the adverse scenario[37] was assessed with the assistance of the CCR, which provided participants with the projected increase in claims by department, based on their exposure to the various climate-related hazards considered at municipal level. From 2025 onwards, participants had the option of reviewing their underwriting policy in line with changes in claims : (i) by considering a geographical reallocation of their portfolio; (ii) by increasing premiums to offset the rising cost of claims; (iii) by revising their reinsurance programs; or (iv) by adapting the insurance contracts distributed to policyholders. It should be noted that this study does not take into account anticipated changes in the French natural disaster compensation scheme (increase in premium rates scheduled to take effect from January 1, 2025).

In mainland[38] France (Table 6), the claims in the classes used to calculate contributions to the Nat Cat compensation scheme increase by 105.3% between 2022 and 2050. When compared with the baseline scenario, total claims in 2050 are 42% higher in the adverse scenario. In terms of individual risks, for instance, in 2050 deviation from the baseline stands at 39.7% for drought and at 44% for floods. The higher loss observed in the adverse scenario is spread over mainland France with significant heterogeneity (Chart 41).

[37] It bears repeating that, on the liabilities side, the Delayed and Below 2 scenarios are based on the same claims assumptions, and that the inflation assumed in the claims statement ("claims total" and "claims by peril", tabs 1.2. Nat Cat) is that of the Delayed scenario. The nat cat underwriting income figures considered here will therefore also match that of the "Delayed" scenario (tab 2. Non-life underwriting income). For the sake of simplicity, in this section we only refer to the adverse scenario, as opposed to the reference scenario.

[38] In view of the limitations of the exercise, and in particular the fact that no assumptions were included by CCR about changes in this particular hazard in overseas France, it was decided not to provide any figures for these territories.

Between 2022 and 2050, premiums increase by 158% in the adverse scenario, and by 127% in the baseline scenario. In 2050, the premium differential -adjusted for the inflation differential between the baseline and adverse scenarios- between the adverse scenario (reduced to baseline inflation) and the baseline scenario comes to 9%.

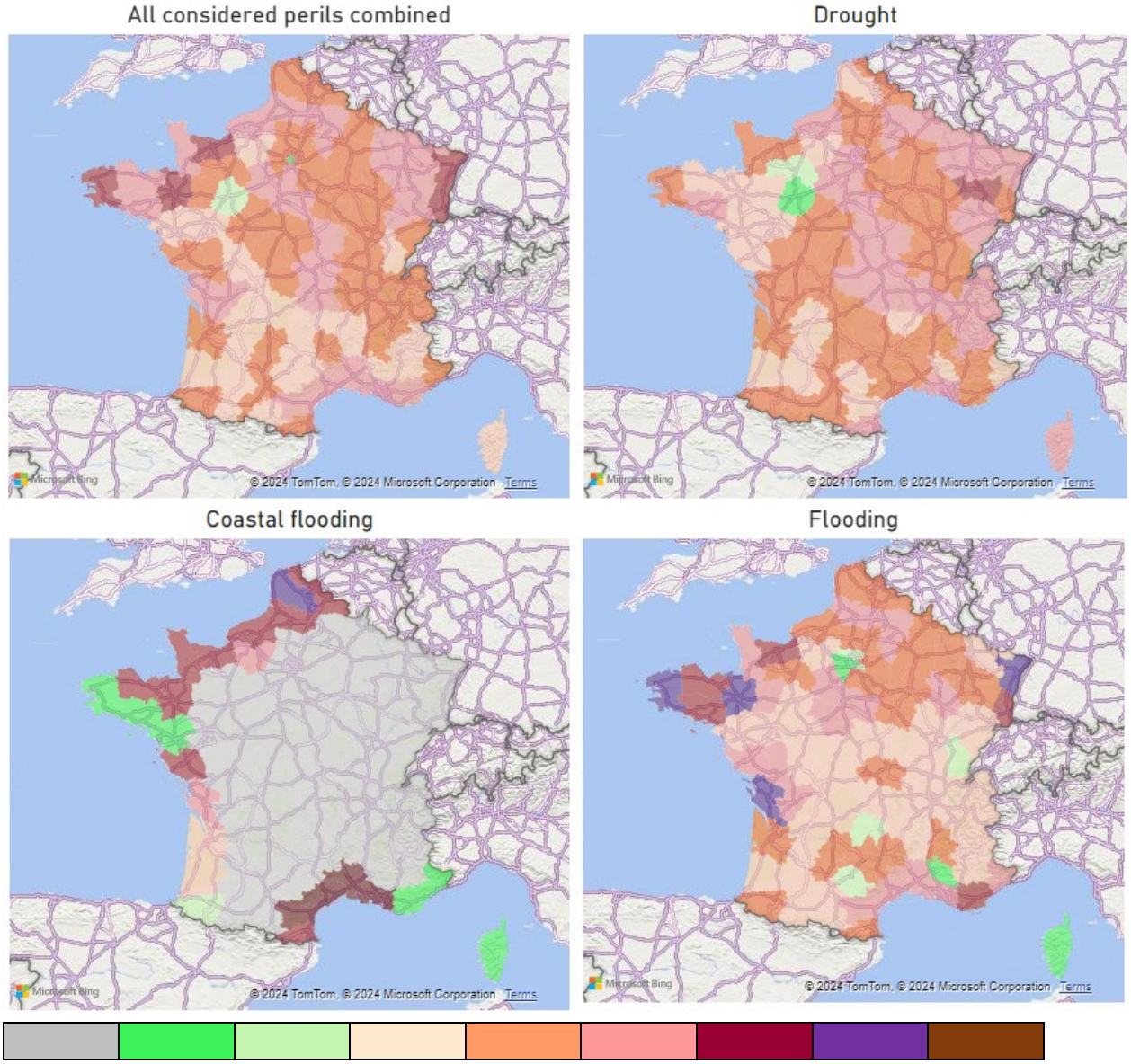
Table 6: Key figures for Nat Cat claims under the adverse and the baseline scenario (in bn EUR and %)[39]

	Adverse scenario (amounts and % compared to 2022)				**Baseline scenario** (amounts and % compared to 2022)			
Year	Total claims	Flood-related claims	Drought-related claims	Submersion claims	Total claims	Flood-related claims	Drought-related claims	Submersion claims
2022	€2.24 billion	€0.38 billion	€1.68 billion		€2.24 billion	€0.38 billion	€1.68 billion	
2025	€1.9 billion	€0.55 billion	€1.31 billion	€0.01 billion	€1.82 billion	€0.53 billion	€1.25 billion	€0.01 billion
	84.49%	143.77%	77.81%	100%	81.23%	139.13%	74.58%	100%
2035	€2.72 billion	€0.82 billion	€1.83 billion	€0.02 billion	€2.31 billion	€0.69 billion	€1.57 billion	€0.01 billion
	121.43%	214.88%	109.30%	196.53%	103.06%	179.81%	93.43%	133.02%
2050	€4.61 billion	€1.43 billion	€3.03 billion	€0.04 billion	€3.25 billion	€0.99 billion	€2.17 billion	€0.02 billion
	205.33%	373.71%	180.31%	425.96%	144.96%	259.66%	129.13%	203.80%

	Claims differential (adverse - baseline) (as amounts and % deviation between adverse and baseline scenarios, at each set year)			
Year	Total claims	Flood-related claims	Drought-related claims	Submersion claims
2025	€0.07 billion	€0.02 billion	€0.05 billion	€0.001 billion
	4.01%	3.36%	4.35%	11.57%
2035	€0.41 billion	€0.13 billion	€0.27 billion	€0.01 billion
	17.82%	19.53%	17.01%	64.84%
2050	€1.35 billion	€0.44 billion	€0.86 billion	€0.02 billion
	42%	43.95%	39.68%	133.19%

[39] Scope: 13 undertakings, except for claims related to submersion (2 undertakings)

Chart 41: Maps of Nat Cat claim deviations between adverse scenario and baseline scenario in 2050 (Mainland France, as a %)[40]



NB: Only two undertakings have included the loss associated with the submersion risk in their submissions for the adverse and baseline scenarios. Some undertakings were unable to distinguish between flood and submersion risks, and therefore included submersion-related claims in their flood risk figures.

[40] Scope: 13 undertakings, excluding for the map showing claims related to the "submersion" risk (2 undertakings)

3.2.1.2. Breakdown of excess claims between hazard effects and insured values

Given the difference in claims observed between the baseline scenario in 2022 and the adverse scenario in 2050, it is useful to understand the extent to which this is attributable to climate-related hazards alone[41].

The difference in claims between the baseline and adverse scenarios in 2050 has therefore been broken down into differences caused by insured value changes and differences as regards hazards, as follows:

$$\Delta\text{Claims} = \Delta\ \text{Pure insured values} + \Delta\text{Overall hazard}$$

For the sake of simplicity, hereafter "pure insured-value effect" refers to the difference $\Delta\ \text{Pure insured values}$, and the difference $\Delta\text{Overall hazard}$[42] is referred to as the "overall hazard effect".

Thus, in 2050, out of a 40.2% difference in total claims between the adverse and the baseline scenarios (i.e. EUR +1.1 billion), 96% are due to an "overall hazard" effect, which represents an additional claim cost of EUR 1.1 billion (Chart 42).

If we compare baseline loss in 2022 and adverse loss in 2050 (Chart 42), we can see that the "overall hazard" effect, due solely to the materialisation of physical risk, accounts for 51% of the increase in total claims, or EUR 1.1 billion out of a EUR 2.1 billion differential between the Nat Cat claims in 2022 and that observed in 2050. The remainder of this differential is mainly due to the effects of increases in insured values and inflation. The contribution of the "overall hazard" effect to the increase in loss between 2022 and 2050 in the adverse scenario is fairly uniform over each department of mainland France (Chart 43).

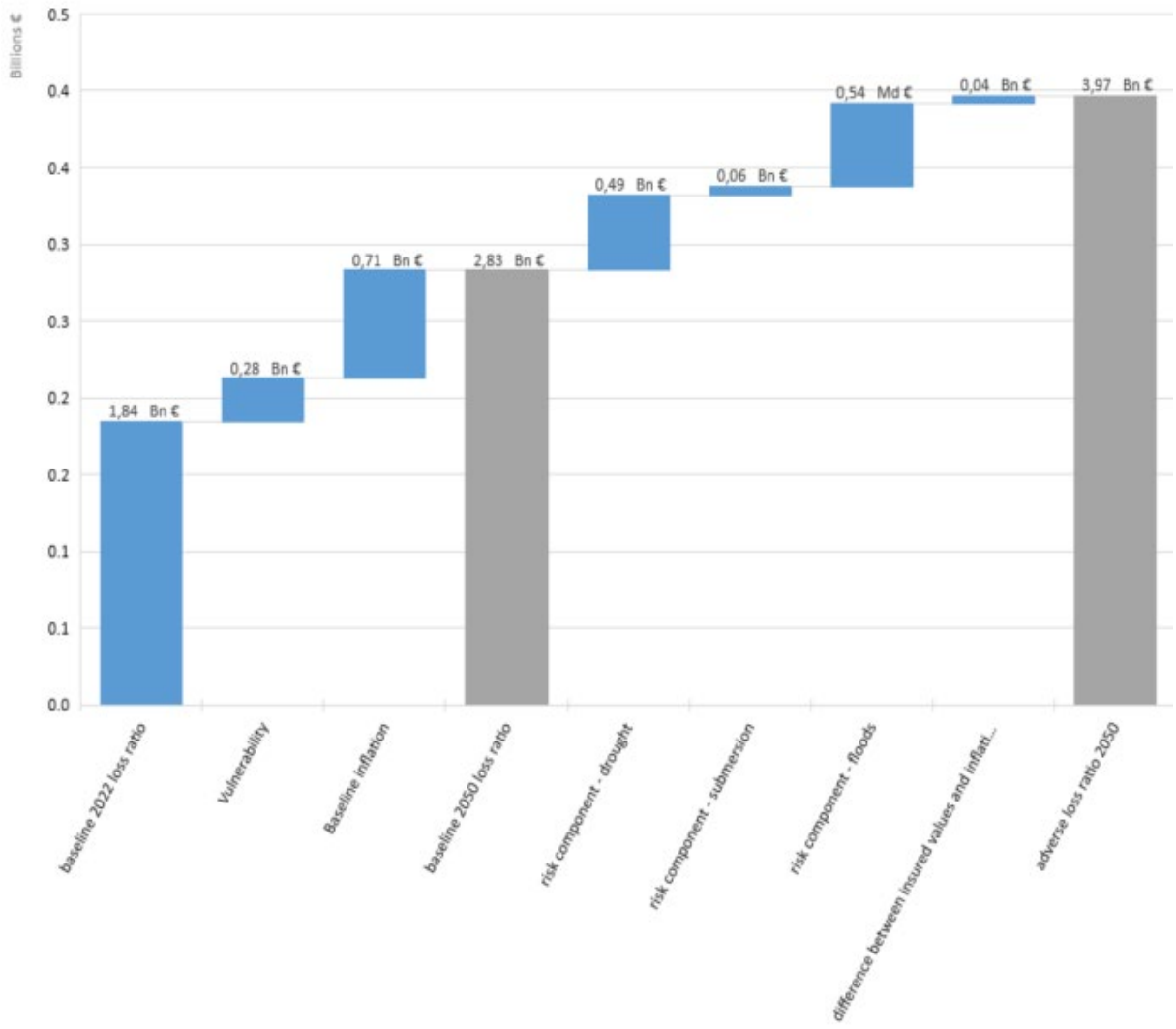
[41] The breakdown presented in this section is based on a scope encompassing 86% of adverse-scenario claims in 2050.

[42] More specifically: $\Delta\text{Claims} = \Delta\ \text{Insured values} + \Delta\text{Pure hazard} + \ \Delta\ \text{Insured values} \times \Delta\text{Pure hazard}$

Et on note : $\Delta\text{Overall hazard} = \ \Delta\text{Pure hazard} + \ \Delta\ \text{Insured values} \times \Delta\text{Pure hazard}$

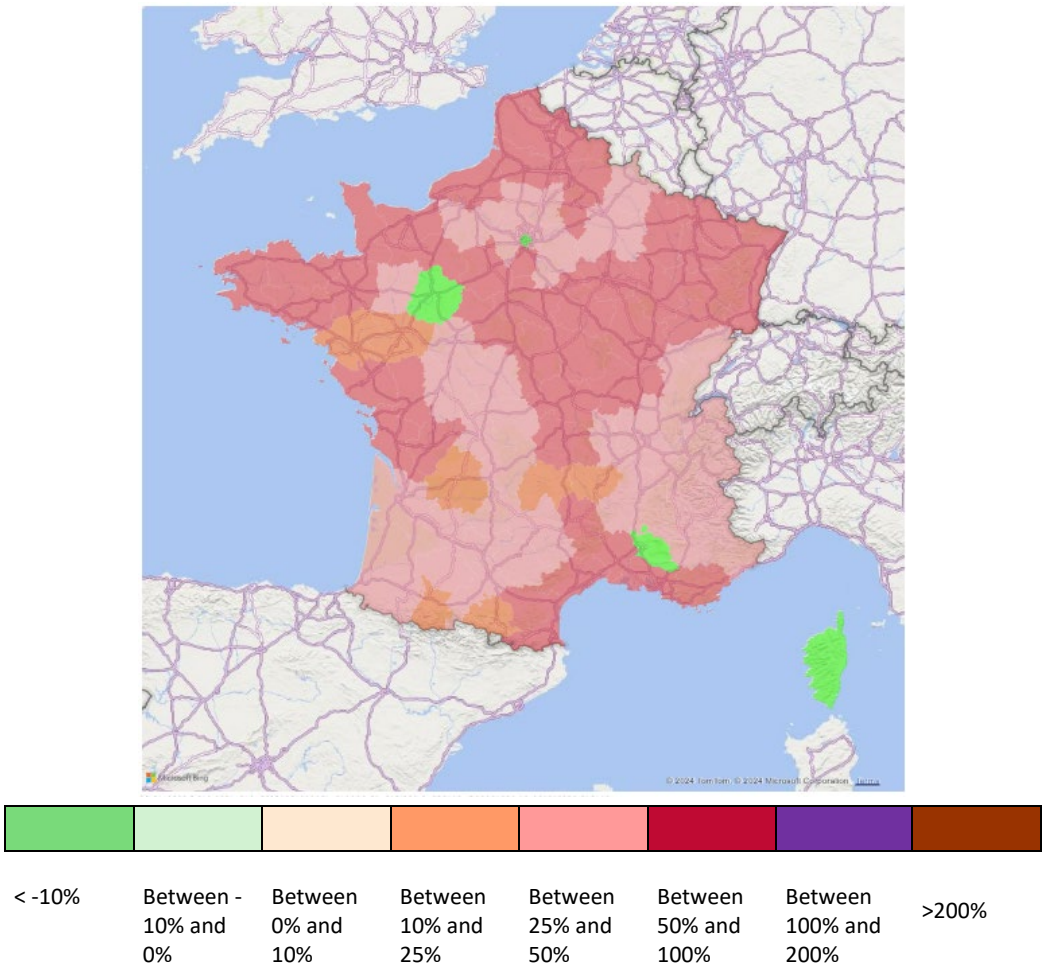
Chart 42: Breakdown of the claim differential between adverse and baseline scenarios in 2050 as a %[43]

(Breakdown based on available data representing 86% of total adverse claims in 2050; based on CCR figures and ACPR assumptions)



[43] Scope: 12 undertakings

Chart 43: Map of the share (as a %) of the claim differential between the baseline scenario in 2022 and the adverse scenario in 2050 attributable to the "global hazard"[44] effect (*based on CCR figures and ACPR assumptions)*



3.2.1.3. Study of Nat Cat loss ratio gross of reinsurance

At national level, the difference in loss ratio gross of reinsurance[45] between the adverse and baseline scenarios reaches 22% in 2050, which translates into considerable heterogeneity across departments. For example, in Finistère, the differential stands at +112%, while in Sarthe it is -17% lower (Chart 44). The breakdown of loss ratio differences between the adverse and baseline scenarios, when considering only claims due to a single type of peril (Chart 45, Chart 46, Chart 47) results, in 2050, in a heterogeneity in mainland France that is relatively similar to that observed when considering the differences in claims per peril between these same scenarios (Chart 41).

