

Bank of England

Climate Biennial Exploratory Scenario (CBES)

Dele Adeleye

Head of Division, UK Deposit Takers Supervision

Stefan Claus

Technical Head of Division, Insurance Analytics

Geneviève Monclin-Evans

Manager, Insurance Supervision

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Headline messages

- Climate change, and the transition to net zero create risks for businesses and households globally, and so for the financial system.
- Climate risks captured in the CBES scenarios are likely to create a drag on the profitability of UK banks and insurers. Overall costs will be lowest with early, well-managed action to reduce greenhouse gas emissions and so limit climate change.
- Some climate costs that initially fall on banks and insurers may ultimately be passed on to their customers. In particular, in the No Additional Action scenario, households and businesses vulnerable to physical risks would be especially hard hit.
- Governments set public climate policy, which will be a key determinant of the speed and shape of the transition in the global economy. Banks and insurers have a collective interest in managing climate-related financial risks in a way that supports that transition over time.
- Projections of climate losses are uncertain; scenario analysis is still in its infancy and there are several notable data gaps. But the CBES has already helped drive improvements in these areas.
- The Bank will continue to work on this important topic, including by disseminating best practices around climate risk management and supporting data initiatives.

Climate Biennial Exploratory Scenario Objectives

The CBES complements the **Bank's objectives and the aims of its policy committees** to protect and enhance the stability of the UK financial system, including the PRA's **supervisory expectations** for how banks and insurers should enhance their approaches to managing the financial risks from climate change.



Assess and promote improvement of participants' **climate risk management capabilities**.



Size the financial exposures of participating firms and the financial system more broadly to climate-related risks.



Understand the challenges to participants' business models from these risks, gauge their likely responses and the implications this carries for the provision of financial services.

The stylised scenarios used in this exercise are illustrations of possible paths for climate policy and global warming, not forecasts

Key: ● Limited ● Medium ● High	Early Action	Late Action	No Additional Action
Transition to net zero begins in	2021	2031	n.a
Nature of transition	Early and orderly	Late and disorderly	Only policies that were in place before 2021
Physical risks	● Limited	● Limited	● High
Impact on output	● Temporarily lower growth	● Sudden contraction (recession)	● Permanently lower growth and higher uncertainty
Average annual output growth in the UK	● Year 6—10 1.4% ● Year 11—15 1.5% ● Year 26—30 1.6%	● Year 6—10 1.5% ● Year 11—15 0.1% ● Year 26—30 1.6%	● Year 6—10 1.4% ● Year 11—15 1.4% ● Year 26—30 1.2%

There are several features that make the CBES distinct from other climate stress tests

- **Wider scope and participation** – covering both banks and insurers which is uncommon.
- **Separate exploration of loss impacts vs participants' strategic responses.**
- Exercise was designed to **improve participants' risk management** and build on their climate risk modelling capabilities, including by requiring participants to **model their risks in a bottom-up way.**
- A **second round of submissions** focussing exclusively on exploring in greater depth banks' and insurers' strategic responses to climate risks.
- Included a novel exercise exploring **insurers' risks from climate-related litigation.**
- **NAA scenario is based on physical risks that may be expected to materialise in the period from 2050 to 2080** if no further policy action were taken, allowing us to explore a severe worsening of physical risks in the exercise.

Assessing firms' Risk Management capabilities

- UK banks and insurers are making **good progress in some aspects of their climate risk management, but still need to do much more** to understand their exposure to climate risks.
- **Data gaps are a common problem, and means climate risks are only being partially measured. Examples include:**
 - Information on corporate emissions across value chains
 - Geographical location of corporate assets
 - Up to date energy efficiency (EPC) ratings
- **Most firms were reliant on third party model providers**, and so need to improve their ability to scrutinise and adapt these models, or develop in-house modelling.

Box B: Observed examples of good practice in assessing climate risks

Examples of good practice – bank corporate lending

General capabilities to develop

- Able to assess corporate loan books at sectoral and geographic level
- Able to assess vulnerability of corporate counterparties to transition risk, including carbon prices
- Able to assess counterparty's transition plans
- Understand counterparties' vulnerabilities to physical risks

Observed examples of good practice

- Modelling of sectors to reflect sector-specific features
- Factoring in wider market dynamics when assessing impact of transition costs on counterparties
- Thorough outreach with counterparties to assess climate vulnerabilities and transition plans
- Considering a wide range of acute and chronic physical risks

Examples of good practice – bank retail lending – transition risk

General capabilities to develop

- Understand the costs of retro-fitting
- Understand interactions with energy prices
- Understand how these factors would impact property prices and borrowers' ability to repay loans.

