Climate Change Risk Management Support

Results of the 2023 ACPR Stress Test

Prepared by Finalyse: 1st July 2024

- The challenges linked to climate change are considerable for the financial sector including:
  - Facing a significant rise in financial risks linked to global warming.
  - Having to play a decisive role in financing the transition to a low-carbon economy.
- In this context, the Prudential Control and Resolution Authority (ACPR) has a dual mission:
  - Preserve the stability of the financial system by ensuring that financial institutions have clearly identified and implemented a framework for managing the climate-related risks that they are exposed to.
  - Contribute to the establishment of favourable conditions for financing an orderly transition towards a balanced and sustainable economy, in order to effectively combat global warming.
- The ACPR hence conducted a first pilot climate stress test exercise in 2020-2021, which concluded that French banks and insurance companies have a "moderate" exposure to risks linked to climate change.
- The ACPR conducted a second climate exercise in 2023, restricting its scope to the insurance sector.

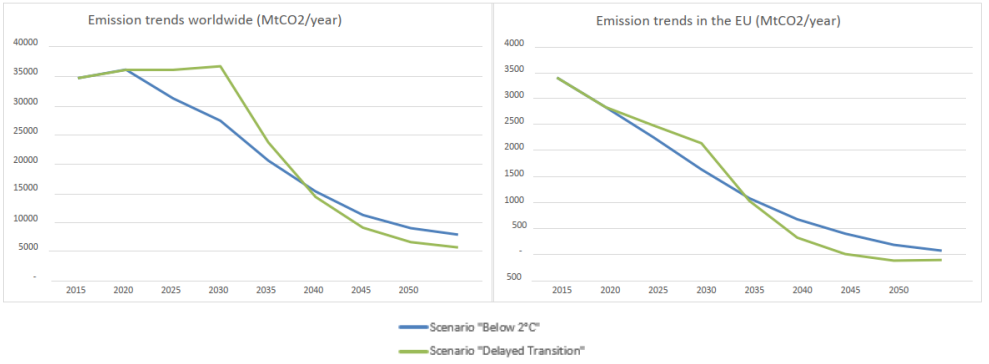
Introduction

Summary of ACPR 2023 stress test exercise

- The ACPR 2023 insurance sector exercise had 22 participants, representing 90% of the French market based on balance sheet.
- The stress test exercise consisted of one short-term scenario and two long-term scenarios, plus an additional hypothetical baseline which represents no climate change:

- The short-term scenario was developed by the ACPR in collaboration with the Banque de France and considers the time horizon of 2023-2027, combining:
  - Two acute physical risk shocks, limited to France:
    - long-lasting episode of drought/heat waves (2023-2024)
    - followed by a localized flood hazard (Q1 2025)
  - A transition risk shock, characterized by a drop in asset values, following a sudden correction of financial markets (2025-2027).

- Two long-term scenarios were developed by the NGFS (Network for Greening the Financial System), which have similar levels of exposure to physical risks and are calibrated so that the probability of reaching a temperature below 2°C in 2100 stands at 67%:
  - An orderly scenario "Below 2°C" which assumes that climate policies are introduced immediately and become gradually more stringent.
  - A disorderly scenario "Delayed Transition" which assumes global annual emissions do not decrease until 2030. Strong policies are then needed to limit warming to below 2°C. This leads to higher transition risks than the orderly scenario.



Summary of ACPR 2023 stress test exercise

	Long Term	Short Term
Projections starting point	31/12/2022	31/12/2022
Scenarios	Baseline, Below 2°C & Delayed Transition	Baseline & Stressed Scenario
Horizon and projection steps	2025, 2030, 2035, 2040, 2050	2023, 2024, 2025, 2026, 2027
Main Assumptions	Dynamic Balance Sheet: ▪ Adjustment of investment and risk management* strategies: premiums increase, reallocation of assets, adjustment of reinsurance cessions, reallocation of activity (by geographical area or by branch of activity). ▪ On the other hand, contracts retained or acquired during a given financial year must have guarantee levels comparable to those held in the portfolio at the end of 2022. * The ACPR provides assumptions related to impact of premium increases on policyholder demand to allow for the risk of uninsurability.	Static Balance Sheet: ▪ No change in portfolio structure, hence excluding management or mitigation actions (renewal of contracts, coupon rate, risk profile according to the same characteristics)

List of companies having participated to the ACPR 2023 stress test exercise

Sector	Non Life	Life	Mixed	Reinsurance
Company Name	ACM IARD	ACM VIE	AEMA	SCOR
	AESIO	BNP PARIBAS CARDIF	AXA	
	ALLIANZ IARD	BPCE VIE	CREDIT AGRICOLE ASSURANCES	
	BPCE ASSURANCE IARD	CNP ASSURANCE VIE	GROUPAMA	
	CNP ASSURANCE IARD	GENERALI VIE	MAIF	
	GENERALI IARD	SGAM AG2R LA MONDIALE		
	GMF ASSURANCES (COVEA)	SOGECAP		
	MAAF ASSURANCES SA (COVEA)			
	MMA IARD (COVEA)			

Physical Risk

Long-Term Scenario

- The acute physical risk is assessed based on the RCP 4.5* scenario of the Intergovernmental Panel on Climate Change (IPCC). The analysis aims to consider the long-term impact of the acute physical risk through:

- An increase in the frequency and intensity of natural disasters, impacting property damage insurance:
  - The evolution of natural disasters on property damage (personal, business and motor) insurers was assessed by the Caisse Centrale de Réassurance (CCR).