[44] Scope: 12 undertakings
[45] As defined in section 5.2.1.2, in the subsection dedicated to the short-term scenario

Chart 44: Maps of loss ratio differentials gross of reinsurance between adverse and baseline scenarios in 2035 and 2050 (as a %)[46]

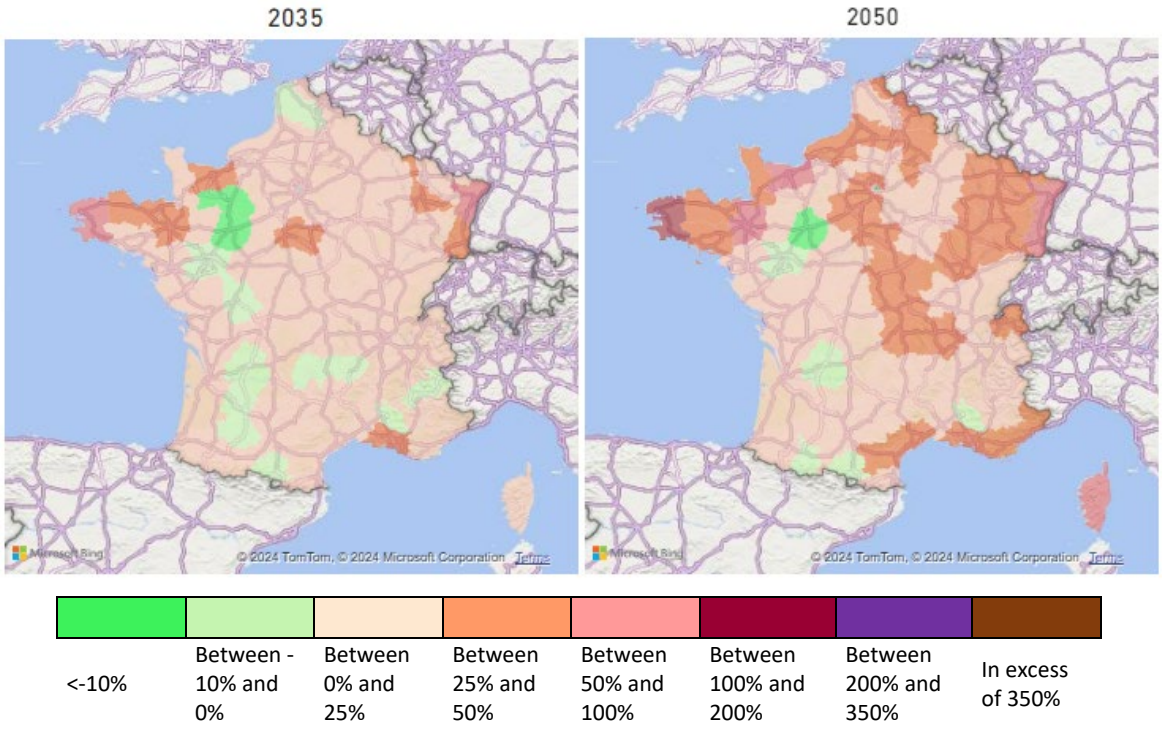
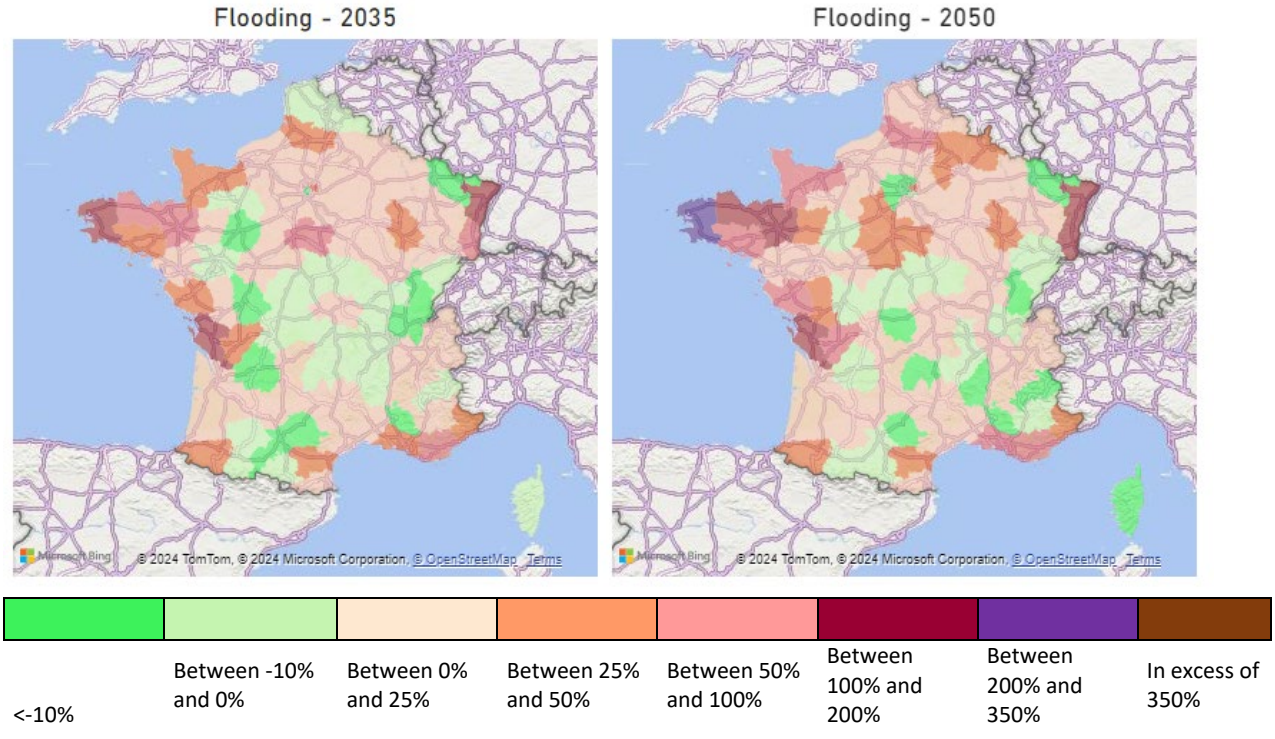


Chart 45: Maps of deviations between adverse scenario and baseline scenario for the flood claims/total premiums gross of reinsurance in 2035 and 2050 (mainland France, as a %)[47]



[46] Scope: 13 undertakings
[47] Scope: 13 undertakings

Chart 46: Maps of deviations between adverse scenario and baseline scenario for the drought claims/total premiums gross of reinsurance in 2035 and 2050 (mainland France, as a %)[48]

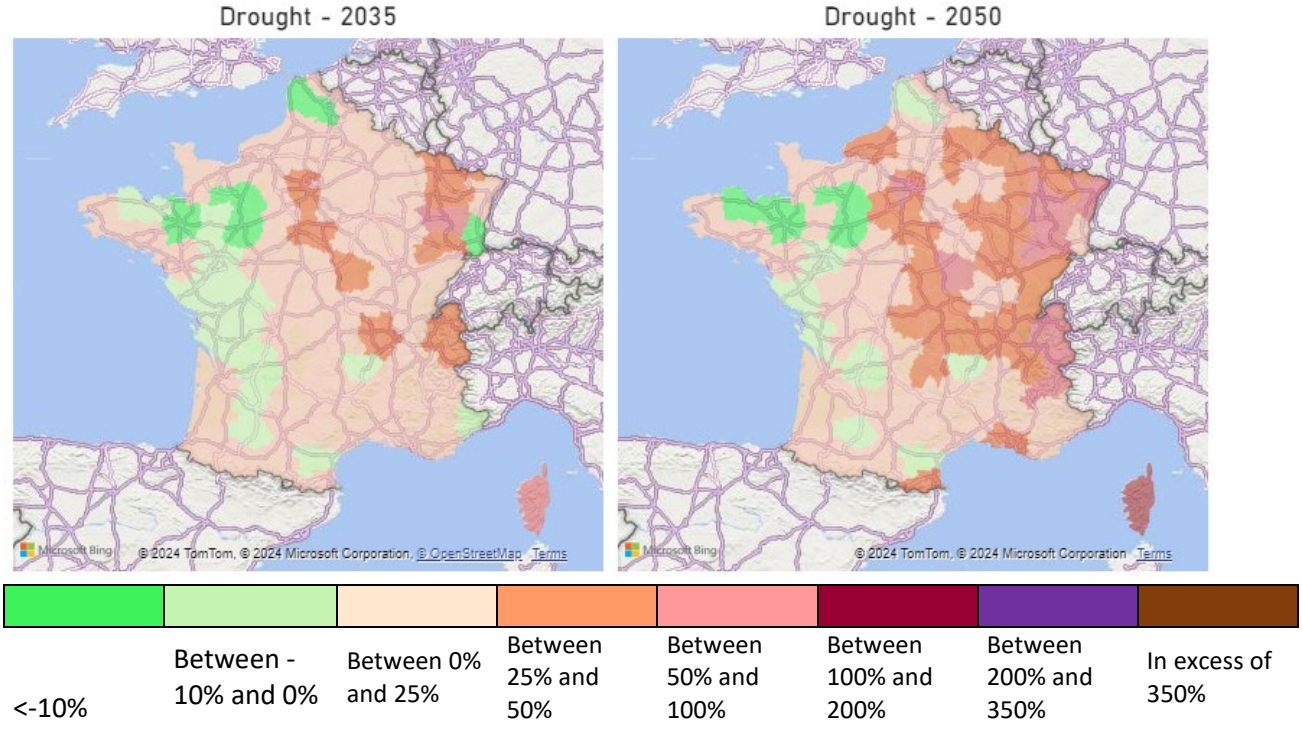
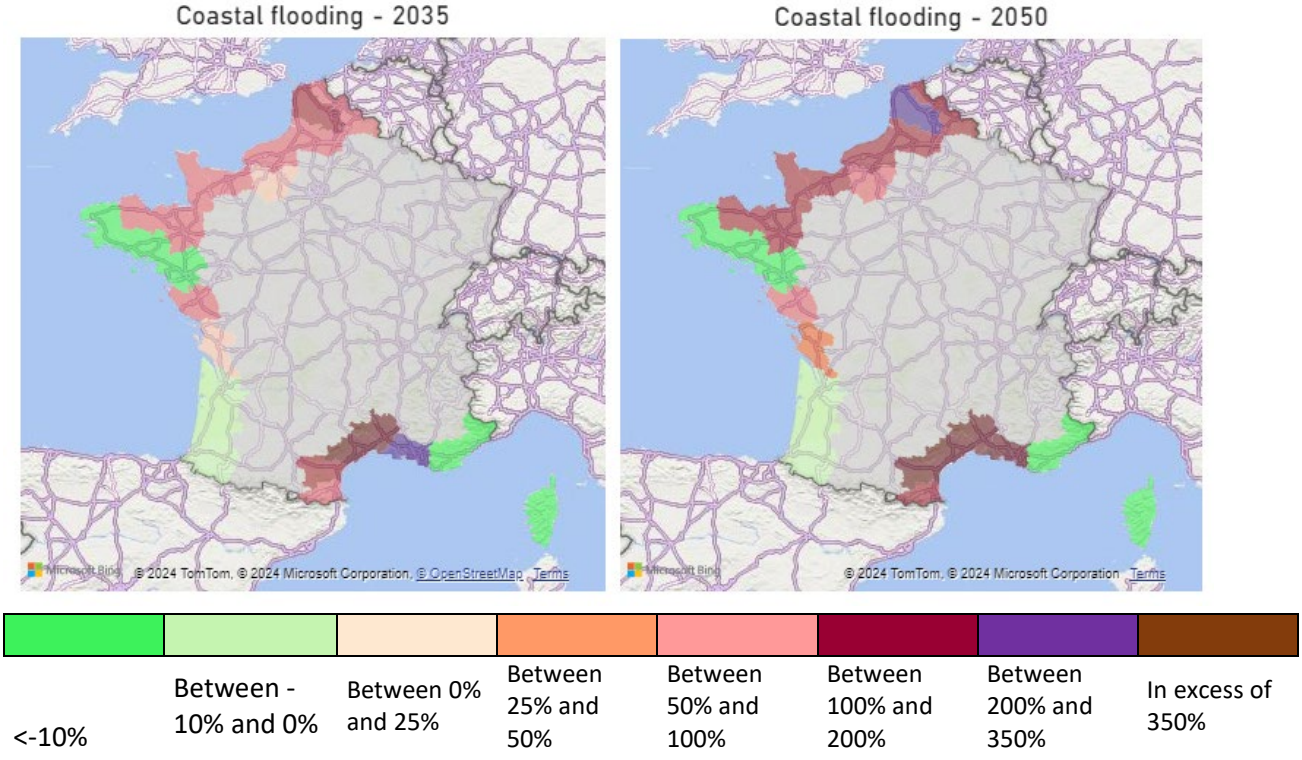


Chart 47: Maps of deviations between adverse scenario and baseline scenario for the submersion claims /total premiums gross of reinsurance in 2035 and 2050 (mainland France, as a %)[49]



[48] Scope: 13 undertakings
[49] Scope: 2 undertakings

The average loss ratio gross of reinsurance in the baseline scenario reaches 119.5% in 2025 and 112% in 2050 (Chart 49); as compared with, in the adverse scenario, 123% in 2025 and 153% in 2050 (Chart 48). Thus, an increase in the average and median loss ratio gross of reinsurance is observed in the adverse scenario between 2025 and 2050. Conversely, under both scenarios, loss ratio gross of reinsurance falls, on average, between 2022 and 2025. Of the 17 non-life (or composite) insurers, 7 project total claims in 2025 that are higher than in 2022 in the adverse scenario, while 10 others project total claims in 2025 that are lower than in 2022. This suggests that insurers have used different input values in 2022 when projecting their claims. In fact, some of the surveyed undertakings used the real, historically high claims of 2022, while others used theoretical figures for 2022, which are considered more representative of recent years and including lower claim levels than that observed in 2022.

Chart 48: Distribution of the total (Nat Cat) loss ratio in mainland France in the baseline scenario between insurers, by year (Boxplot)[50]

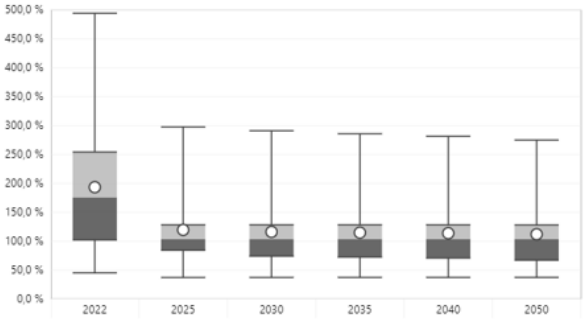
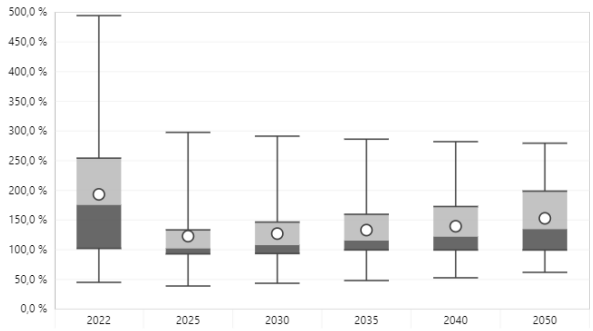


Chart 49: Distribution of the total (Nat Cat) loss ratio in mainland France in the adverse scenario between insurers, by year (Boxplot)[51]



3.2.1.4. Analysis of the share of reinsurance in natural-disaster related claims

An analysis of premiums and claims ceded to reinsurance shows a similar role played by reinsurance between the long-term and short-term scenarios. As a result, the proportion of claims and premiums ceded to reinsurers is much higher for the Natural disasters category (Chart 51) than for the broader property damage class (Chart 50), into which it is incorporated.

