# Overview of EIOPA sensitivity analysis of climate-change related transition risks

Referring to: Sensitivity analysis of climate-change related transition risks


## Summary

EIOPA has undertaken an analysis of the climate-related transition risks in EU insurer's portfolios. This purpose of the exercise was to inform future climate-related work, including future EU-wide stress testing exercises.

The analysis is based on a two-stage process:

1. EIOPA maps individual holdings of corporate bonds and equity to issuers operating in the following sectors:
   - fossil fuel extraction industries
   - carbon-intensive industries
   - vehicle production
   - power

   EIOPA considers that these investments are exposed to transition risks and therefore attempts to quantify these risks under a scenario where there is an abrupt and unforeseen policy shock to reach alignment with the Paris agreement (i.e. aligning CO2 emissions with a 2 degree scenario).

   The analysis is complemented by an analysis of the transition risks to sovereign bonds using a climate scenario model which is considered consistent to that employed for equities and corporate bonds.

2. EIOPA runs a "price-sensitivity assessment" to investigate the effects of price adjustments to the equity and corporate bonds that have been identified as climate-policy relevant (ie those which operate in the sectors outlined above). This aims to quantify potential price and balance sheet sensitivities to "what-if" scenarios where the economies are required to re-align and dramatically reduce the CO2 footprint. A similar assessment is made for sovereign bonds.

   To carry out this sensitivity analysis, EIOPA uses a model that links carbon intensity in a quantifiable way to a transition scenario. In particular, the implementation of the scenario relies on a model/view on how the production, profit or value-added will change in each sector as well as a model or methodology to consider how this shift will affect market prices of the assets.

In terms of main findings, the top-down exercise reveals:

- Exposures to climate-change transition risks are muted (EIOPA describe them as "manageable") due to the limited size of allocations to assets which are exposed to transition risk.
- Only 5.4% of equity, corporate bonds and collective investment fund holdings were identified as being climate-related technologies. This equates to 3% of the total portfolio value (ie including all other asset classes).
- The expected losses from the aggregate asset portfolios, under the scenario, are:
  - -0.3% for non-unit linked portfolios
  - -0.7% for unit-linked portfolios
- At a more granular level,
  - Potentially high losses on equity investments in the high-carbon sector (over 25% on average), driven by investments in fossil fuel extraction and in the production of cars with combustion engines.

- smaller losses on the corporate bond portfolio than those for equities, but for the coal power sector a larger share of losses for corporate bonds than for equities.
- an overall balanced impact on the balance sheets of the insurance sector thanks to the counterbalancing effect of investments in renewable energy and a small share of high-carbon investments by European insurers.

EIOPA states that the chosen scenarios and methodology should not be seen as final and appears aware of the limitations on the study as methodology and availability of data are under progress. Limitations to the assessment include the following:

- the results are based on a subset of the portfolio of European insurers.
- data limitations which did not allow to fully account for the impacts to all sectors, eg agriculture and real estate sectors are not considered, as well as provide robust calibrations of price adjustments.
- The effects of macroeconomic shocks and physical risks are not included. Likewise, second round effects are not in scope of the exercise.

## Detailed overview

### Risks related to climate change

Insurers may be exposed to transition risks on the asset side through the holdings of corporate bonds and equity of private companies, but also through holdings of governments bonds which are directly related to the carbon intensity of the economy as a whole.

The asset side is also exposed to physical risks from climate change. Such risks concern longer term shifts in the climate that are generally expected to affect the frequency and intensity of weather events such as heatwaves, floods, wildfires and storms. These events may bring about valuation changes. Physical risk can also affect the liability side with pricing and revenue implications.

### Assessing asset-side transition risks in the portfolio of insurers

**EIOPA maps holdings to carbon intensity in climate-policy relevant sectors, firms and technologies in order to assess insurers' exposures to climate-relevant transition risks in their investment portfolios.**

Given the challenge to get a consistent overview of a full portfolio which may contain thousands of individual investments and ISINs (even with the growing availability of services by data providers), EIOPA considers NACE sector classifications for assets as well as assessment of individual firms and the emission intensity in their value-generation (scope 1, 2 and 3 emissions). **Its approach assesses individual firms and their activities/technology separately, then this is linked to the physical production carried out by the specific companies.**

### Holdings mapped to issuers by sector

The first part of the analysis includes mapping each security to its issuer, its ultimate parent (i.e. the final owner) and the key sectors of operation. EIOPA assessed about 2.3 trillion in corporate bond and equity holdings excluding UK (or 3.4 trillion incl. UK), out of which about 350 bn euro of these were identified to be in climate policy relevant sectors (539 if UK is included). This represents:

- 3.1% (4.8% incl. UK) of total investments (incl. all asset classes)
- 8.3% (9.3% incl. UK) of all relevant corporate bonds, equity and funds investments.