- The potential effects of environmental degradation on the population's health, impacting life insurance, medical expenses and work stoppage benefits:
  - For pollution and vector-borne diseases, AON provided assumptions on the evolution of mortality tables and health costs by geographical area and by age of the population.
  - Average shocks for the entire French territory were also provided to allow for impact calculations without segmenting insurers' liability portfolio.

Figure 1: Breakdown by department of the termination threshold assumption for contracts concluded with individual homeowners

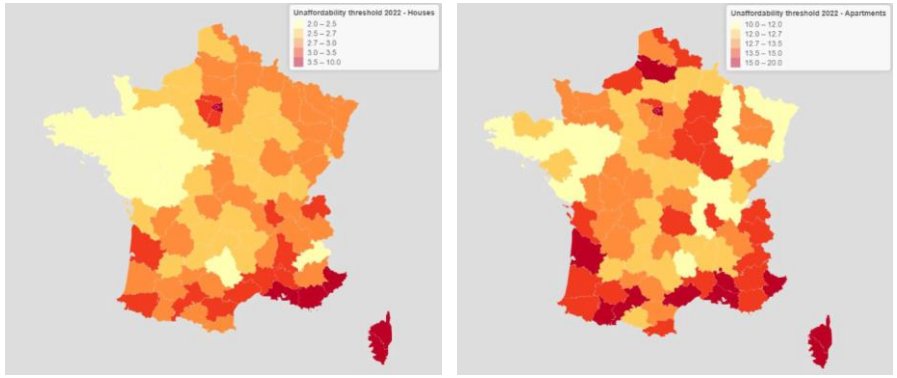
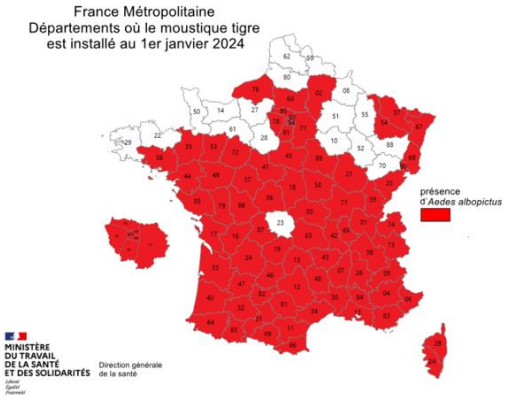


Figure 2: Geographical presence of the Aedes albopictus dengue vector in mainland France in 2022



** The RCP 4.5 scenario assumes an increase of the global temperature between 0.9°C and 2.0°C by 2050, compared to 1.4°C to 2.6°C by 2050 under RCP 8.5*

- For the short-term scenario, ACPR defined the following assumptions:

- Severe droughts in 2023 and 2024: the episodes of drought and heat waves observed in 2022 would recur.
  - For non-life insurance activities (Nat Cat drought peril, agricultural insurance), insurers were able to apply a loss ratio which corresponds to that observed or estimated in 2022.
  - For life insurance activities, AON provided mortality and healthcare expense assumptions associated with the heat waves of 2022.

- In the first quarter of 2025, a localized flood from the Durance river, generated by Serre-Ponçon dam failure:
  - For non-life insurance activities, the impact of the dam failure was assessed by the CCR according to the same procedures as for Nat Cat flood claims in the long-term scenario.
  - For life insurance activities, AON provided mortality rates at a departmental level. In this context, insurers would be able to simulate their losses via their number of policyholders and capital under risk.

Figure 3: Map of relative excess mortality during the heatwaves of summer 2022

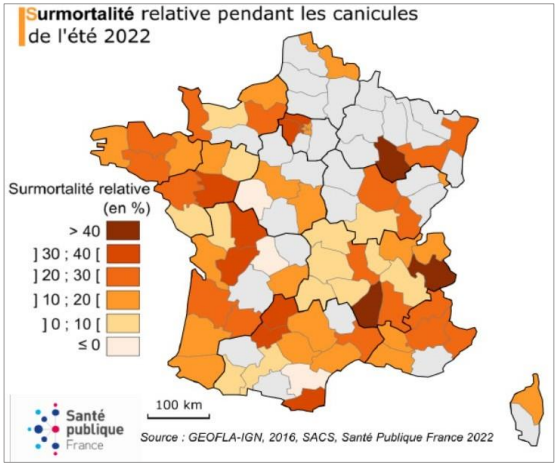


Figure 4: Drought in France (2023-2024)