However, this finding needs to be qualified in light of the fact that, compared with the short-term scenario, the share of ceded claims is greater overall at each set year in the long-term scenario than in the short-term one.

The vast majority of participating undertakings chose not to review their reinsurance policy (one of the management actions available in the long-term scenario) as part of this exercise.

[50] Scope: 13 undertakings
[51] Scope: 13 undertakings

Chart 50: Share of claims and premiums ceded to reinsurance in the adverse scenario[52] for the property damage class (individuals, professionals and agricultural insurance), by amount and as a %[53]

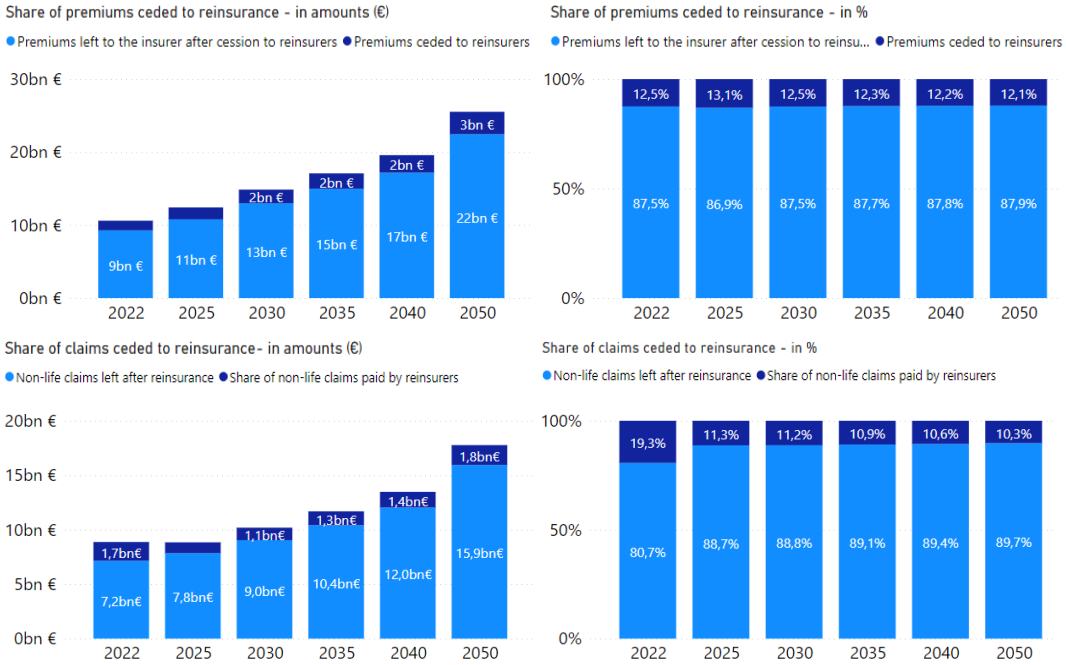
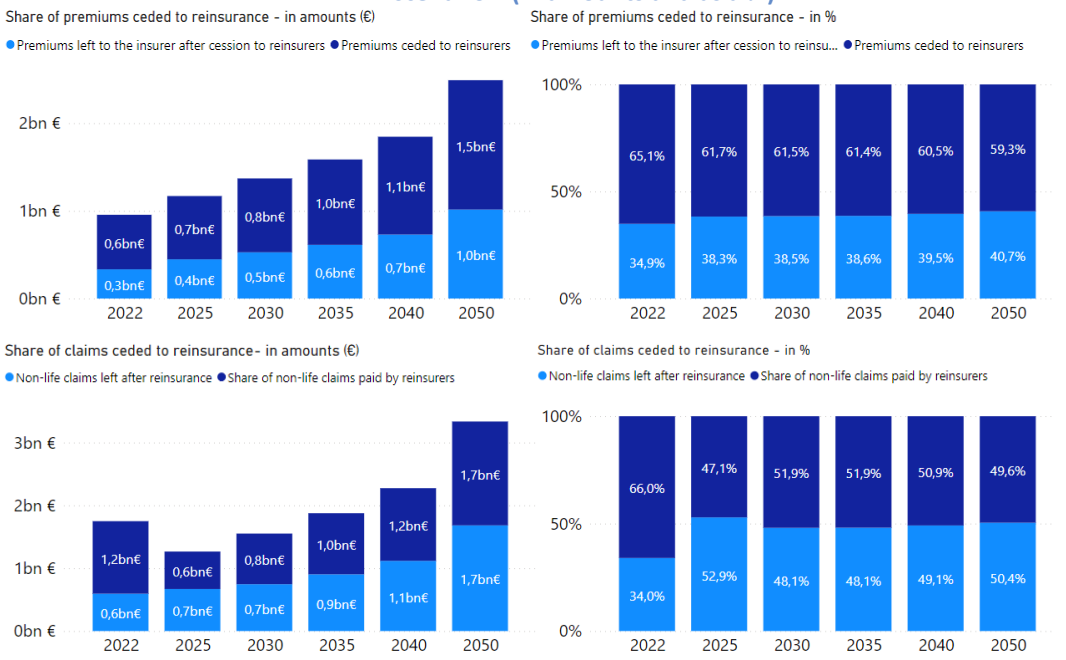


Chart 51: Share of claims and premiums ceded to reinsurance for the Nat Cat category in the adverse scenario[54] (in amounts and as a %)[55]



[52] As mentioned above, the inflation considered for the claims due natural disasters, both total and broken down by hazard, matches the Delayed scenario, for the sake of harmonisation, the data considered here are taken from the underwriting outcome tabs of the Delayed scenario (2. Non-life underwriting income).

[53] Scope: 11 undertakings

[54] As mentioned above, the inflation considered for claims due to natural disasters, both total and broken down by hazard, matches the Delayed scenario, for the sake of harmonisation the data considered here are taken from the underwriting income tabs of the Delayed scenario (2. Non-life underwriting income).

[55] Scope: 11 undertakings

The reinsurance loss ratio[56] increased on average[57] from 82% in 2025 to 118% in 2050 (Chart 53) (and, from a market perspective[58], from 82% in 2025 to 112% in 2050 (Table 7 Market view in the adverse scenario).

From a market perspective, loss ratios gross of reinsurance also increase between 2025 and 2050. At the level of undertakings, on average, the difference in loss ratio gross of reinsurance between adverse and baseline scenarios at set year also increases over time (Chart 52). However, as mentioned above, the loss ratio gross of reinsurance falls between 2022 and 2025 in the adverse scenario.

Chart 52: Difference in total Nat Cat loss ratio gross of reinsurance between adverse and baseline scenarios broken down by undertaking and by year (Boxplot)

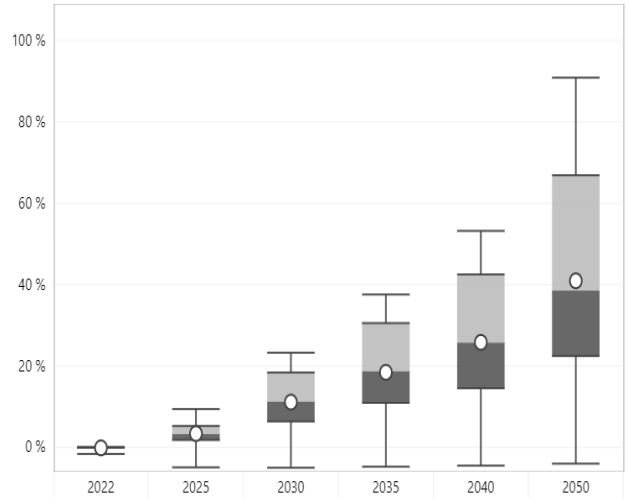


Chart 53: Reinsurance loss ratio under the adverse scenario broken down by undertaking

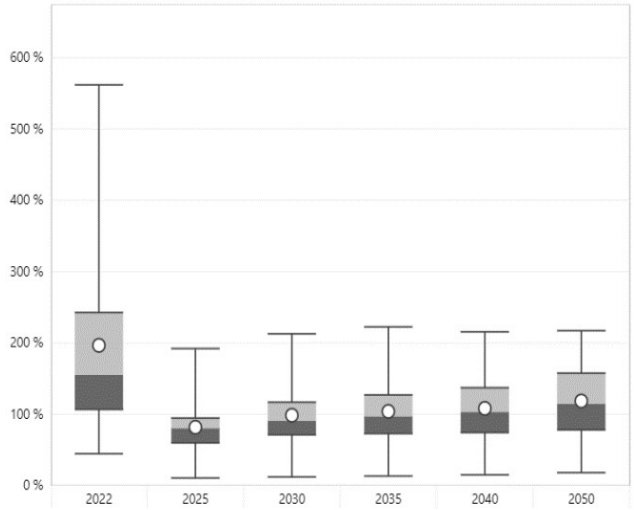


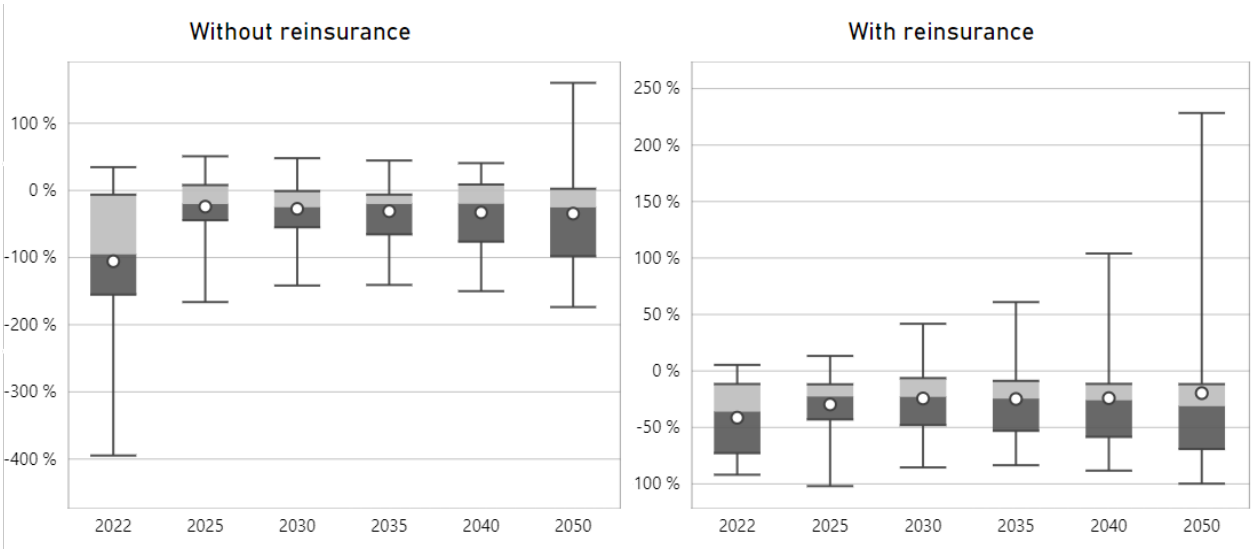
Table 7: Market view in the adverse scenario [59]

	Loss ratio gross of reinsurance for all undertakings considered	Reinsurance loss ratio for all undertakings surveyed
2022	171.92%	185.59%
2025	120.83%	82.57%
2030	123.46%	95.65%
2035	126.93%	99.95%
2040	130.21%	103.62%
2050	136.75%	112.02%

[56] Defined the same way as in section 5.2.1.3, in the subsection dedicated to the short-term scenario
[57] Reinsurance claims average for each participant
[58] Sum of reinsurance claims for all participants divided by the sum of premiums ceded to reinsurers
[59] Scope of analysis for the loss ratio gross of reinsurance: 13 undertakings. Scope studied for reinsurance loss ratio: 11 undertakings. (11 undertakings are included in both scopes)

In the adverse scenario, comparing the underwriting income of the Nat Cat category as a % of premiums with and without reinsurance makes it possible to analyse the role played by reinsurance at undertaking level. For instance, in 2050, underwriting income in the Nat Cat category as a % of premiums was down -34.5% on average without factoring in reinsurance, and -19.6% when accounting for reinsurance (Chart 54). In 2050, that amount varies from EUR -1.81 billion without factoring in reinsurance to EUR -1.43 billion with it is included (Chart 55). Reinsurance therefore results in a beneficial transfer of risk for the insurer, but not to the extent that it improves the underwriting outcome of the Nat Cat category enough to return to a level of Nat Cat underwriting outcome similar to that obtained in the baseline scenario, which is higher but also remains negative (Chart 56, Chart 57).

Chart 54: Underwriting income as a % of Nat Cat premiums with and without reinsurance, in the adverse scenario[60]



[60] Scope: 12 undertakings

Chart 55: Comparison of Nat Cat underwriting income- with and without reinsurance; in the adverse scenario[61]

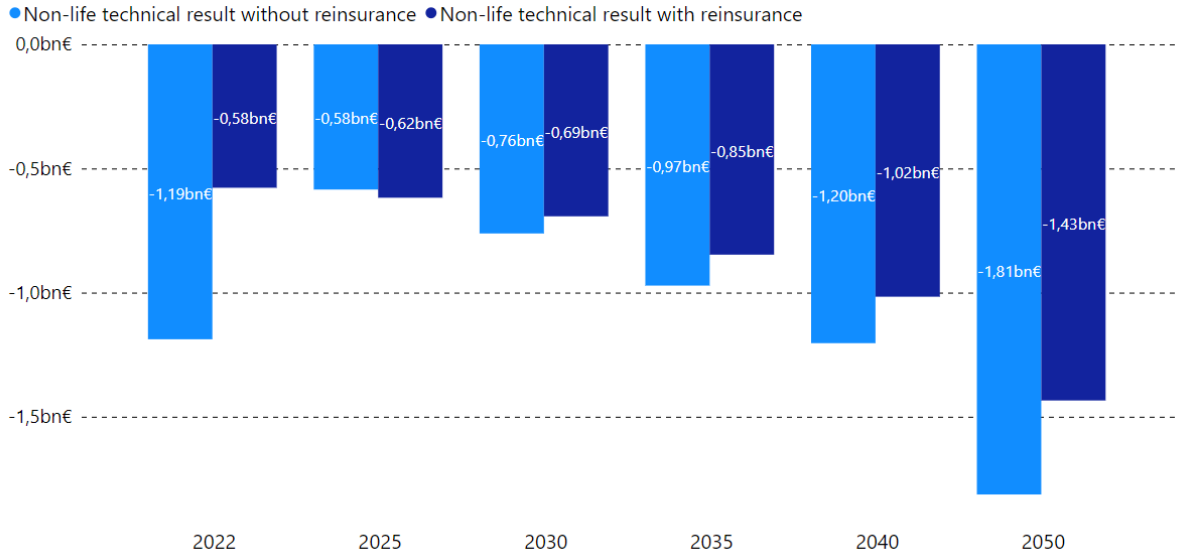
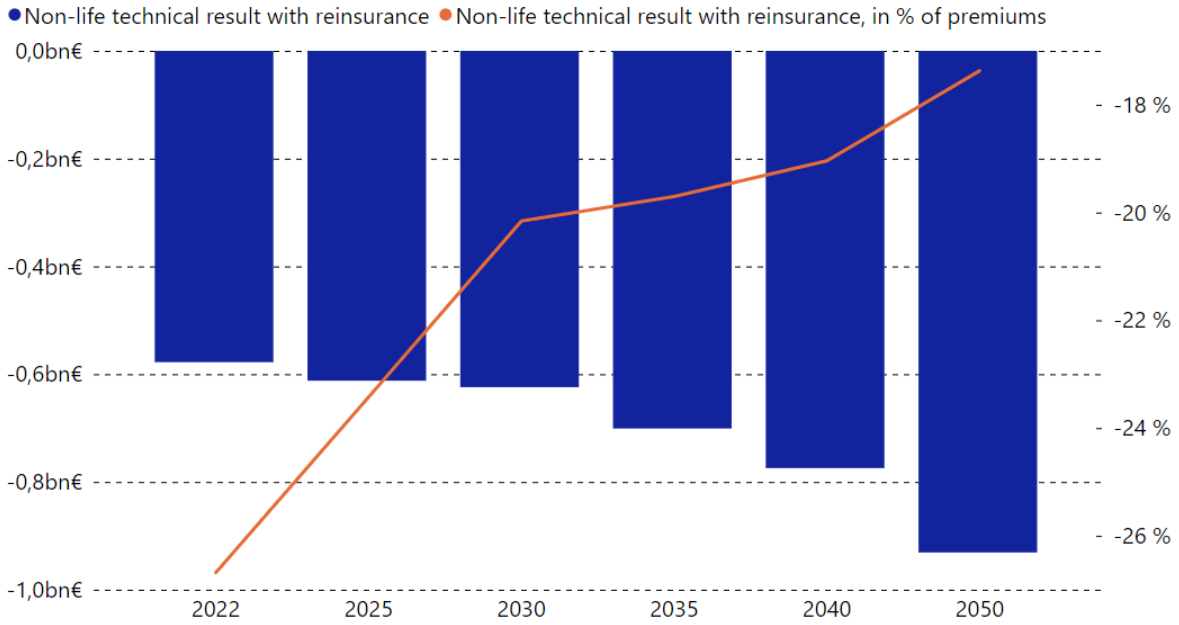
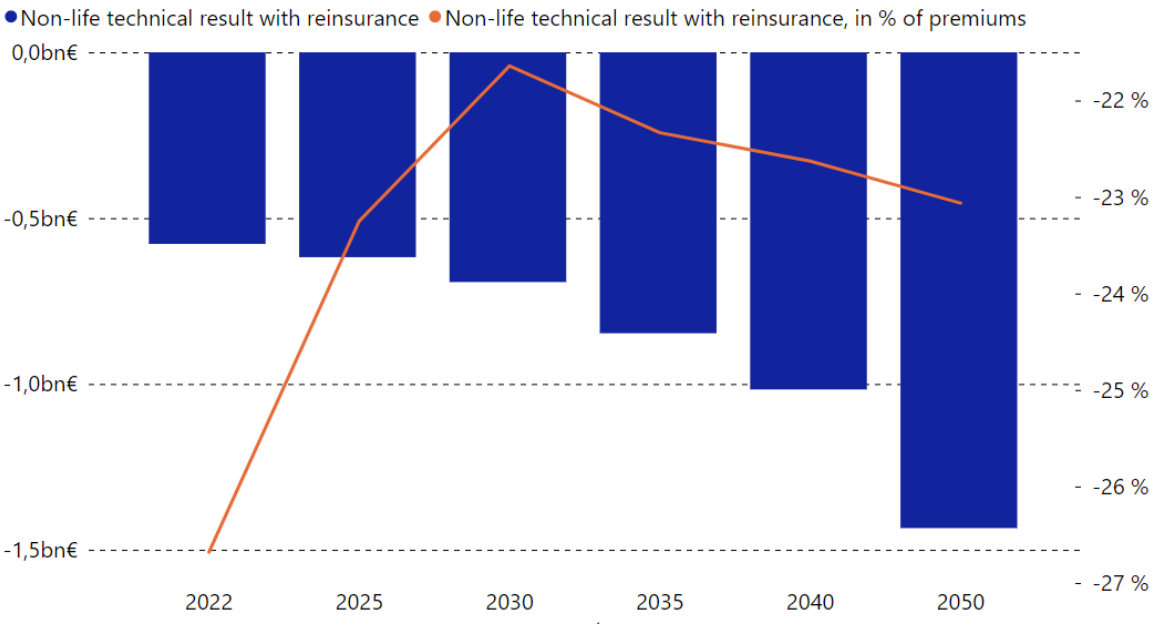