The parts that have been classified as non-climate policy relevant in this context are mainly investments in financials, public administration or property. For a large share of assets with a sector identification, it is possible to further identify the technologies used in production: using the data available in PACTA, EIOPA identified the

technology used for investments worth around 227 billion euro (344 billion euro if UK is included), which represents about 3% of total investments (incl. all asset classes).

For corporate bonds holdings:

- **Common corporate bonds (plain-vanilla), convertible bonds, hybrid bonds and subordinated bonds were considered.** These cover about ¾ of all assets classified as corporate bonds in the insurance portfolio. Covered bonds and money market instruments were excluded from the analysis. For this analysis, this means that corporate bonds holdings in the EEA excl. UK for about 1.2 trillion euros have been considered (1.45 trillion euros if UK is included).
- **Using the PACTA service coverage of *listed* bonds and equity, EIOPA achieves an overall mapping share of 86% of corporate bonds.** The main reason why an asset was not mapped, is the fact that it is not listed. The mapping was lower for non-life undertakings compared to life because non-life undertakings tend to have a larger share of non-listed corporate bonds on their portfolio.
- **For all the corporate bonds that were mapped, EIOPA managed to assign to them either a climate-policy relevant sector, or to define them as not immediately climate-policy relevant in the context of PACTA.** For corporate bonds, the difference between the unit-linked and non-unit-linked portfolios is relatively minor.

For equity holdings:

- **The overall mapping share of the equity holdings to assets covered in the PACTA service is about 1/3 of the equity holdings being matched.** A key reason for this low share is attributed to the fact that a large part of common and preferred equity holdings are participations or holdings in related undertakings. These holdings are generally in other insurance undertakings and not in PACTA sectors. Excluding these participations, only 2% of the equity holdings remain unmapped.
- **In total, equity holdings of 278 billion euro were mapped**. Overall, EIOPA considers the coverage for equity holdings as high because of the large share of participations, which is not likely to be in climate-policy relevant sectors. In terms of sector breakdown, there is not a clear visible difference between the unit-linked and non-unit-linked portfolio.

For holdings through collective investment undertakings (indirect holdings through funds):

- **Using the data available via the PACTA service, EIOPA identified a total of 871 billion euro**, amounting to 44% of the underlying assets in these fund holdings (collective investment undertakings). While the share is below 50%, EIOPA notes that there is almost no information available about the assets in a fund regularly reported to the supervisor.
- **On an EEA level, the holdings in climate-policy relevant sector is about 6% of the mapped investments**, a figure which is comparable to direct equity and corporate bond investments.

For holdings of government bonds:

- EIOPA recognises that the value of government bonds is also likely to react to changes in the economic activities, eg from the energy transition, but argues that the transmission mechanism is different and less direct than for equity and corporate bonds. EIOPA attempts to assess the impact on these holdings by using the value that insurers report under Solvency II for their holdings of government bonds.

### Sensitivity to valuation changes

- Drawing on existing literature related to asset-side transition risks, **EIOPA considers a late and sudden policy scenario where delayed policy action is taken to move the economy to a path line with the Paris agreement** to limit global warming compared to pre-industrial levels. The policy change takes the form of an increase in carbon price per ton by the end of the decade so that carbon concentration is limited to around 450-500 ppm.
- **Because the policy is late to be enacted and emission reduction is only gradually achievable, the economy is expected to re-align by changing production and output** in the sectors considered

in the report. This response will have to be "stronger" to make up for the CO2 emitted before the policy was enacted (a "delayed" policy action).

- **EIOPA considers that this policy shock would have an impact on market prices that is not currently anticipated**. This is because, as pointed out by the European Systemic Risk Board (ESRB, 2020) and other research papers, climate risk does not appear to be fully reflected in asset prices so far.
- **For equity and corporate bond holdings, the main scenario is implemented by assuming that the production shock is a function of the difference in capacity between the "late and sudden transition" and either the "2 degree scenario"** (referred to as SDS, ie the Sustainable Development Scenario by the International Energy Agency's (IEA)) or the B2DS scenario (IEA "Beyond 2 degrees" scenario). Asset price changes are assumed to be a function of the required change in production and the misalignment with the scenario. **The resulting alignment in production is translated to shocks to the assets as an instantaneous shock** under the assumption that the portfolio of the insurers remains constant and that the shock is not already priced in.

Equity prices

- *For assets with detailed production data,* the projections of implicit production in the insurance portfolio have been mapped to the trajectories described by the IEA's output from their models for SDS (and B2DS) scenarios. Based on the PACTA tool, EIOPA calculates production levels consistent with the IEA scenarios (for the following sectors: Power, Oil&Gas, Coal and Automotive).
- The energy transition required by the policy shock will impact companies' revenues and expenses. Using standard valuation, EIOPA estimates net profits and the net present values of the technology under the two scenarios.
- The difference between what is currently projected and what would have to be required under the IEA SDS or B2DS scenarios forms the basis of understanding how much production would have to be cut (or increased) given a policy shock. This represents the equity value put at risk by the transition, ie the price change for each of the identified technologies.
- *For identified technologies that could not be modelled* (ie Aviation, Cement and Steel sectors), EIOPA relied on the price sensitivities employed by the Prudential Regulation Authority (PRA) in their 2019 stress test. EIOPA notes that, since the volume of investments in these sectors are relatively small, the impact of minor adjustments to these factors would not be material at relevant levels of aggregation used in this report.
- **The estimated price adjustments employed for equity using the approach described above shows that the effect of the supplementary scenario is mainly visible for the key high-carbon technologies, with production of ICE vehicles and coal and oil extraction in particular.** The effects on renewable power and coal power were smaller and is a result of the output of the IEA scenarios on which the scenario is based.