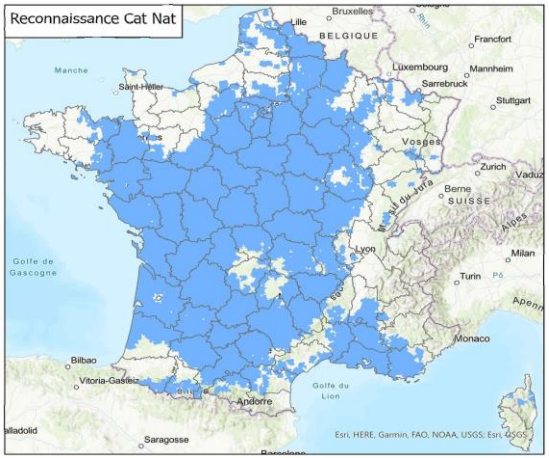
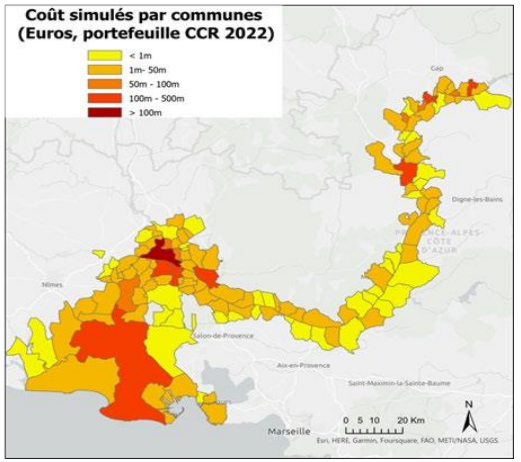


Figure 5: Localised flood risk due to Heavy rainfall and a dam burst (2025)



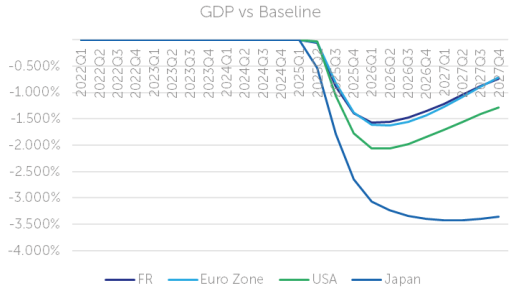
Transition Risk (Market Risk)

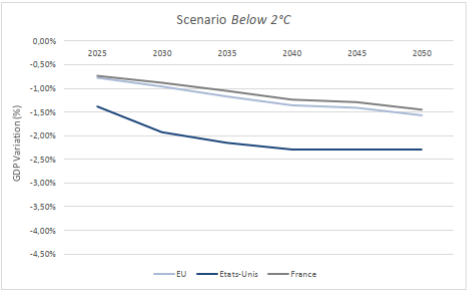
General approach

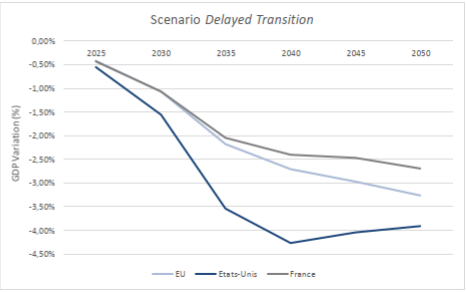
- The objective is to capture the financial impact of the devaluation of certain assets within the framework of transition policies or their anticipation, starting in 2025, following the physical risks observed in 2023 and 2024 (drought, heat waves & flood).

- Short-term scenarios:
  - Exceptional events hitting France are followed by a sudden adjustment of the financial markets, in anticipation of the rapid implementation of carbon regulations in several major economies
  - Euro area GDP falls by 1.6%, by the end of the first year following the shock. Inflation is also falling in this recessionary context.

- Long-term scenarios:
  - Below 2°C: thanks to a growing awareness that has led to the early adoption of environmental regulations; variations in GDP level do not fall below -2.5% in all the geographical areas.
  - Delayed Transition: following the sharp increase in carbon prices starting in 2030, GDP drops as low as -4.3% in the United States in 2040 and reach -3.3% in Europe by 2050.







Transition Risk (Market Risk)

General approach

- No distinction in methodology between short-term and long-term scenarios.
- Insurers' bond and equity portfolios were valuated at market value for each of the proposed scenarios, following Solvency 2 principles.
- Insurers would need to assess and provide a breakdown of their asset portfolios based on the different long-term and short-term scenarios, by type of security and investment sector.
  - It was not necessary to enter data for each individual asset. The minimum required granularity was the nature of assets by sector of activity.
  - Further segmentation could be based on the country where the asset is issued.
  - The type of shares (listed, unlisted) could also be specified.
  - Transparency of investments fund was not required.
  - Asset reallocation decisions would be integrated based on the dynamic nature (in long-term scenarios) or static nature (in the short-term scenario) of the projections.