Chart 56: Non-life Nat Cat underwriting income - baseline in EUR billion and as a % of premiums[62]



[61] Scope: 12 undertakings
[62] Scope: 12 undertakings

Chart 57: Non-life underwriting income for Nat Cat class- adverse scenario in EUR billion and as a % of premiums[63]



3.2.2. Extreme claims associated with a 50-year return period

Among the new features of this exercise is the assessment of the higher claims associated with extreme weather events over a long-term horizon, at the scale of mainland France. Thus, for the assessment of the claims under the French natural disaster compensation scheme, the CCR provided projections corresponding both to the average of the RCP 4.5 scenario and to the 98th percentile of damage figures associated with this trajectory. Regarding the assessment of extreme loss, the data provided by the CCR to participating undertakings carrying property damage business took the form of coefficients for the evolution of losses with a 50-year return period (PDR50) as a result of hazard alone, and coefficients for evolution under the effect of the hazard and the projection of the insured portfolio[64] between the projected climate and current climate on the other.

Only the projections of extreme loss and Nat Cat exposures in terms of insured values were expected as part of this assessment, as calculation of the impact on underwriting income and on the balance sheet of undertakings were not requested.

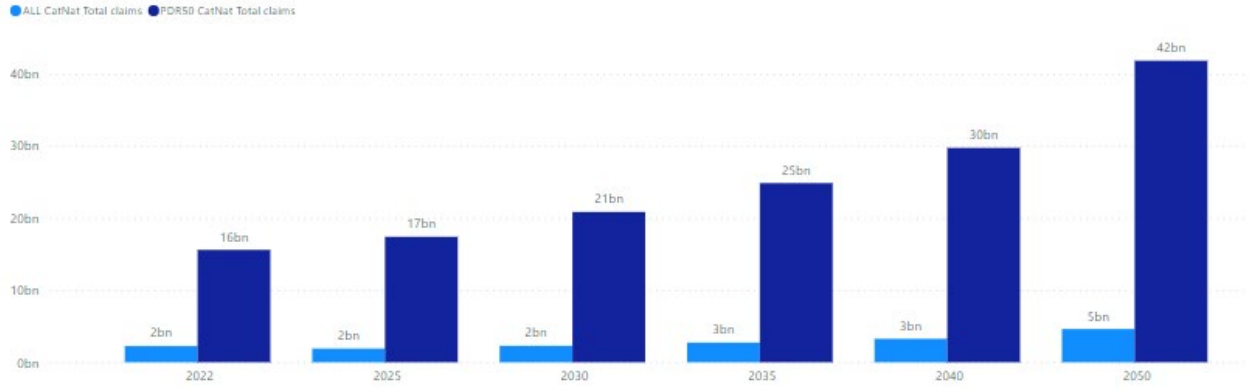
The purpose of assessing losses with a 50-year return period is to study the variability between the average annual loss and an extreme quantile of the climate-related loss under the same scenario, with a constant socio-economic trajectory.

[63] Scope: 12 undertakings
[64] Changes in insured portfolios, which translate into changes in the number and location of insured stakes, are based on INSEE projections.

Participants could also opt for their own claim projection models, including for the assessment of physical risk outside of France. The majority of participating undertakings have restricted their analysis to the scope of mainland France, using CCR data for the assessment of PDR50 losses. Three undertakings have carried out an assessment of the 98th percentile of damage in their property damage portfolio internationally, using their in-house model for this study.

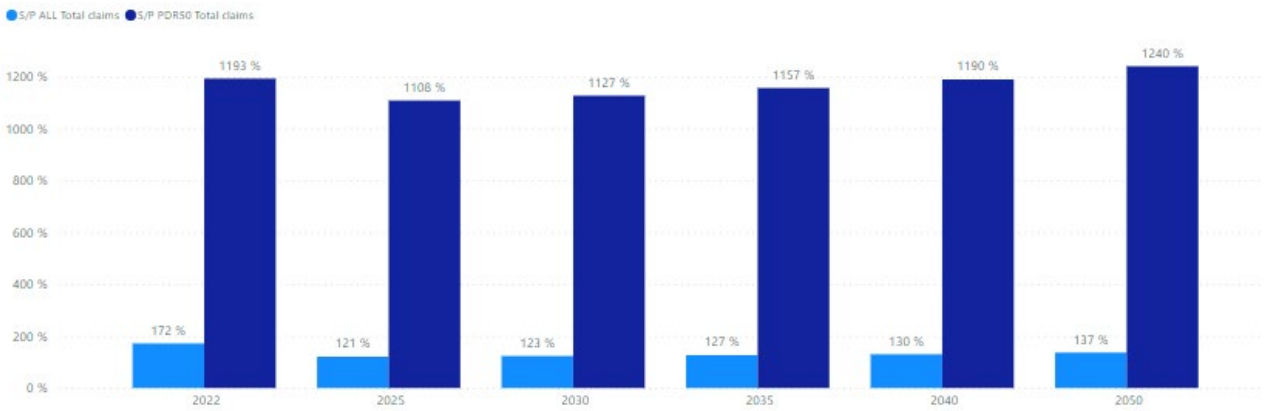
In 2022, the PDR50 Nat Cat claims (all perils combined) represents 7 times the average annual loss of participating undertakings in mainland France, and eventually reaches 9 times the average Nat Cat claims by 2050 (Chart 58).

Chart 58: Average annual loss (AAL) and PDR50 Nat Cat claim change between 2022 and 2050[65]



If Nat Cat PDR50 claims (all perils combined) are compared with Nat Cat written premiums associated with the RCP 4.5 scenario, the resulting extreme loss ratio would amount to 1193% in 2022 and would reach 1240% in 2050 (Chart 59).

Chart 59: Change in AAL loss ratio and PDR50 Nat Cat claims ratio between 2022 and 2050[66]

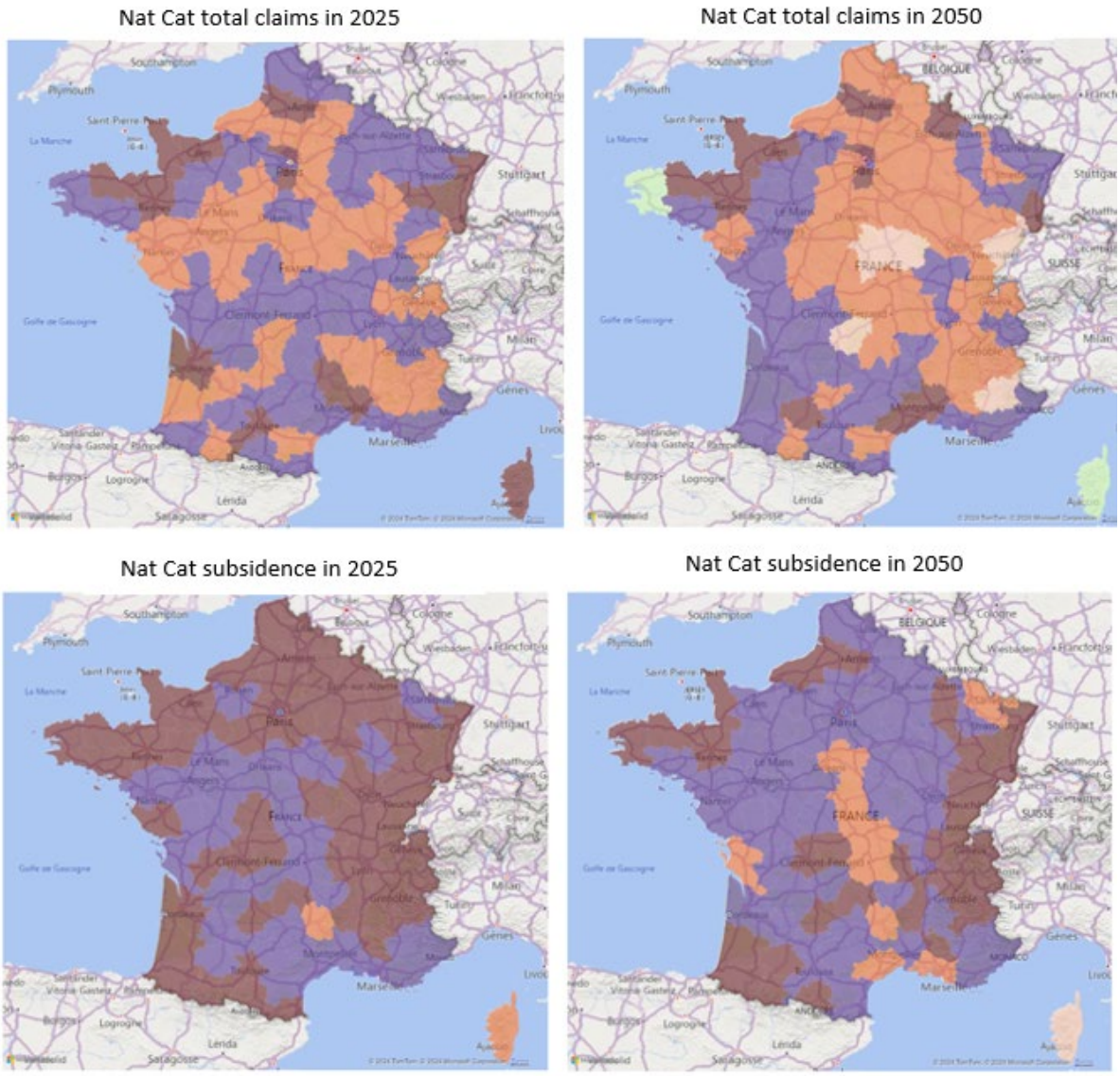


[65] Scope: 13 undertakings
[66] Scope: 13 undertakings

As the increase in Nat Cat PDR50 claims between 2022 and 2050 (+168%) is higher than the increase in average Nat Cat claims over the same period (+105%), the premium adjustments made by insurers in order to keep pace with changes in the average claims and thus maintain a stable loss ratio, are not sufficient to contain the increase in extreme loss.

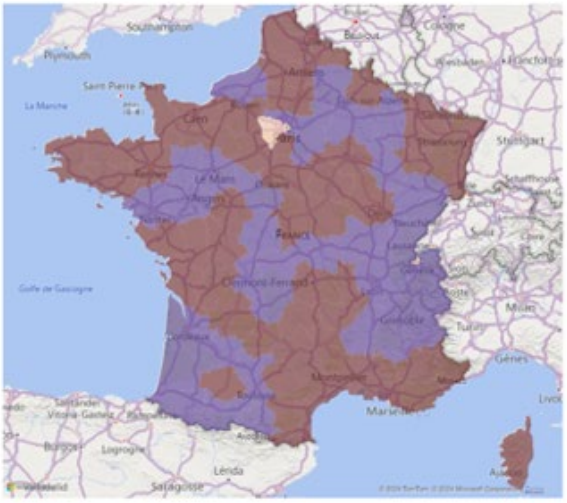
Depending on the type of hazard studied and on the location considered, the relative difference between the PDR50 claims and the average Nat Cat claims shows very heterogeneous trends (Chart 60).

Chart 60: Relative difference, as a %, between PDR50 claims and average Nat Cat claims[67]



[67] Scope: 13 undertakings

Nat Cat floodinf in 2025



Nat Cat floodinf in 2050

Below 100%	Between 100 and 300%	Between 300 and 600%	Between 600 and 1000%	In excess of 1000%

In particular, extreme loss ratio for weather-events (Nat Cat) varies widely across departments. For instance, PDR50 loss ratio, all perils combined, averages 1304% in 2050, with a median value at 1044%, and reaches a maximum value of 7917%. For the PDR50 subsidence risk, the average loss ratio stands at 1029% in 2050, with a median value of 749% and a maximum of 7582%. With regard to the PDR50 flood risk, the projections give an average loss ratio at 536% in 2050, with a median value at 429% and a maximum at 3655%.

Despite a wide dispersion of extreme climate-related claim indicators, this distribution remains fairly stable over the projection horizon.

Chart 61: Relative difference, as a %, between PDR50 claims and average Nat Cat claims broken down by department and by year (Boxplot)

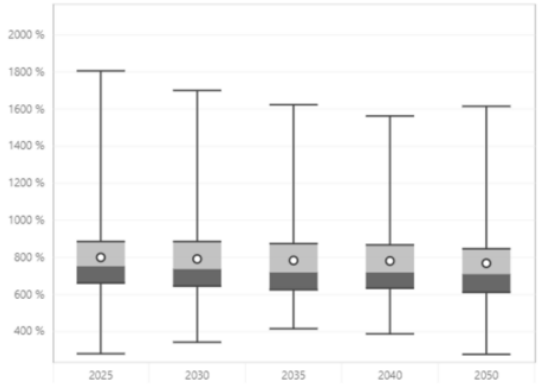


Chart 62: Distribution of PDR50 loss ratio for total Nat Cat claims by department, by year (Boxplot)

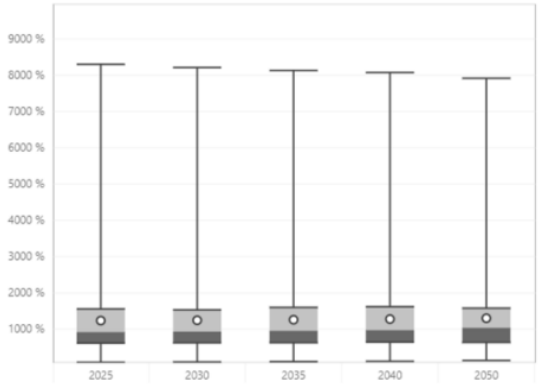


Chart 63: Distribution of PDR50 loss ratio for subsidence claims by department, by year (Boxplot)