Corporate bonds

- **The changes in net profit stemming from the production change also means that the probability of default (or credit ratings) could change**, and it may be more difficult to raise money in high-carbon sectors. Given the difficulty to modelling the probability of defaults, the EIOPA approach therefore follows the Prudential Regulation Authority (2019) at the Bank of England.
- **EIOPA considers the impact on corporate bonds by applying a flat multiplier of 15% compared to the impact on equities** (so that the impact on corporate bonds equals 0.15 times the impact on equities). While EIOPA acknowledges that this is a simplification, it notes that this reflects the lack of an available model to more accurately capture the more complex impact on corporate bonds. The factor 15% was decided based on conversations with market participants.

Government bonds

- For government bonds, EIOPA considers a climate scenario where emissions concentration targets are set to ensure a reasonable likelihood of meeting a two-degree outcome. In this respect, it replicates the work presented in its December 2019 Financial Stability Report, which prices forward-looking climate transition risks in the value of individual sovereign bonds.
- In a disorderly transition, the climate policy shock affects the performance of issuers in each sector via a change in economic activities' market share, cash flows and profitability. This affects the sectors gross value added (GVA) in the economy and in turn the probability of default for sovereigns. Because the role of fossil fuels and renewable energy technologies in the sovereign's GVA and fiscal revenues can considerably affect the fiscal and financial position of a country, countries that have already started to align their economy to the low-carbon transition would face more favourable financing conditions.
- **EIOPA calibrates a set of shocks per issuer of government bonds and computes the weighted average price adjustments by country of holder**.

## Results

- Taken at face value, equity holdings vulnerable in the type of "what-if" scenario assessed in this report may be quite sensitive to the transition and lose more than 25% of their value. The impact on bonds are lower as it is assumed that profitability declines are likely to impact equity prices first. However, in terms of overall impact, the insurance sector also stands to potentially gain from the transition through investments in renewable power generation (and somewhat in electric/hybrid vehicle production).
- Overall, therefore, while high-carbon assets – especially equities –may experience substantial losses, the overall impact on assets in climate-relevant sectors may be somewhat smaller when accounting for gains, eg in renewable energy investments. In this context, however, it is key to bear in mind that the price adjustment for renewable power generation assumes that capacity can be built sufficiently fast.
- In terms of the impact in individual countries, there is a clear tendency that countries with a high share of high carbon vis a vis to low carbon production tend to have a larger negative impact. Moreover, it appears that smaller insurers have a somewhat higher "high-carbon" to "low-carbon" ratio, due to the detailed asset holdings and the price shocks.
- Overall, these findings indicate that losses on individual assets and especially high carbon asset classes can be substantial in terms of percentage change. However, the impact on the aggregate portfolio is likely to be much smaller, because the holdings in key climate-policy relevant sectors considered here are small compared to the overall portfolio. The overall impact for EEA insurers is less than 0.5% in the non-unit-linked portfolio, and about 0.7% in the unit-linked portfolio.
- EIOPA compares the losses (or gains) of the non-unit-linked assets to the value of excess of assets over liabilities for each of the country included in this analysis. The losses include the price changes for government bonds, which explains why all countries in this figure report overall losses. The losses on non-unit-linked business alone would represent between 0.1% and up to 2.1% of the excess of assets over liabilities.

## Conclusion

- The results presented in this report clearly identify and quantify potential climate-change related transition risks in the investment portfolio of European insurers. While the exposures are manageable compared to the overall holdings because insurers generally hold relatively well-diversified portfolios, it is still clear that these investments may expose the insurance sector to transition risks.
- The results in this report show that losses on equity investments in the high-carbon sector can be high, reaching up to 25% on average for these particular equity holdings (before accounting for any counterbalancing investments in e.g. renewable energy).
- The overall impact on the balance sheets of the insurance sector is counter-balanced both by investments in renewable energy and the fact that the high-carbon investments considered here account for a small part of the total investments of European insurers. Losses on bonds are also lower than those on equities.

- Naturally, as this is a first exercise carried out at this level on a top-down basis (using only data already available), there are a number of caveats that should be noted (see summary section for a list).
- Impacts of climate-change will clearly have transformative power in the 21st century. This report considers part of the challenges faced by European insurers in this context, namely asset-side transition risks. The overall impact of changes in climate on the insurance business in general, and even the insurability of certain risks is equally important.