Transition Risk (Market Risk)

Financial Variables to be shocked

	Long-Term	Short-Term	Granularity
Equities	Shocks provided in the assumption tables	Shocks provided in the assumption tables	Country x GICS Code / NACE Group x Year
Bonds, Derivatives	Shocks provided in the assumption tables	Shocks provided in the assumption tables	Country x GICS Code x Year x Maturity
Real Estate	Shocks provided in the assumption tables	Use of the shock on **Real Estate subsector of the Equities**	Country x Region (France only) x Year
Other Assets (deposits, loans, etc.)	Must remain constant, multiplying by inflation only	Shocks provided in the assumption tables	

NB: A mapping table between NACE code, NACE Group and GICS code is provided by ACPR

Transition Risk (Market Risk)

List of Stressed Variables provided by ACPR

	Long Term	Short Term
Gross Domestic Product	Country x Year	Country x Quarter
Unemployment	Country x Year	Country x Quarter
Inflation	Country x Year	Country x Quarter
Public Debt	Country x Year	Not applicable
Budget Deficit	Country x Year	Not applicable
Carbon Price	Country x Year	Not applicable
Oil Price	Year	Not applicable
Insured Values	Country x NACE Group x Year	Not applicable
Gross Revenue	Country x NACE Group x Year	Not applicable
Real Estate	Country x Region (only France) x Sector x Year	Not applicable
Sovereign Yields	Country x Year x Maturity	Country x Year x Maturity
EIOPA Rates (VA / noVA)	Year x Maturity	Year x Maturity
Corporate Spread	Country x GICS Code x Year x Maturity	Country x GICS code x Year x Maturity
Equities	Country x NACE Group x Year	Country x GICS code x Year

NB: A mapping table between NACE code, NACE Group and GICS code is provided by ACPR

- A significant decrease in the SCR capital coverage ratio is observed, mainly due to the impact of the financial shock.

Figure 6: SCR coverage ratio by scenario and years (in %)

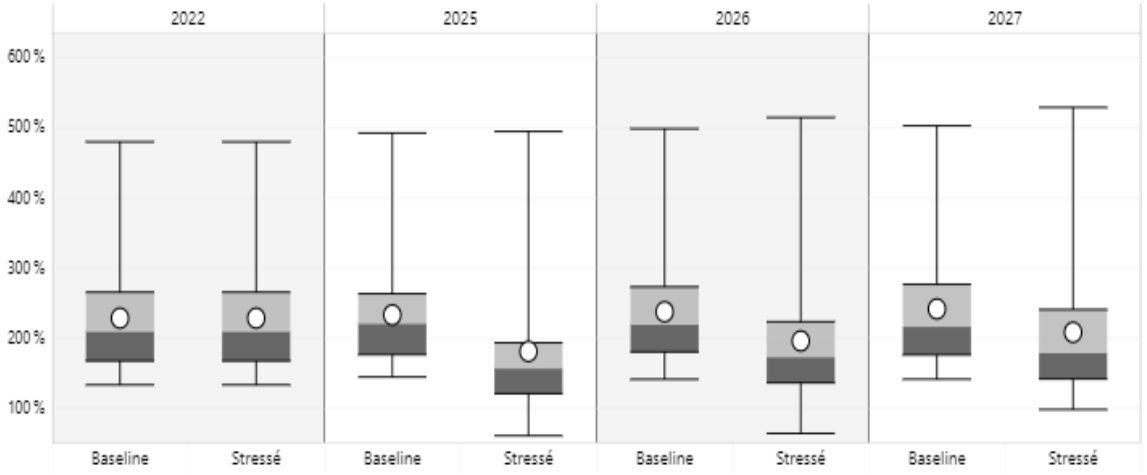
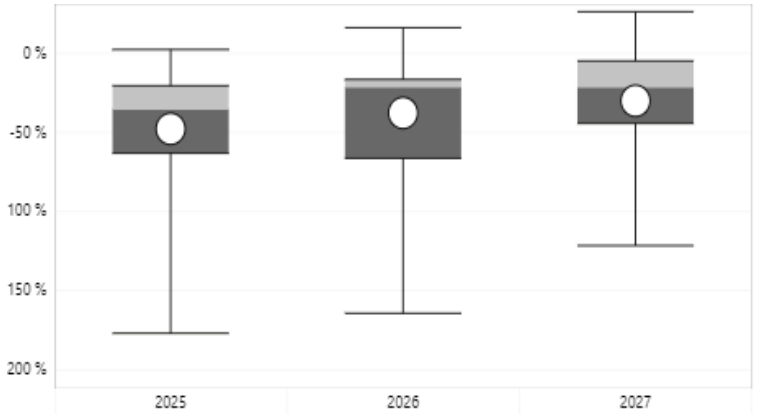


Figure 7: Distribution of the Relative Difference Between the Reference RAS Ratio and the Adversarial RAS Ratio, by Organization and Year (%)



Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- Starting in 2025, the shocked coverage ratios deviate by an average of -48 points with 25% of organizations experiencing a loss of more than -63 ratio points.