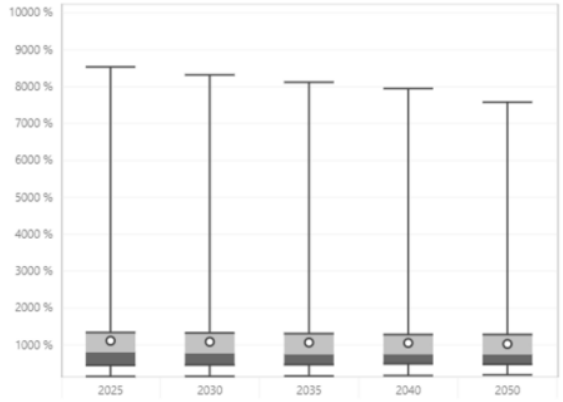
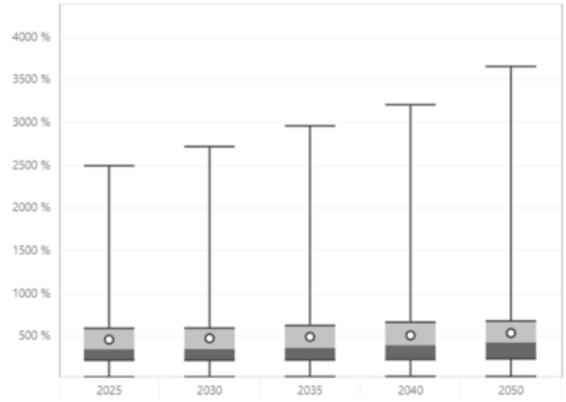
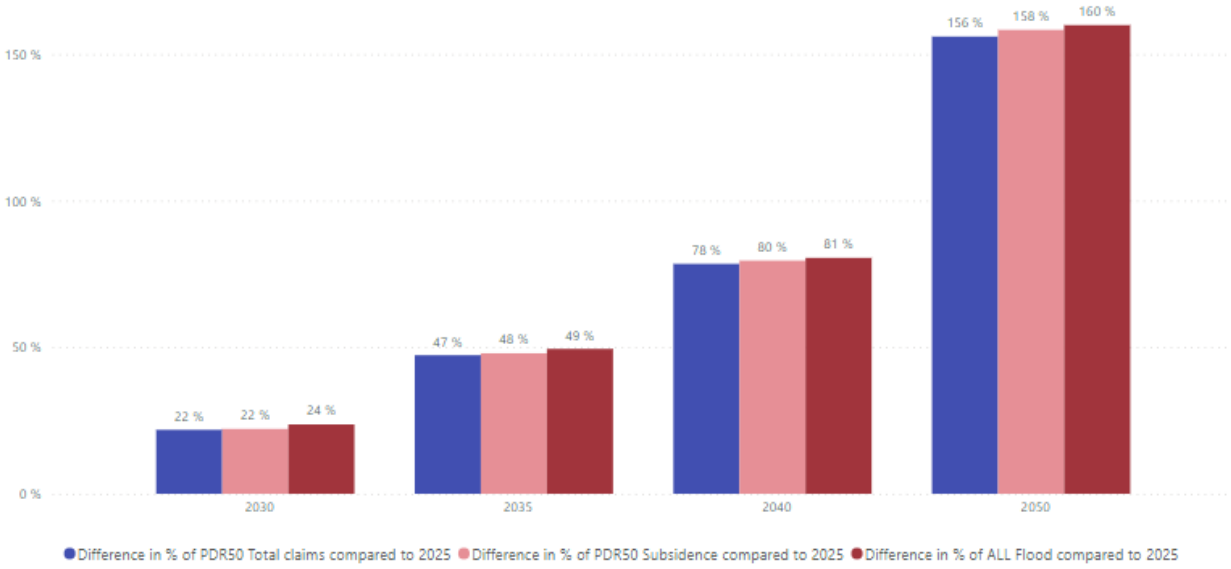


Chart 64: Distribution of PDR50 loss ratio for flooding claims by department, by year (Boxplot)



Aggregated at the level of mainland France, the 98th percentiles of damage for the main Nat Cat perils (flooding, subsidence and all perils combined) evolve similarly. The peril that records the sharpest increase is flooding, with a 160% increase between 2050 and 2025.

Chart 65: Relative deviation, as a %, of Nat Cat PDR50 claims compared with 2025



3.2.3. Trends in insurance gap

3.2.3.1. Uninsurability ratio

The exercise was an opportunity for the ACPR to study the insurance gap risk, namely the risk of cancellation of insurance contracts analysed from two perspectives: that of the policyholder, who would no longer be able or willing to insure property given the increase in premiums induced by climate risk; and that of the insurer, for whom the increased cost and frequency of extreme weather events would make some property in certain geographical areas effectively uninsurable. To perform this modelling, insurers were asked to estimate the number of contracts terminated, broken down by department. This figure corresponds to the number of contracts for which ratio $\frac{\text{Damage premiums}}{\text{Total insured values (in € thousands)}}$ exceeds an "*ad hoc*" insurability threshold defined by the ACPR using in-house data. This threshold was proved for each department and year considered.

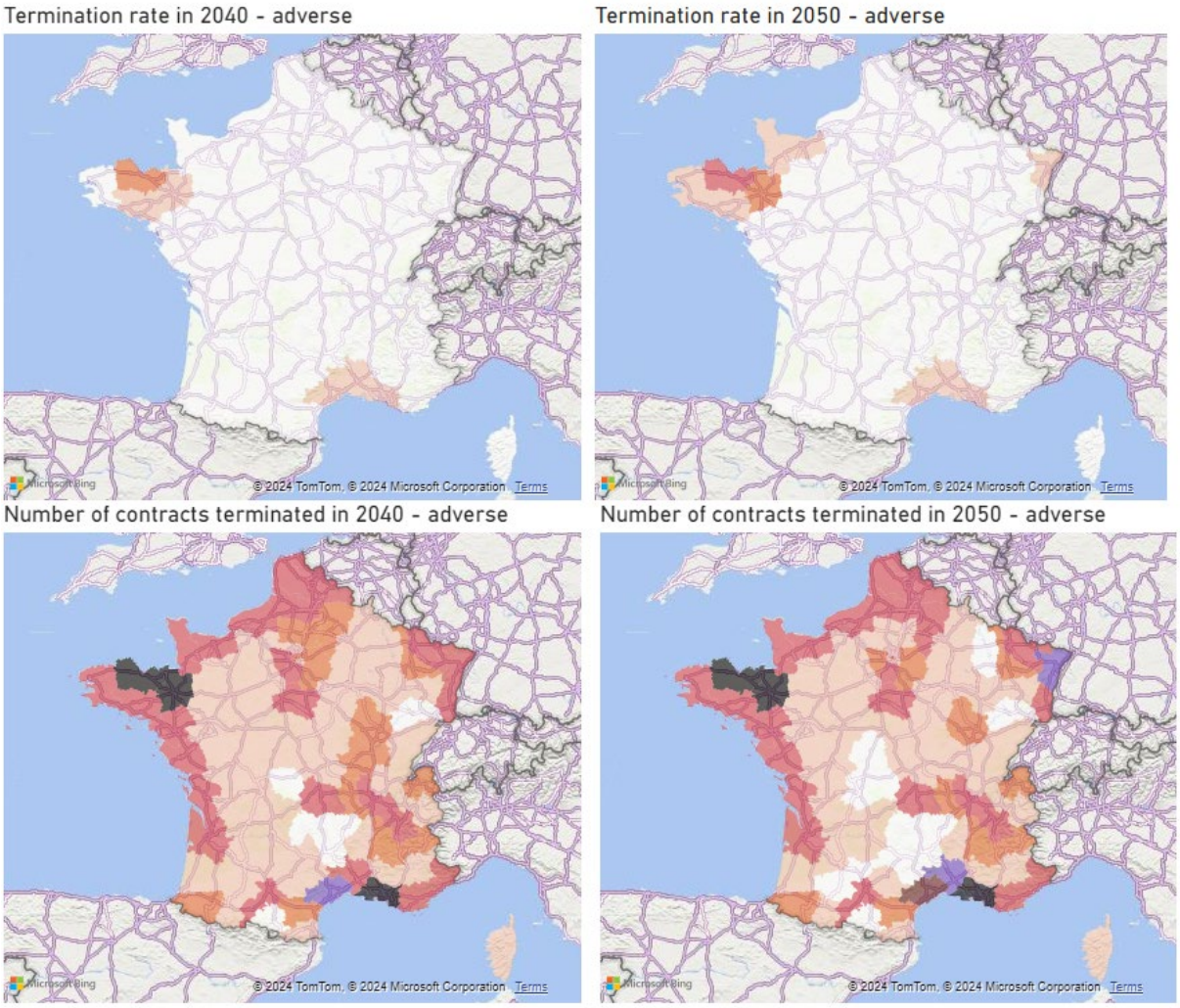
In this study, the "Total insured value" variable was understood as the sum of insured values including real estate and personal property; and the assessment covered only the departments located in mainland France. This assessment of the cancellation of insurance for specific risks was requested as part of the application of the average loss in long-term adverse scenarios[68].

Some undertakings have also supplemented the initial approach by incorporating additional parameters into their modelling, such as the assumption made on housing price trends in the Delayed scenario.

As for the number of policies terminated after application of average claims in the adverse scenario, of the 15 insurers in the sample concerned with property & casualty insurance, only 2 have a noticeable termination rate. Six insurers obtained nil or negligible termination rates. The other undertakings did not carry out this calculation, which was considered too complex according to the methodological notes. The number of policyholders used to determine churn rates for each department is obtained by summing up the policyholders of the 8 organisations that carried out the analysis.

[68] Long-term adverse scenarios which, as a reminder, are identical in terms of physical risk

Chart 66: Insurance gap maps[69]



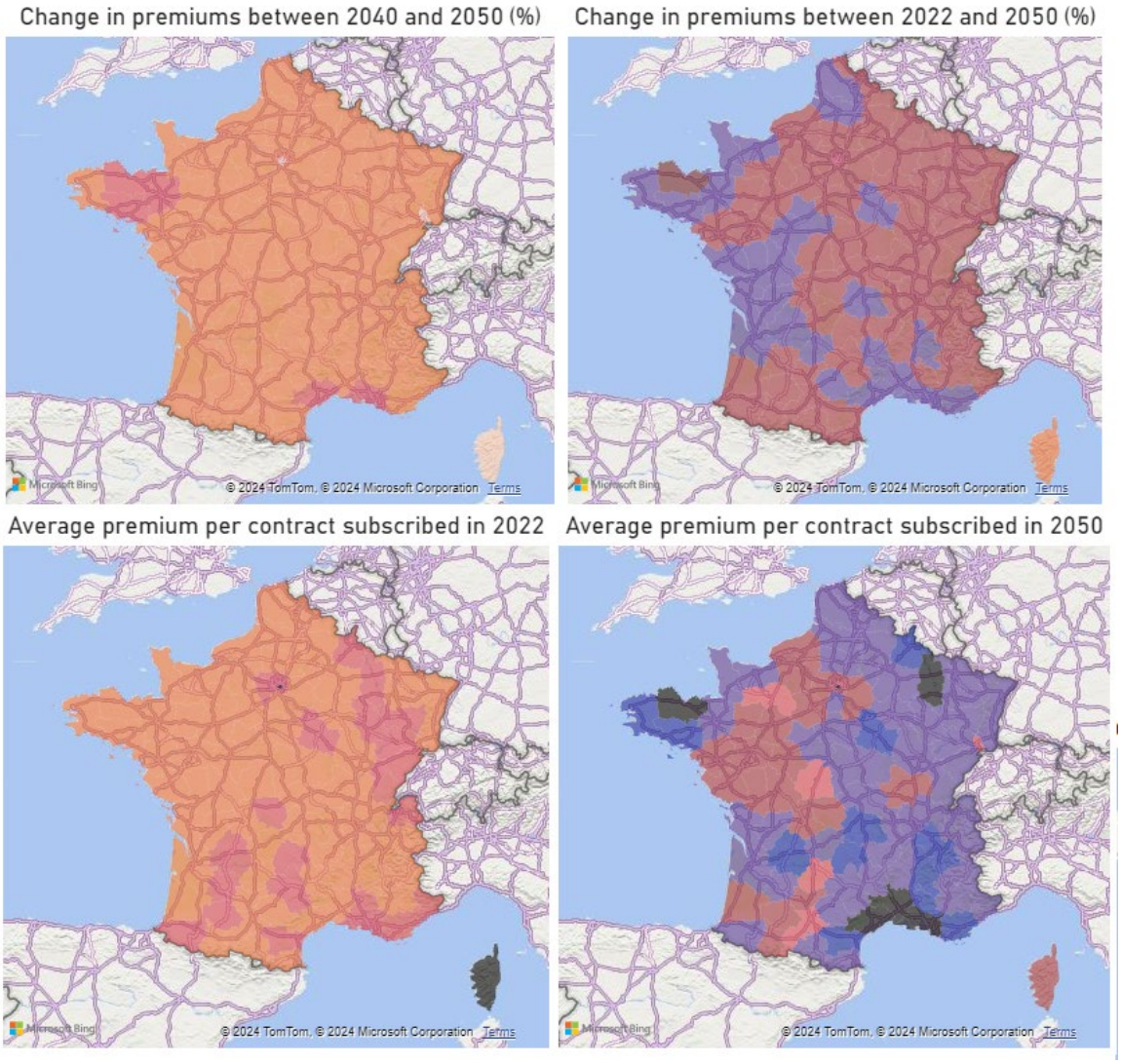
Churn rate:	Between 0 and 0.5%	Between 0.5 and 3%	Between 3% and 5%	Between 5% and 10%	Above 10%		
Number of risks terminated:	Between 0 and 100	Between 100 and 500	Between 500 and 1,000	Between 1,000 and 5,000	Between 5,000 and 10,000	Between 10000 and 15000	Greater than 15,000

Qualitatively, it would appear that North Brittany and the Mediterranean coast are the areas with the highest termination thresholds. In 2050, the churn rate in the Côtes d'Armor region would reach 7.15%, which is the maximum rate per department for that year (Chart 66)

[69] Scope: 8 undertakings

This outcome may possibly be explained by higher claims in these geographical areas (see maps included in the previous panels). Moreover, when considering the same scope of undertakings as that defined to assess insurance gap, these territories are also among those for which the increase in premiums is the most significant, both in terms of total premiums and as premiums per contract (see Chart 67).

Chart 67: Maps showing changes in total Nat Cat premiums and average premiums broken down by department[70]



Change in premiums as a %	Between 0% and 25%	Between 25% and 50%	Between 50% and 100%	Between 100% and 200%	Between 200% and 350%	In excess of 350%		
Average premium per contract (in €)	Between 0 and 10	Between 10 and 20	Between 20 and 30	Between 30 and 40	Between 40 and 50	Between 50 and 60	Between 60 and 70	Over 70

[70] Scope: 8 undertakings

However, the abovementioned finding needs to be qualified, as it is due solely to the two insurers mentioned above, and therefore in no way represents a massive withdrawal from the sector in the departments concerned. Furthermore, the number of contracts held by these two insurers remains stable in these territories, which could suggest a reallocation of contracts rather than a departure of insurers from these geographical areas.

It should also be noted that, as the exercise is carried out individually by each insurer, a "terminated" policy does not equate an "uninsurable" property: in practice, the policy cancelled with one insurer could be taken out again with another insurer offering lower premiums as a result of different pricing methods.

This exercise reflects an initial attempt by the ACPR to estimate insurance gap risk and will therefore need to be repeated and extended in the future.

3.2.3.2. Insurance gap questionnaire[71]

The questionnaire entitled "Qualitative questions on the insurability of natural hazards" covered the following topics: governance, underwriting policy, pricing, prevention measures, reinsurance policy, risk tolerance indicators, zoning and uninsurable areas. 13 responses to the questionnaires were collected. These responses show that a significant proportion of insurers are either considering or have already introduced pricing policies depend on the risks incurred, as well as potential exclusions depending on the geographical scope considered. This suggests that, should these trends hold, insurance gap risk could indeed emerge.

The risk mitigation measures envisaged, in terms of underwriting, to cope with the physical risks associated with climate change most frequently cited in these questionnaires are price increases and price adjustment for 12 insurers, with higher deductibles being cited by 3 of them. The questionnaire also requested a definition of the extent of product pooling in relation to exposure to natural disaster risk, in terms of pricing, and a definition as to whether price segmentation was carried out according to the location of the risks insured. In line with the previous item, the answer most frequently given is that of a pricing policy based on geographical area and risk location.

Concerning trends in risk transfer mechanisms to mitigate the physical risks associated with climate change, only a small minority of insurers are considering any changes at all.

As regards the identification of risk areas, eight insurance undertakings have drawn up natural disaster risk zones, four of them have not done so and only one of them does not answer that question directly. While seven insurers do not apply any exclusion policy and do not set risk tolerance limits for the exclusion of physical risks, six of them do implement an exclusion policy in the event of significant exposure. This result potentially contradicts the figure of 6 insurers who do not foresee the emergence of areas deemed "uninsurable" due to climate change and the risks associated with it, while 2 plan to do so and 5 are divided on the issue or do not provide a direct answer.

[71] Scope: 13 undertakings

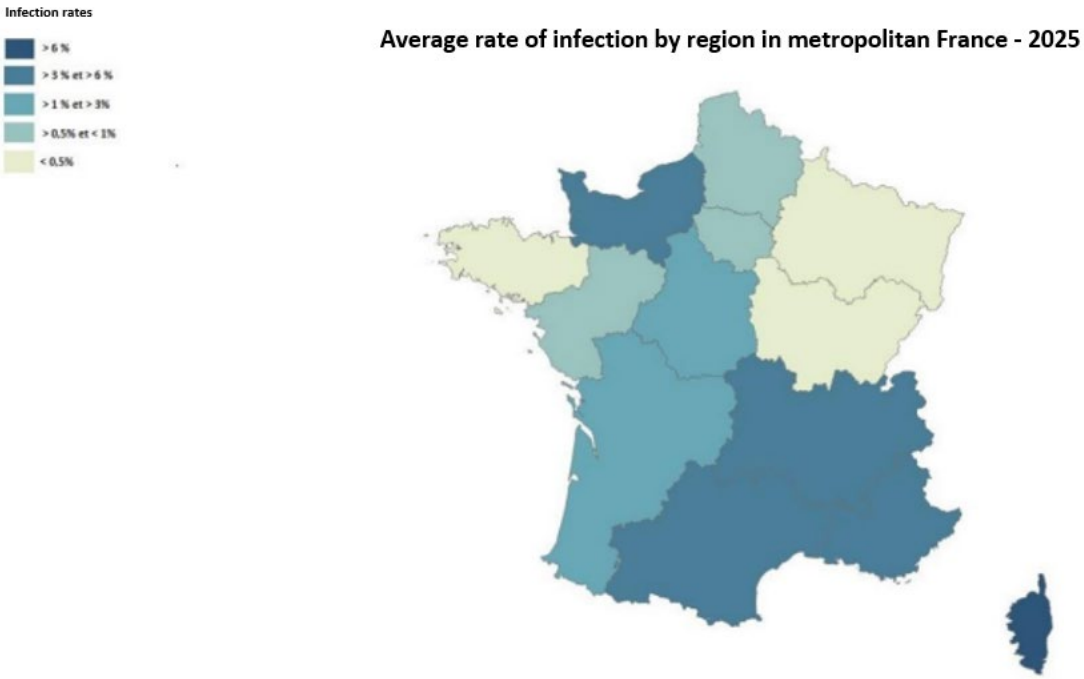
Lastly, in terms of prevention, 12 insurers report that they have set up or planned to set up in-house mechanisms to help policyholders cope with the physical consequences of climate change.

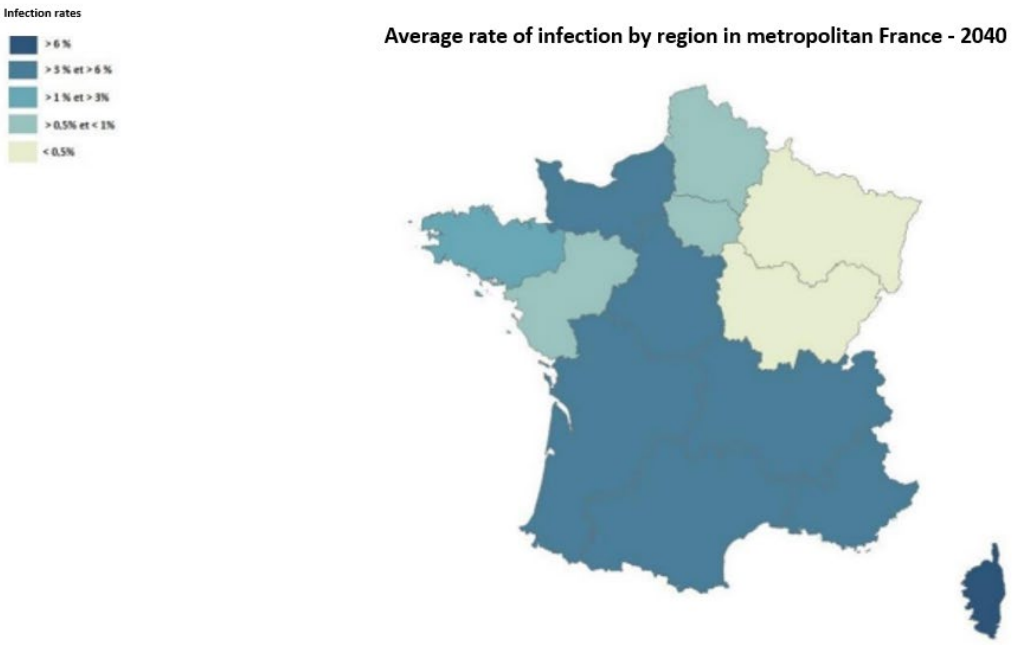
3.2.4. Health and death & disability risks

For loss in health and death & disability insurance, with the participation of AON, regional granularity assumptions were introduced for both pollution risk and vector-borne disease risk assumptions (Chart 68).

However, as was the case in the short-term scenario, given the contradictions between the health and death and disability insurance claims provided by insurers on a regional basis, and the figure provided for mainland France, only the figures provided for mainland France were used for our analysis.

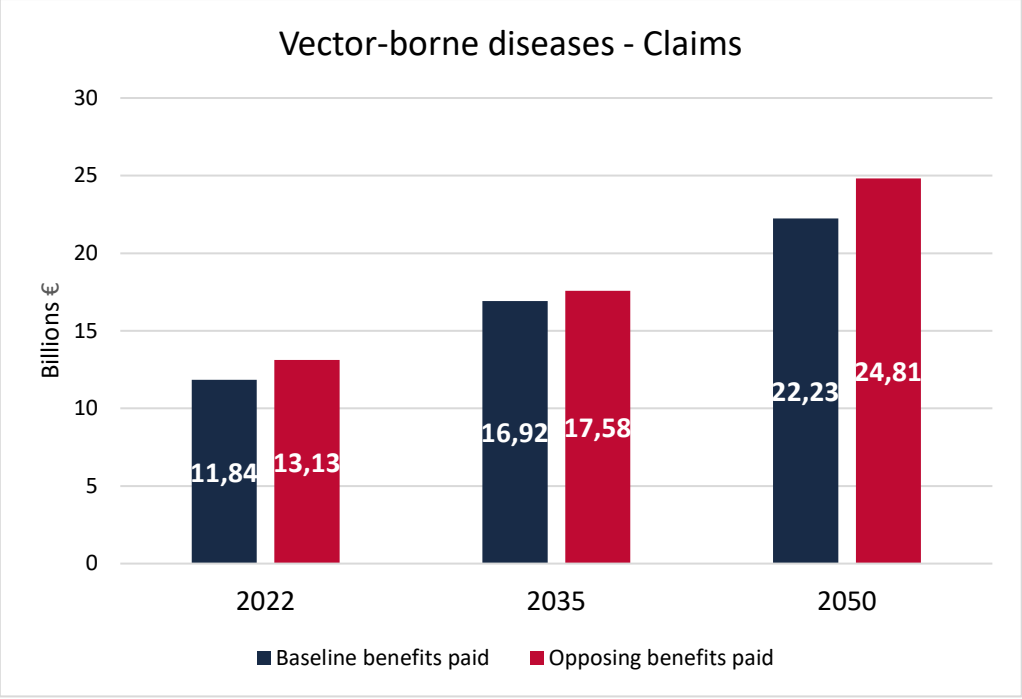
Chart 68: AON assumptions - Projection of the average rate of infection by region in 2025 and 2040 based on assumptions relating to the "vector-borne diseases" risk



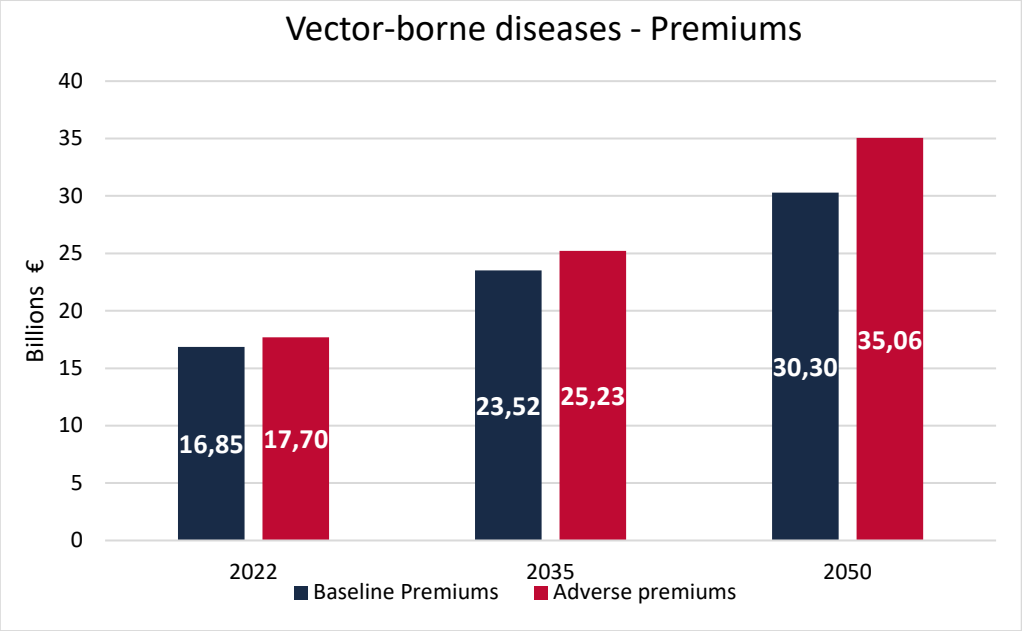


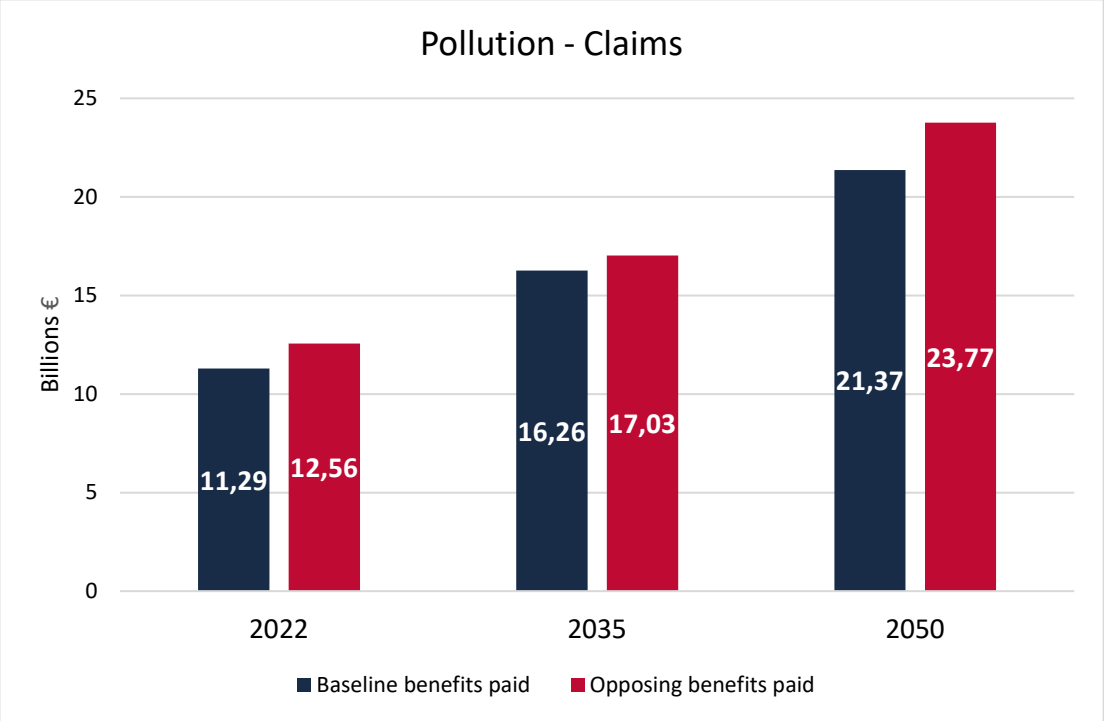
As in the short-term scenario, the rise in premiums, combined with the assumption of a significant proportion of healthcare costs covered by the French social security system (resulting in lower costs for insurers), has had little impact in terms of loss ratio in health and death & disability insurance (Chart 69).

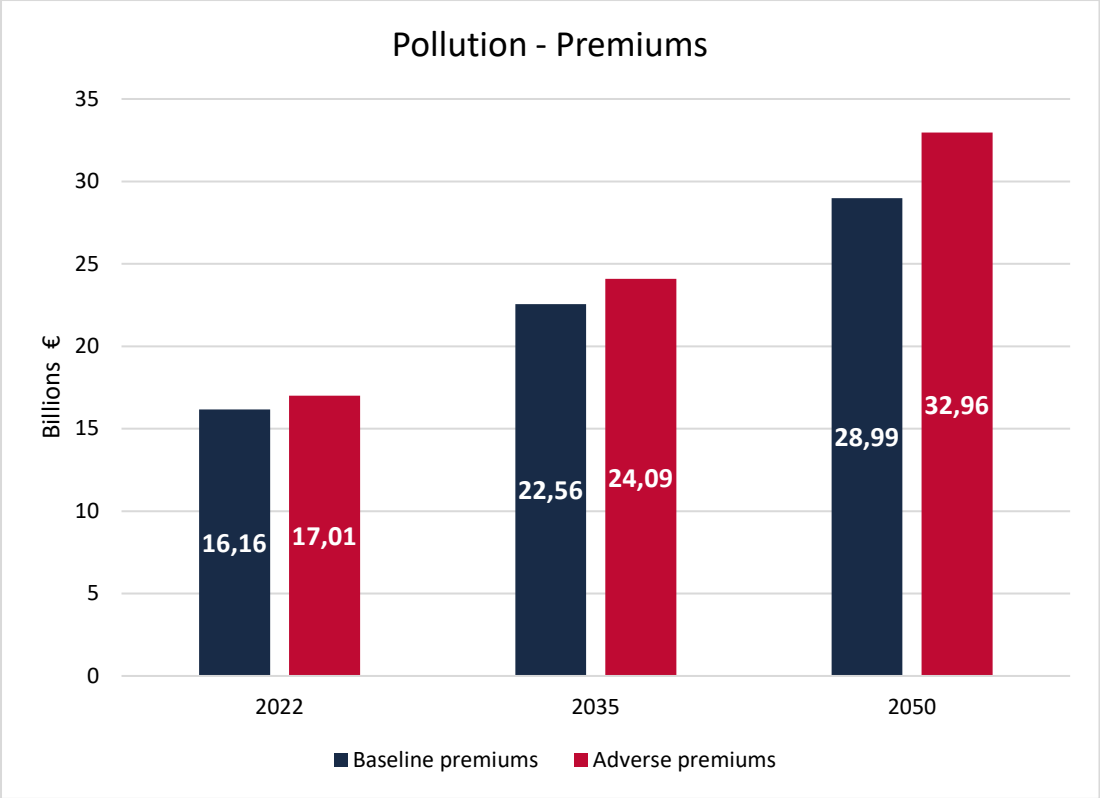
Chart 69: Change in claims and premiums for health and death & disability insurance associated with vector-borne diseases and pollution in the long-term scenario[72] and table of loss ratio for health, death and disability insurance broken down by risk



[72] Scope: 10 undertakings


Vector-borne diseases - Premiums
40
35
30
25
20
15
10
5
0
Billions €
16,85
17,70
23,52
25,23
30,30
35,06
2022
2035
2050
Baseline Premiums
Adverse premiums


Pollution - Claims
25
20
15
10
5
0
Billions €
11,29
12,56
16,26
17,03
21,37
23,77
2022
2035
2050
Baseline benefits paid
Opposing benefits paid



	Vector-borne diseases		Pollution	
Year	Loss ratio gross of reinsurance - baseline	Loss ratio gross of reinsurance - adverse scenario	Loss ratio gross of reinsurance - baseline	Loss ratio gross of reinsurance - adverse scenario
2022	70%	74%	70%	74%
2035	72%	70%	72%	71%
2050	73%	71%	74%	72%

3.3. Impacts on insurers' assets

3.3.1. Overview

In the long-term scenario, insurers' investments increase significantly until 2050, mainly due to inflation (58% growth in total investments between 2022 and 2050 in the baseline scenario, Chart 70).

Expressed as a deviation from the baseline scenario, impairment losses on total investments stand at -3% in the Below 2°C scenario and -3.5% in the delayed transition scenario. Analysis by asset class shows that real estate and related funds are most affected in the adverse scenarios (around -7% loss in value in 2035 compared with the baseline, and between -9 and -10% in 2050 depending on the

scenario, Chart 71). Bonds, however, show much smaller deviations from baseline, often by less than 3%.