NB: This is primarily due to a significant decrease in own funds (-28% in 2025) rather than an increase in the SCR (+9% in 2025).

- The financial shock associated with transition risk directly affects the economic value of investments on the assets side of insurers' balance sheets.
  - In 2025, the value of equities and real estate assets drop by 27% and 32% respectively.
  - Due to contagion effects, government and corporate bonds lose an average of 8% of their value.
- The overall investments value drop by approximately 13% in 2025.

Figure 8: Total investments by asset class (in € billion)

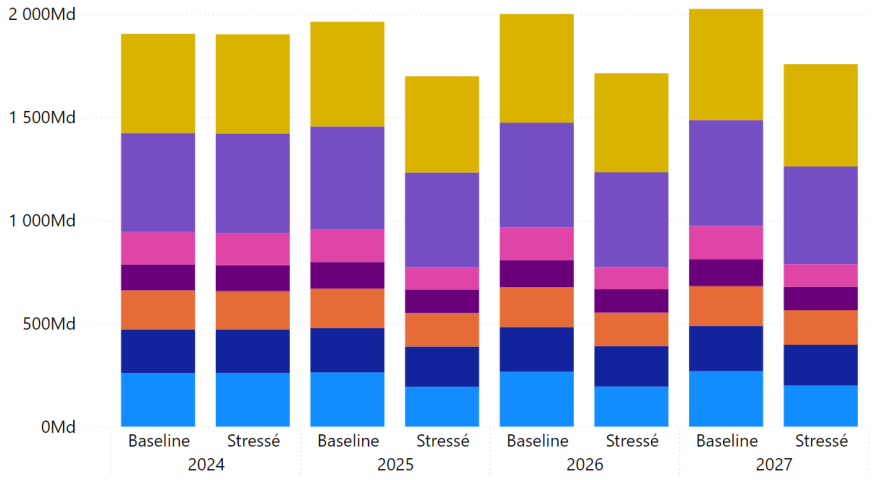
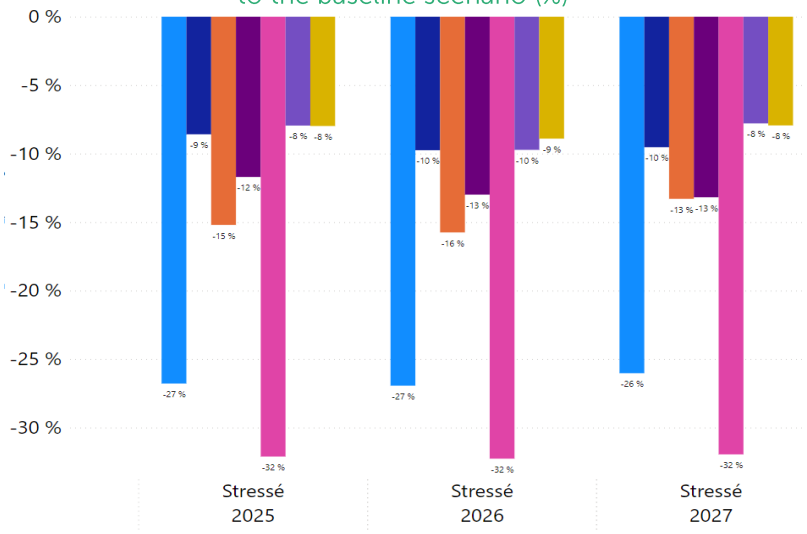


Figure 9: Change in the value of asset classes relative to the baseline scenario (%)



Actions et fonds assimilés · Autres · Autres fonds · Fonds obligataires · Immobilier et fonds assimilés · Obligations d'entreprise et assimilés · Obligations souveraines et assimilés

Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- The impairment loss of **total investments** is **-3%** in the **Below 2°C** scenario and **-3.5%** in the **Delayed transition** scenario.
  - **In 2035, equities** and **real estate** assets decrease in value by **7%,** and by **10%** in **2050** .
  - **Government and corporate bonds** lose an average of **less than 4%** of their value.
- The proportions of each **asset class** remain relatively **stable over time** and across scenarios, aligning with the minor changes observed.