Chart 70: Total investments by asset class, scenario and year (in billion EUR)

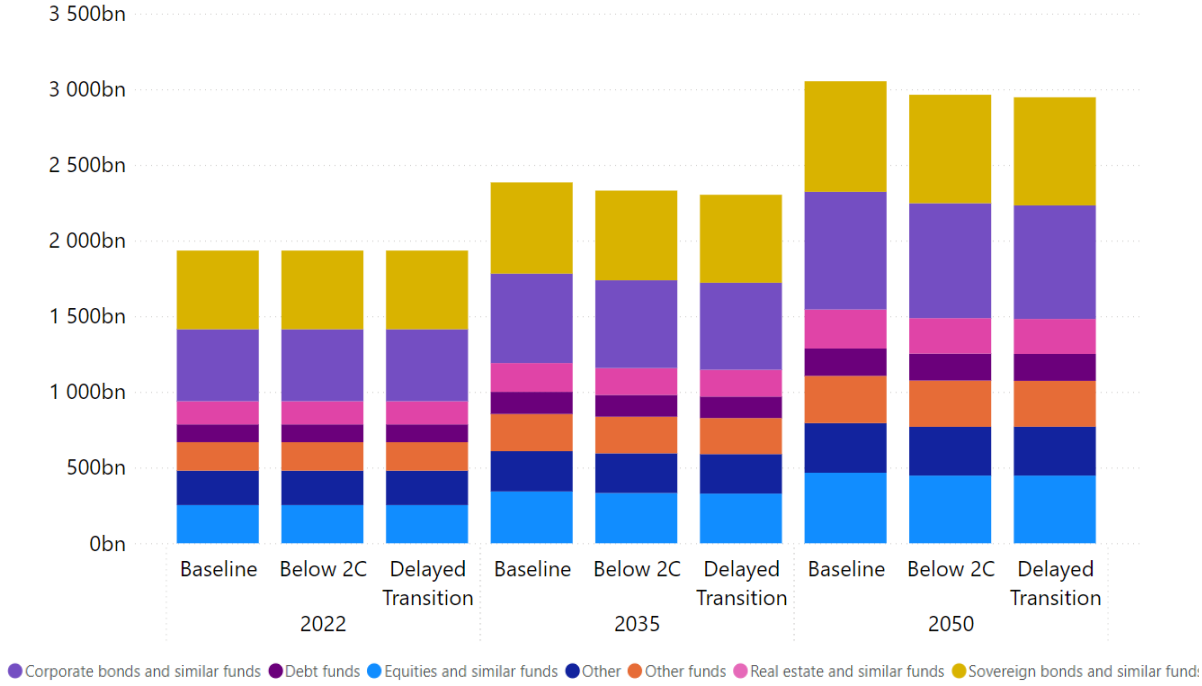
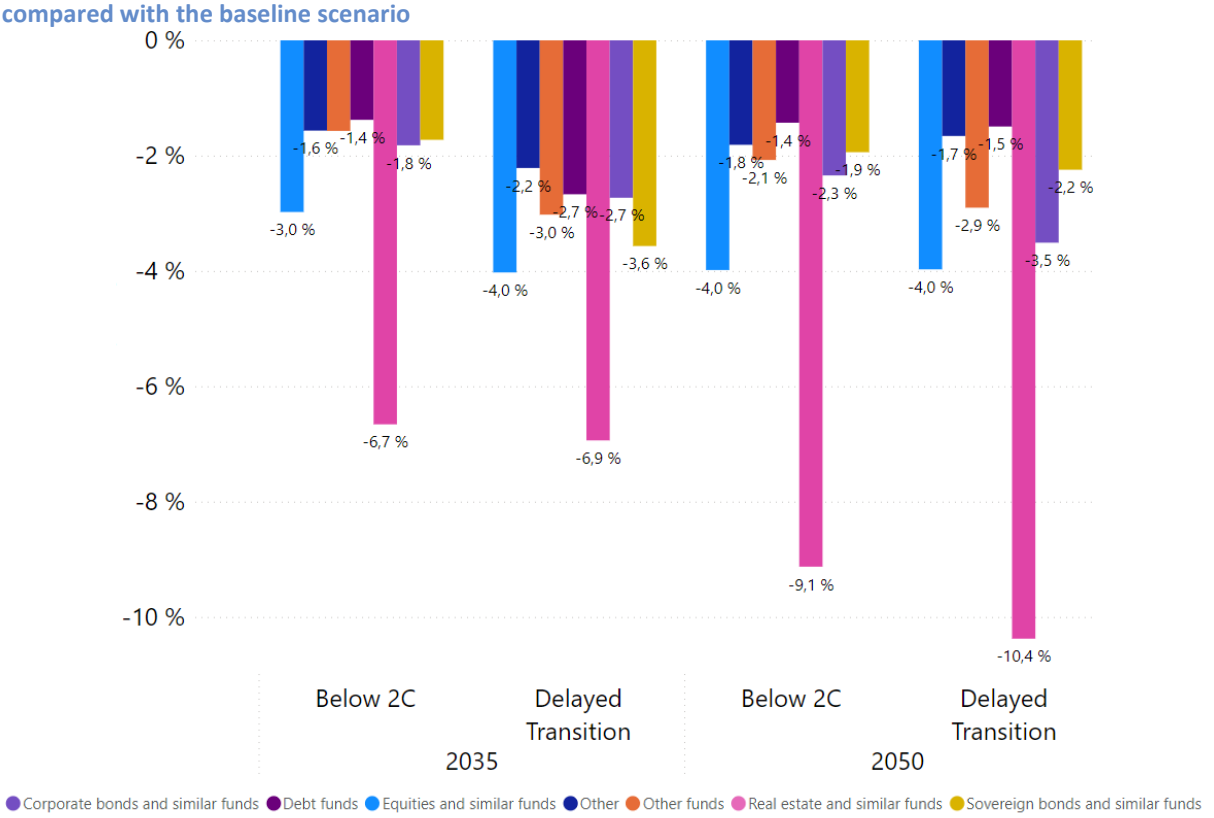
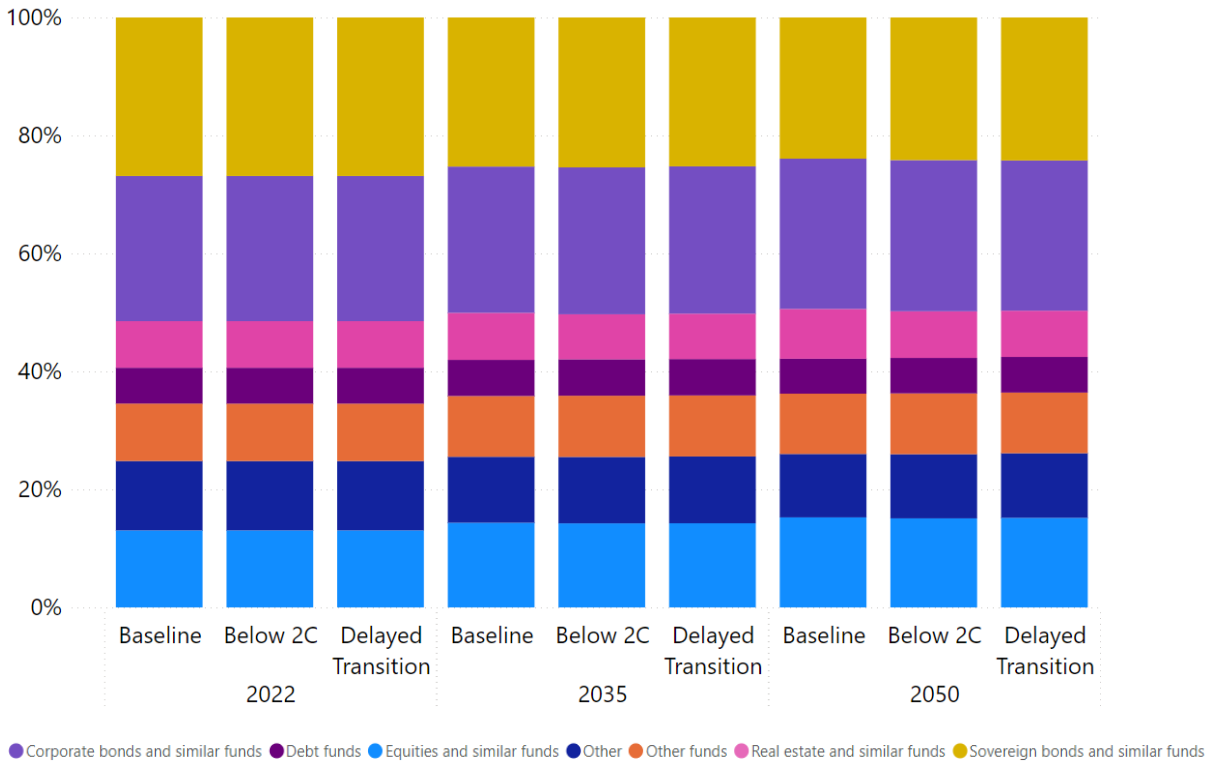


Chart 71: Variations in asset class value in 2035 and 2050 according to each transition scenario (as a %) compared with the baseline scenario



The relative shares of each asset class remain relatively stable over time and for each scenario, in line with the low variation level observed. Relative disinvestment from sovereign bonds is low (-3 percentage points between 2022 and 2050, see Chart 72) which, in all scenarios, benefits corporate bonds and equity investments. This change could reflect discrepancies between the historical allocation reflected in the 2022 balance sheet and the target allocations visible in the 2050 investments.

Chart 72: Share of investments for each asset class, scenario and year (as a %)



3.3.2. Sovereign bonds

The structure of sovereign bonds remains relatively stable over time and across scenarios (Chart 73). Countries recording the most significant declines (around -4.5% in 2035 in Delayed transition scenario compared with the baseline, Chart 74), such as Belgium and Spain, do not account for a significant share of the portfolio (around 10% in volume). France shows a decrease in values by about 2%, except in 2035 for the Delayed transition scenario, where the value of bonds is 4% lower than in the baseline scenario.

Chart 73: Sovereign bonds according to scenario and country of issuer (in EUR billion)

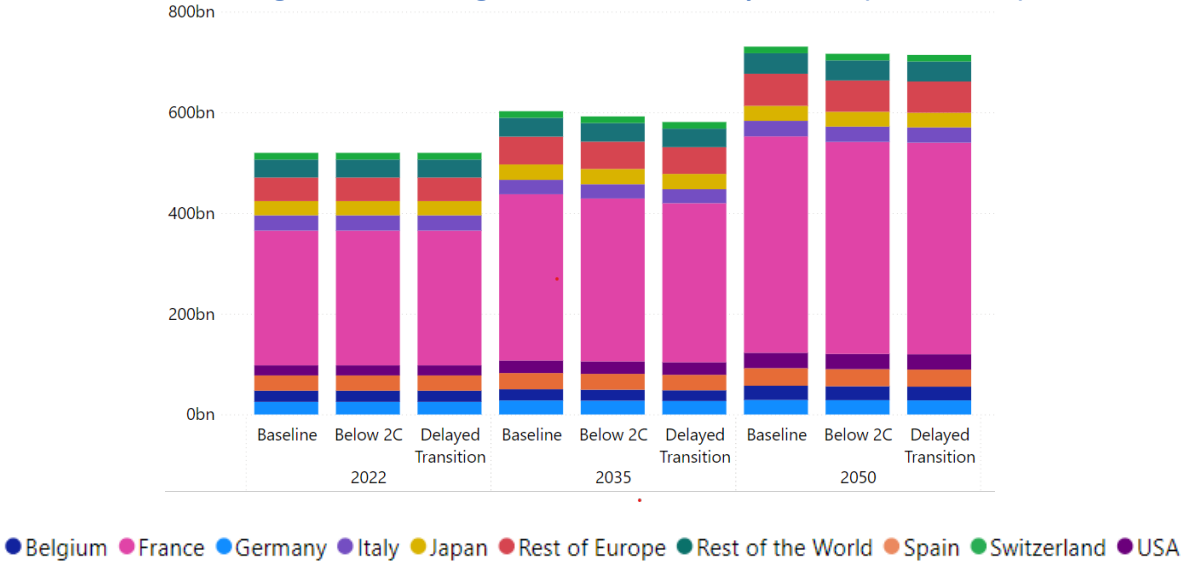
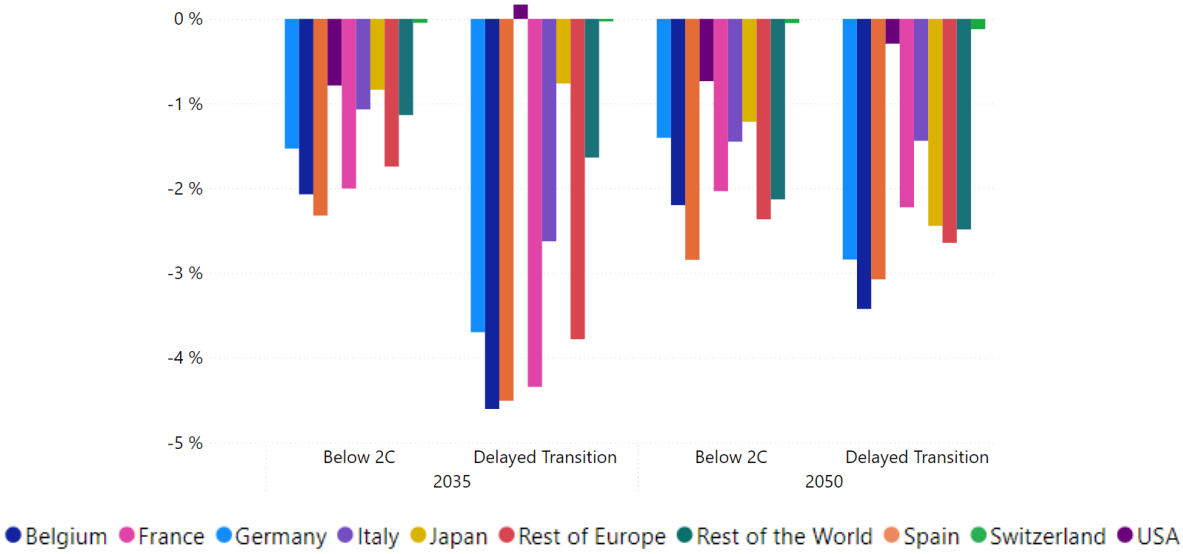


Chart 74: Change in the value of sovereign bonds by country in 2035 and 2050 and according to each transition scenario (as a %) compared with baseline



3.3.3. Corporate bonds

The corporate bond shocks appear relatively balanced across GICS sectors, although the Delayed scenario seems more adverse overall. In 2050, the investments most affected are those associated with the Technology and Real Estate sectors, while those associated with the Communications and Industry sectors appear relatively less affected (Chart 76).

Chart 75: Corporate bonds according to GICS sector and scenario considered (in EUR billion)

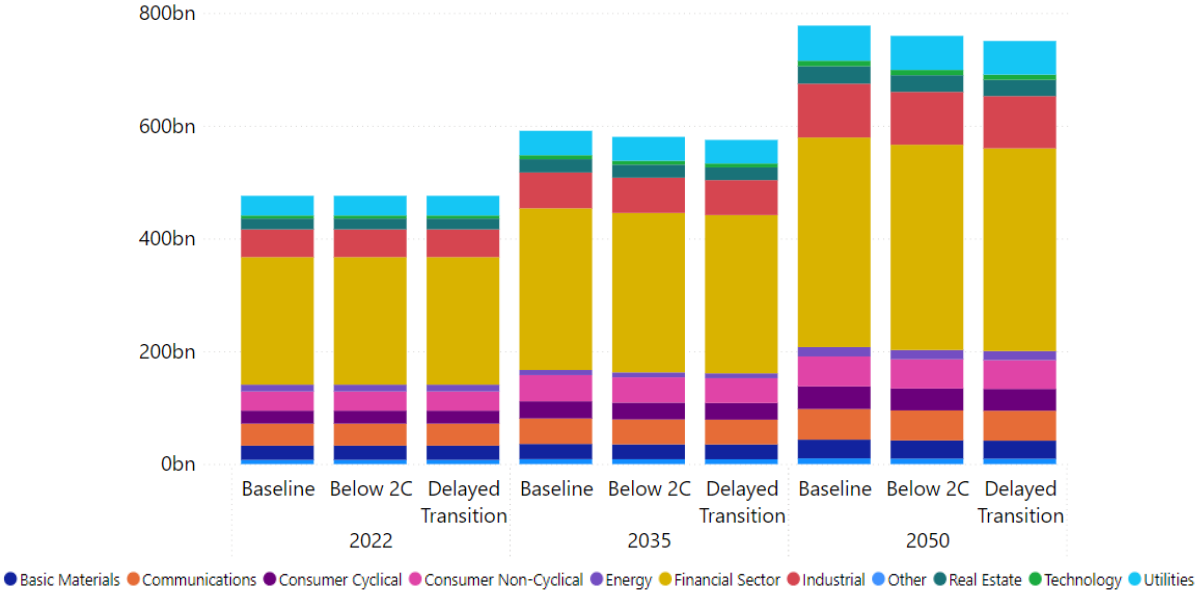
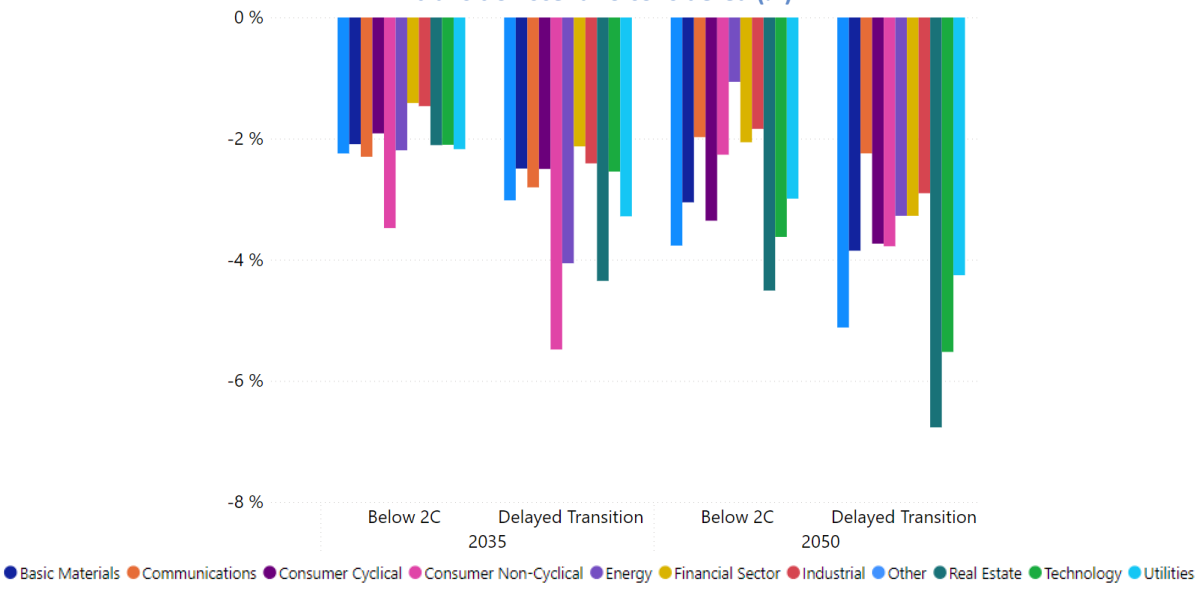


Chart 76: Change from baseline in corporate bond values in 2035 and 2050, according to GICS sector and transition scenario considered (%)



3.3.4. Equity and equity funds

Values related to coal mining (B05) show significant losses (from -10% to -15% as of 2035 depending on the transition scenario considered, as do associated refining activities (C19.1), albeit to a lesser extent (between -5% and -8% decrease in value depending on the transition scenario considered, Chart 78).