Figure 10: Share of Investments by Asset Class, Scenario and Year (%)

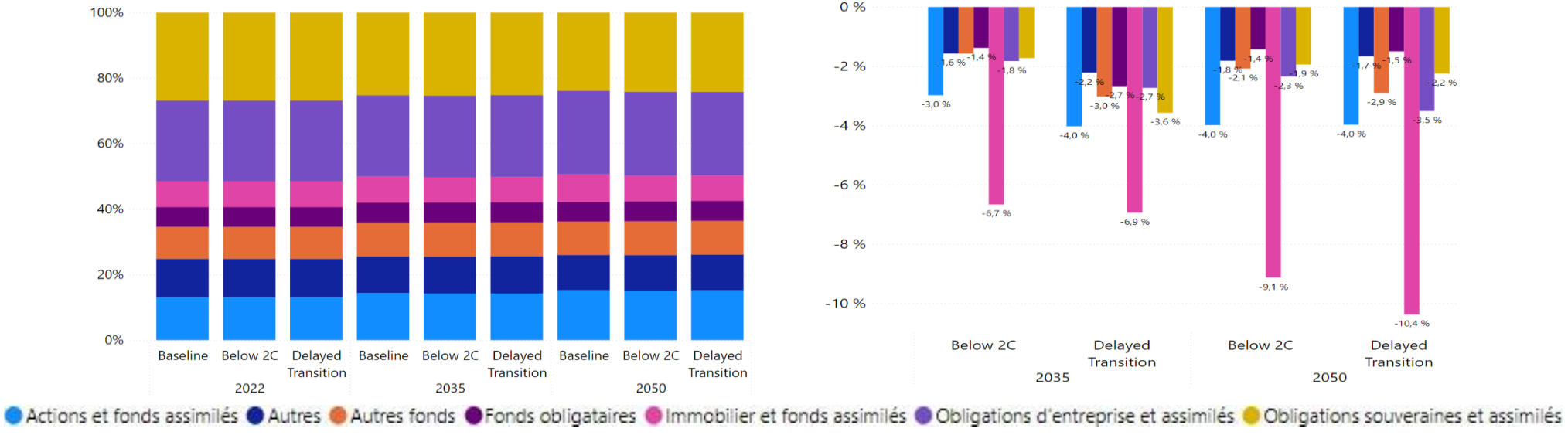


Figure 11: Baseline change in asset class values in 2035 and 2050, by transition scenario (%)

Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- In mainland France, the gap in total claims between the adverse scenario and the reference scenario is:
  - +€1.5 billion (i.e. +86%) in 2023
  - +€2.23 billion (i.e. +128%) in 2024
  - +€3.51 billion (i.e. +141%) in 2025 (year of the dam failure)

Table 1: Key figures for claims (in % and €bn)

		Adverse Scenario (amounts and % compared to 2022)			Baseline Scenario (amounts and % compared to 2022)			Loss Differences (Adverse scenario – Baseline scenario)		
Year	Event	Claims Total	Claims Floods	Claims Drought	Claims Total	Claims Floods	Claims Drought	Claims Total	Claims Floods	Claims Drought
2022	Baseline	2,24 €bn	0,38 €bn	1,68 €bn	2,24 €bn	0,38 €bn	1,69 €bn			
		100 %	100 %	100 %	100 %	100 %	100 %			
2023	Severe Droughts	3,37 €bn	0,63 €bn	2,66 €bn	1,82 €bn	0,51 €bn	1,27 €bn	1,56 €bn	0,12 €bn	1,39 €bn
		150 %	166 %	159 %	81 %	133 %	75 %	86 %	24 %	109 %
2024	Severe Droughts	3,96 bn	0,64 €bn	3,24 €bn	1,74 €bn	0,52 €bn	1,19 €bn	2,23 €bn	0,13 €bn	2,05 €bn
		177 %	168 %	193 %	77 %	135 %	70 %	128 %	25 %	173 %
2025	Dam Failure	6,0 €bn	4,35 €bn	1,57 €bn	2,49 €bn	1,2 €bn	1,25 €bn	3,51 €bn	3,15 €bn	0,32 €bn
		267 %	1138 %	93 %	111 %	313 %	74 %	141 %	262 %	25 %

Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- The excess claims observed in the adverse scenario are distributed very unevenly across mainland France due to:
  - Varying assumptions and insured values for drought-related claims in different geographical areas;
  - The highly localised nature of dam failure in a specific region for the flood risk.

- In mainland France, regarding total claims, we observe the following for the adverse scenario:
  - +105.3% between 2022 and 2050
  - +42% in 2050 compared to the baseline scenario (+39.7% for drought and +44% for floods).

Table 2: Key figures for claims (in % and €bn)

	Adverse Scenario (amounts and % compared to 2022)				Baseline Scenario (amounts and % compared to 2022)				Loss Differences (Adverse scenario – Baseline scenario)			
Year	Claims Total	Claims Floods	Claims Drought	Claims Submersion	Claims Total	Claims Floods	Claims Drought	Claims Submersion	Claims Total	Claims Floods	Claims Drought	Claims Submersion
2022	2,24 €bn	0,38 €bn	1,68 €bn		2,24 €bn	0,38 €bn	1,68 €bn					
	100 %	100%	100 %		100 %	100%	100 %					
2025	1,9 €bn	0,55 €bn	1,31 €bn	0,01 €bn	1,82 €bn	0,53 €bn	1,25 €bn	0,01 €bn	0,07 €bn	0,02 €bn	0,05 €bn	0,001 €bn
	84,49 %	143,77 %	77,81 %	100 %	81,23 %	139,13 %	74,58 %	100 %	4,01 %	3,36 %	4,35 %	11,57 %
2035	2,72 €bn	0,82 €bn	1,83 €bn	0,02 €bn	2,31 €bn	0,69 €bn	1,57 €bn	0,01 €bn	0,41 €bn	0,13 €bn	0,27 €bn	0,01 €bn
	121,43 %	214,88 %	109,30 %	196,53 %	103,06 %	179,81 %	93,43 %	133,02 %	17,82 %	19,53 %	17,01%	64,84 %
2050	4,61 €bn	1,43 €bn	3,03 €bn	0,04 €bn	3,25 €bn	0,99 €bn	2,17 €bn	0,02 €bn	1,35 €bn	0,44 €bn	0,86 €bn	0,02 €bn
	205,33 %	373,71 %	180,31 %	425,96 %	144,96 %	259,66 %	129,13 %	203,80 %	42 %	43,95 %	39,68 %	133,19 %

Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- The excess claims observed in the adverse scenario is spread in a very heterogeneous way over mainland France due to:
  - different assumptions and insured values for drought-related claims in different geographical areas;
  - the very localized local nature of floods, drought and submersion perils.

- In the adverse scenario, the technical result in 2025 represents -400% of premiums without reinsurance and -239% with reinsurance.
- Although reinsurance allows insurers to transfer some risks to reinsurers, it remains insufficient to offset the excess claims caused by acute perils. However:
  - Nat Cat insurance is never a standalone product; it is always included in insurance policies that cover other property damage risks.
  - The increase in the Nat Cat surcharge from 12% to 20%, adopted in December 2023 and effective January 2025, has not been considered in this ACPR exercise.

Figure 12: Nat Cat technical result in % of premiums, without reinsurance (adverse scenario)

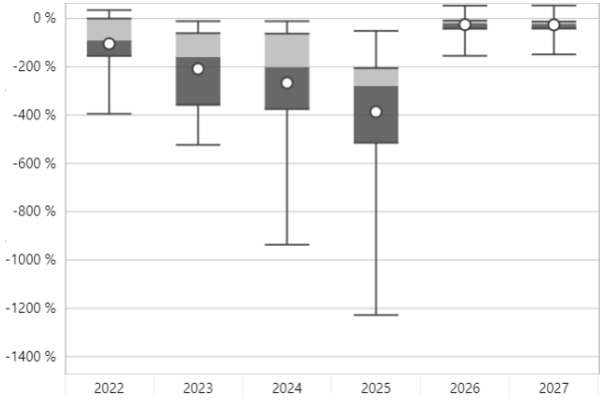


Figure 13: Nat Cat technical result in % of premiums, with reinsurance (adverse scenario)

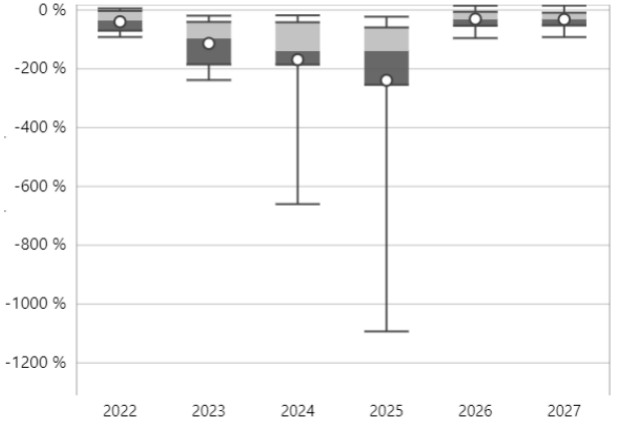
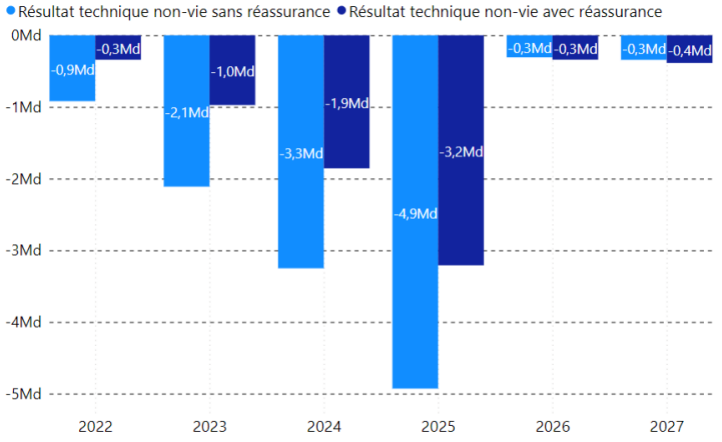