Oil-related activities also show significant declines in value: the value of assets associated with oil extraction (B06.1) falls as early as 2035 (-3.5% to -6% depending on the scenario considered) and those

associated with the refining of oil products (C19.2) account for the sharpest drop, at -18% in 2050 in the Delayed transition scenario.

The gas sector appears to be little affected, with the value of extraction-related assets (B06.2) remaining stable in 2035 (-2% in the Delayed scenario) or even increasing in 2050 in both transition scenarios compared with the baseline (+1% in Delayed).

The changes thus observed essentially reflect the impact of shocks as defined by the assumptions. Indeed, undertakings made very little use of asset reallocations in the long-term scenario (even though this option was offered to them).

These developments should also be put into perspective, however, given the modest share of these asset classes that is exposed to transition risk in the portfolio (Chart 77): extraction activities account for less than 0.1% of shares, while refining activities account for 2.5% of shares in 2022.

The L68 real-estate sector also appears significantly affected in 2050 (-14% decline in value in the Delayed Transition scenario compared with the baseline scenario), and it accounts for a greater share of insurers' equities (around 4.5% of the value of equities and similar products in 2050).

Chart 77: Equity according to NACE sector and scenario (in EUR billion)

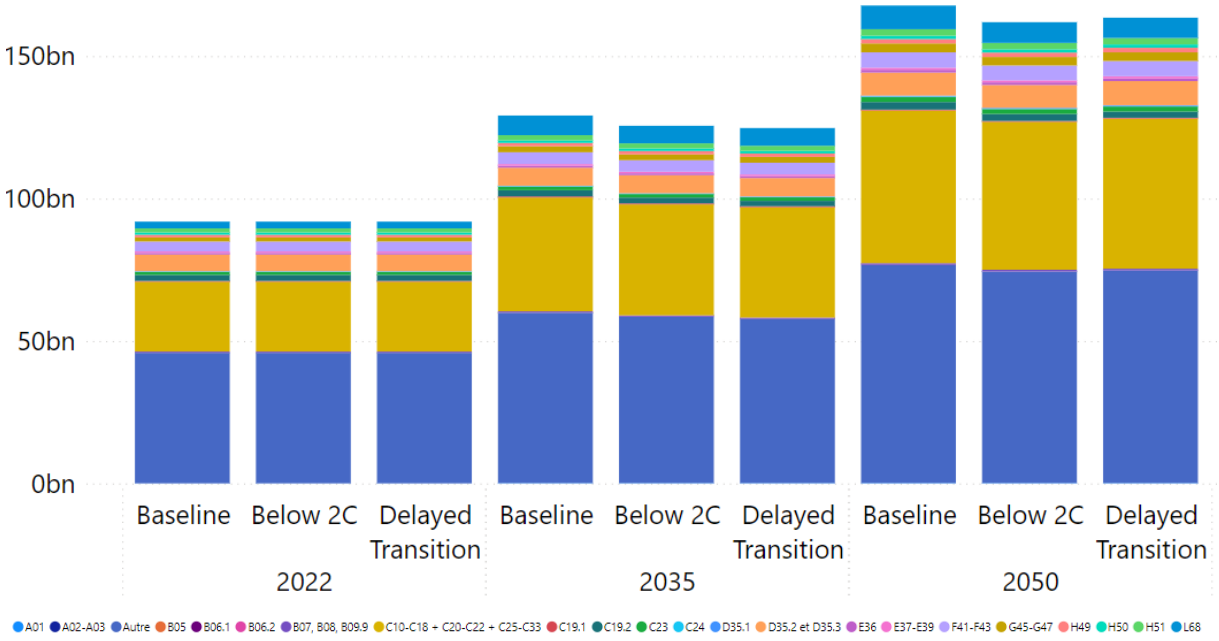
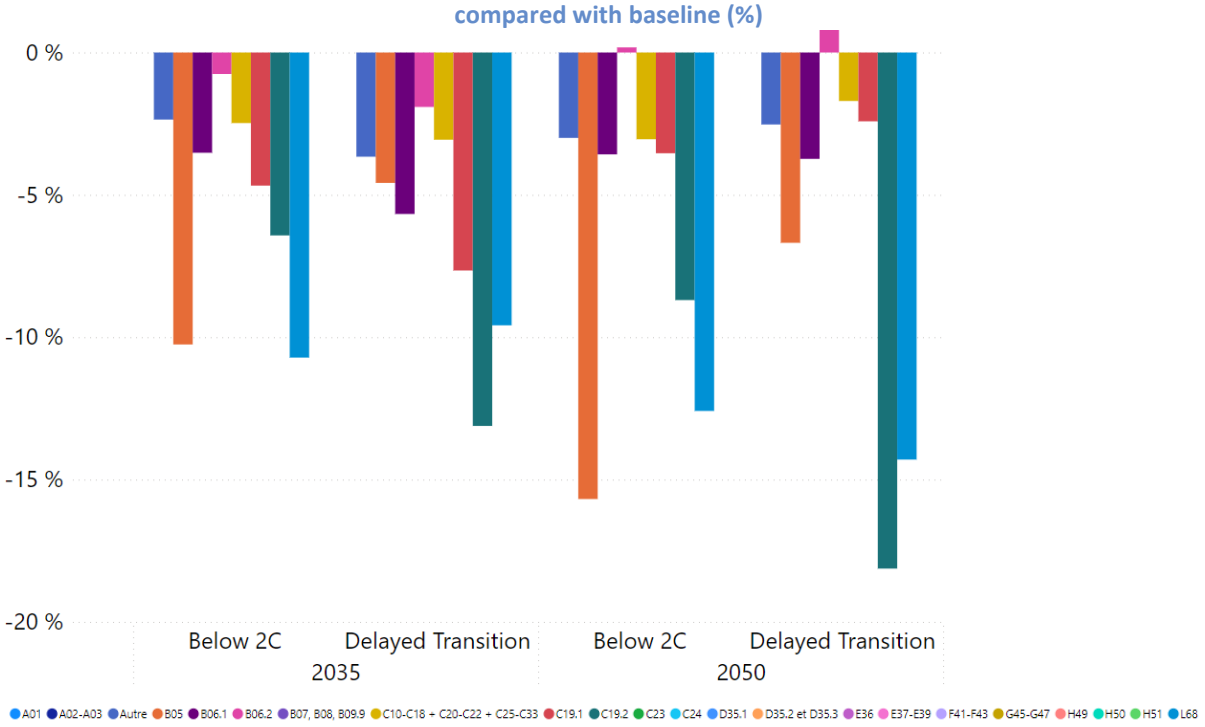


Chart 78: Variation in equity value according to NACE sector and transition scenario in 2035 and 2050 compared with baseline (%)



3.4. Balance-sheet growth

Total assets and excess of assets over liabilities increase over the period under all three scenarios:

- For the balance sheet total: approximately +50% in 2050 compared with 2022, regardless of the scenario considered;
- For the excess of assets over liabilities +124% to +136% in 2050 compared with 2022, depending on the scenario considered.

Changes to balance sheet total directly mirror GDP growth assumptions.

Thus, the adverse scenarios deviate from the baseline scenario by deteriorating more, but in fairly moderate proportions (at most -3.9% for the balance sheet total in 2050 in the Below 2°C scenario compared with the baseline scenario, and -3.3% in 2040 for the Delayed Transition scenario compared with the baseline).

Chart 79: Balance sheet total by year and for each scenario (in EUR billion)

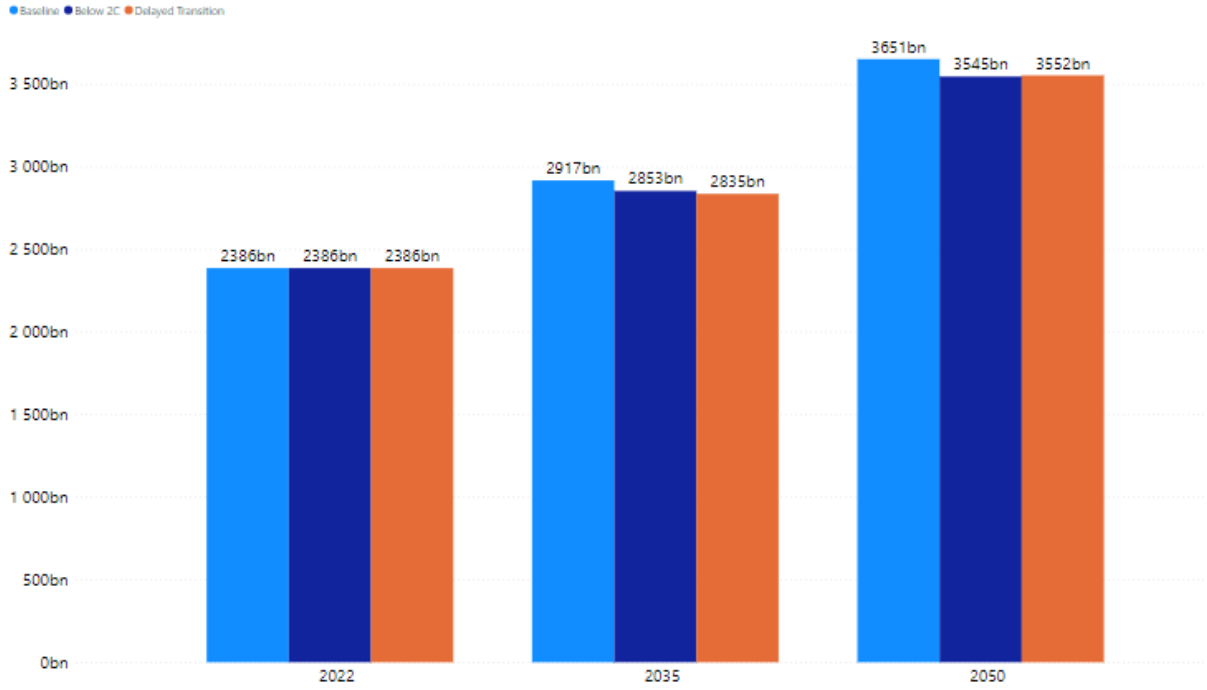
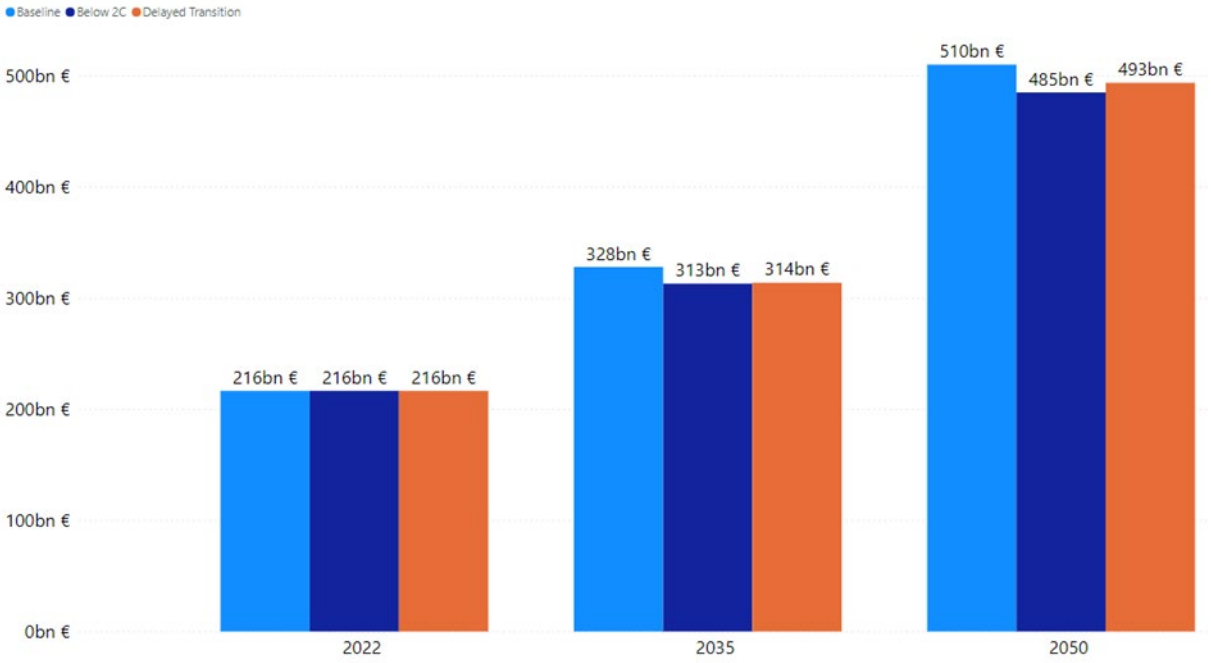


Chart 80: Excess of assets over liabilities by year and for each scenario (in EUR billion)



4. Conclusion - Methodological lessons learned

After each climate stress test, supervisory authorities and insurers are better equipped in terms of both methodology and data. This new exercise provides a number of additional lessons.

First of all, with regard to the scenarios used, the delayed transition scenario, despite being the most disorderly of NGFS scenarios, still remains insufficiently adverse to generate strategy changes or more awareness, and may lead to an underestimation of the potential impacts of climate change on financial stability.

Despite the progress made in the current climate stress testing exercise, supervisory authorities and insurers will need to conduct additional, in-depth work to assess the impact of shocks on short-term solvency and longer-term insurance gap risk. More specifically, despite recent debate on the ability of reinsurers to cover specific risks, stress-test participants believe that they will not face particular challenges in their recourse to reinsurance by 2025. The issue of risk transfer therefore remains to be explored.

In addition, some insurers have indicated that the significant gap between the time horizon considered for stress tests (2050) and the one usually used for business planning purposes (3-5 years) makes it difficult to effectively integrate climate risks in decision-making processes, which has consequences in terms of certain methodological choices and the low number of management decisions envisaged in the projections. This stress testing exercise has addressed this challenge by including a short-term scenario (5 years), a new feature that departs from the pilot exercise on climate risks. This *ad hoc* scenario was, however, based on a range of climate risks and will require further exploration. In turn, the long-term scenario can serve to enrich insurers' thinking when defining their strategies for the longer term.

Supervisors and insurers must therefore continue improving the methodology and granularity of their analyses, in terms of both scenario specification and the ability of projection tools to fully integrate them. Despite these challenges, climate stress testing is a powerful tool for assessing the resilience of the financial system to climate risks. This kind of exercise is therefore bound to be reiterated in the future, at a frequency that remains to be determined, but it is already in line with the European and French frameworks requiring undertakings to include sustainability risk into their respective ORSA.

5. ANNEX A - list of insurance undertakings that took part in the exercise

Name	Life/non-life/Composite
ACM IARD	Non-life
ACM VIE	Life
AEMA	Composite
AESIO	Non-Life
ALLIANZ IARD	Non-life
AXA	Composite
BNP PARIBAS CARDIF	Life
BPCE ASSURANCE IARD	Non-life
BPCE VIE	Life
CNP ASSURANCE IARD	Non-life
CNP ASSURANCE VIE	Life
CREDIT AGRICOLE ASSURANCES	Composite
GENERALI IARD	Non-life
GENERALI VIE	Life
GMF ASSURANCES (COVEA)	Non-life
GROUPAMA	Composite
MAAF ASSURANCES SA (COVEA)	Non-life
MAIF	Composite
MMA IARD (COVEA)	Non-life
SCOR	Reinsurer
SGAM AG2R LA MONDIALE	Life
SOGECAP	Life

6. ANNEX B: Table of Figures