Figure 14: Nat Cat technical result with and without reinsurance (adverse scenario)



Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- In the adverse scenario, the technical result in 2050 represents -35% of premiums without reinsurance and -20% with reinsurance.
- Although reinsurance allows insurers to transfer some risks to reinsurers, it remains insufficient to offset the excess claims caused by acute perils. However:
  - Nat Cat insurance is never a standalone product; it is always included in insurance policies that cover other property damage risks.
  - The increase in the Nat Cat surcharge from 12% to 20%, adopted in December 2023 and effective January 2025, has not been considered in this ACPR exercise.

Figure 15: Nat Cat technical result in % of premiums, without reinsurance (adverse scenario)

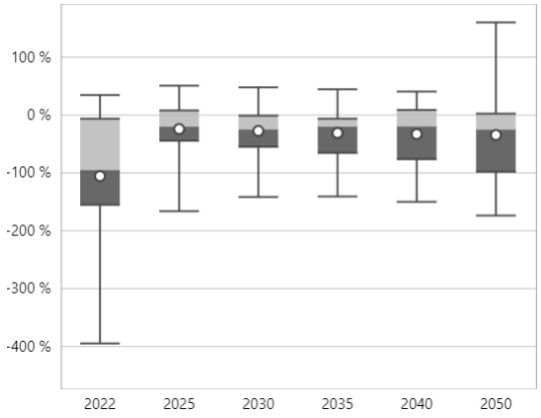


Figure 16: Nat Cat technical result in % of premiums, with reinsurance (adverse scenario)

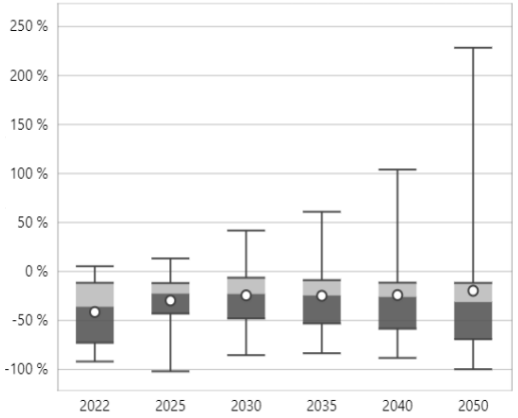
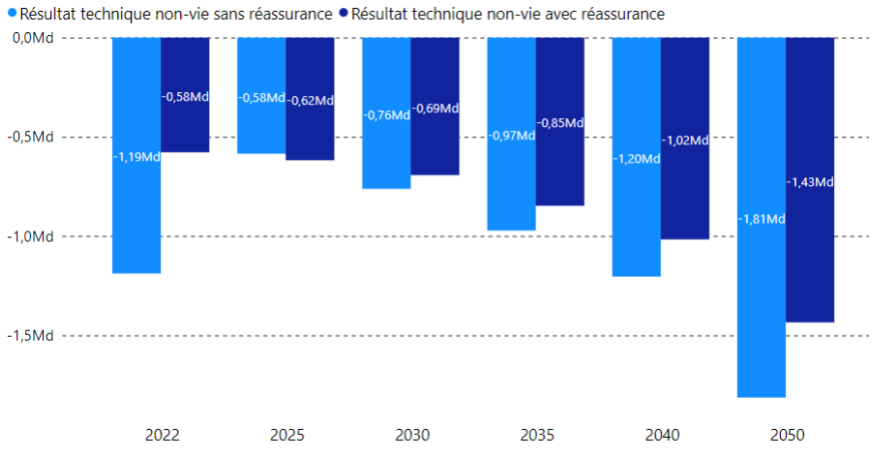


Figure 17: Nat Cat technical result with and without reinsurance (adverse scenario)



Source: Les principaux résultats de l'exercice climatique sur le secteur de l'assurance, APCR 2024

- Regarding the scenarios used, the Delayed Transition scenario is still not sufficient to generate strategic changes or adequate awareness, leading to a potential underestimation of the impacts of climate change on financial stability.
- Additionally, some insurers have noted that the significant difference between the stress tests time horizon (2050) and their usual business planning horizon (3-5 years) constitutes a challenge for effectively integrating climate risks into their decision-making processes. This disparity affects certain methodological choices and the few management decisions considered in the projections.
- Participants in the exercise also believe they will not face any specific difficulty in accessing reinsurance in 2025. Therefore, the question of risk transfer remains to be explored.
- Supervisors and insurers must continue to improve the methodology and granularity of their analyses.
- Despite these challenges, climate stress tests are a valuable tool for assessing the financial system resilience to climate risks.

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