Observed examples of good practice

- Considering transition risk impacts on property prices and borrower income
- Addressing gaps in EPC data using information on comparable properties

Examples of good practice – bank retail lending – physical risk

General capabilities to develop

- Consider impacts on property price, and secondary impacts (eg insurance, remediation costs)
- Able to review estimates of physical risk vulnerability
- Consider mitigation strategies eg flood defences

Observed examples of good practice

- Capturing impacts at a granular level (eg individual property)
- Considered how a variety of factors would impact both probability of default and losses given default
- Had clear plans for development of physical risk modelling

Examples of good practice – insurance investments

General capabilities to develop

- Improve data capabilities: e.g. lack of geographic location data to establish physical risks, and lack of standardised information on the value chain emissions
- Improve modelling capabilities: consideration of corporate leverage on the value of the financial asset
- Clarity on road-map for developing risk models to incorporate climate risk factors, and how these will be delivered alongside other data improvement plans
- Embedding risk appetite

Observed examples of good practice

- Adjusting pricing models to account for the fact that expected future changes in physical or transition risks may affect market prices in the near-term, not just when they eventually materialise
- Using bespoke modelling approaches for sectors with specific climate vulnerabilities such as power, oil and gas, and transport

Examples of good practice – insurance liabilities

General capabilities to develop

- Improve model flexibility; specifically the ability to
 - incorporate a wider set of physical risk variables;
 - consider a range of future climatic conditions
- Improve knowledge capabilities to scrutinise and challenge third party models

Observed examples of good practice

- Modelling a wide range of physical perils, beyond those readily available from catastrophe models and using a range of tools to incorporate and expand the physical risk variables; for example, allowing for UK west coast storm surge losses and explicitly considering flood defences, and additional factors such as litigation, social inflation.
- Demonstrating validation and review of results – leveraging both academic research and alternative model outputs

Sizing participants' exposures

Additional cumulative climate losses over scenario (a) (b)



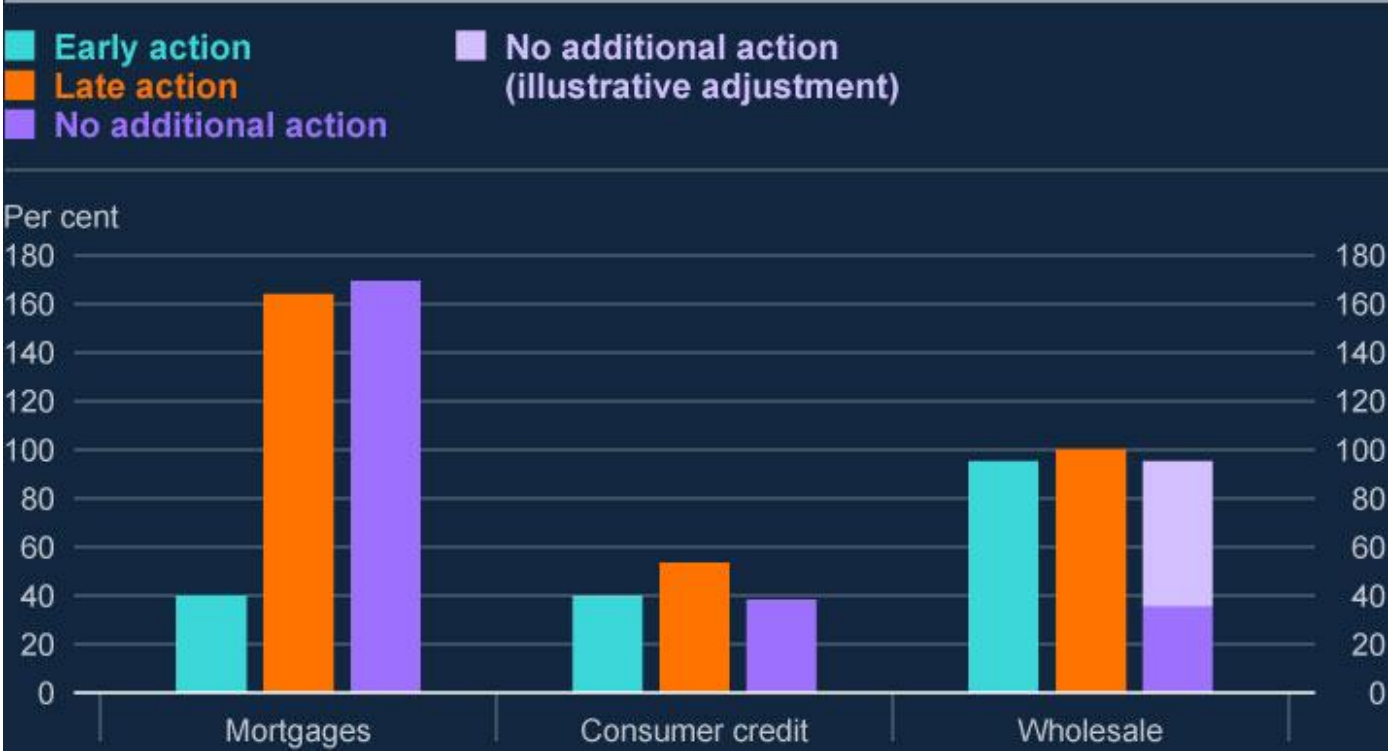
(a) Incremental additional losses compared with losses that would be expected to occur in a hypothetical counterfactual scenario in which there are no additional headwinds from climate risks.

(b) For banks, chart shows cumulative 30-year impairment losses on bank lending. For life insurers it shows additional investment losses at year 30. For general insurers it shows additional investment losses at year 30, plus the cumulative increase in average annual loss over 30 years relative to year zero.

- Overall climate losses associated with the No Additional Action scenario are the largest.
- For all participants, losses are lower in the Early Action vs the Late Action scenario.
- UK banks' and insurers' projections suggest they are likely be able to bear the costs of transition that fall on them. But not all channels are captured, and lot of uncertainty for those that have.

Sizing participants' exposures

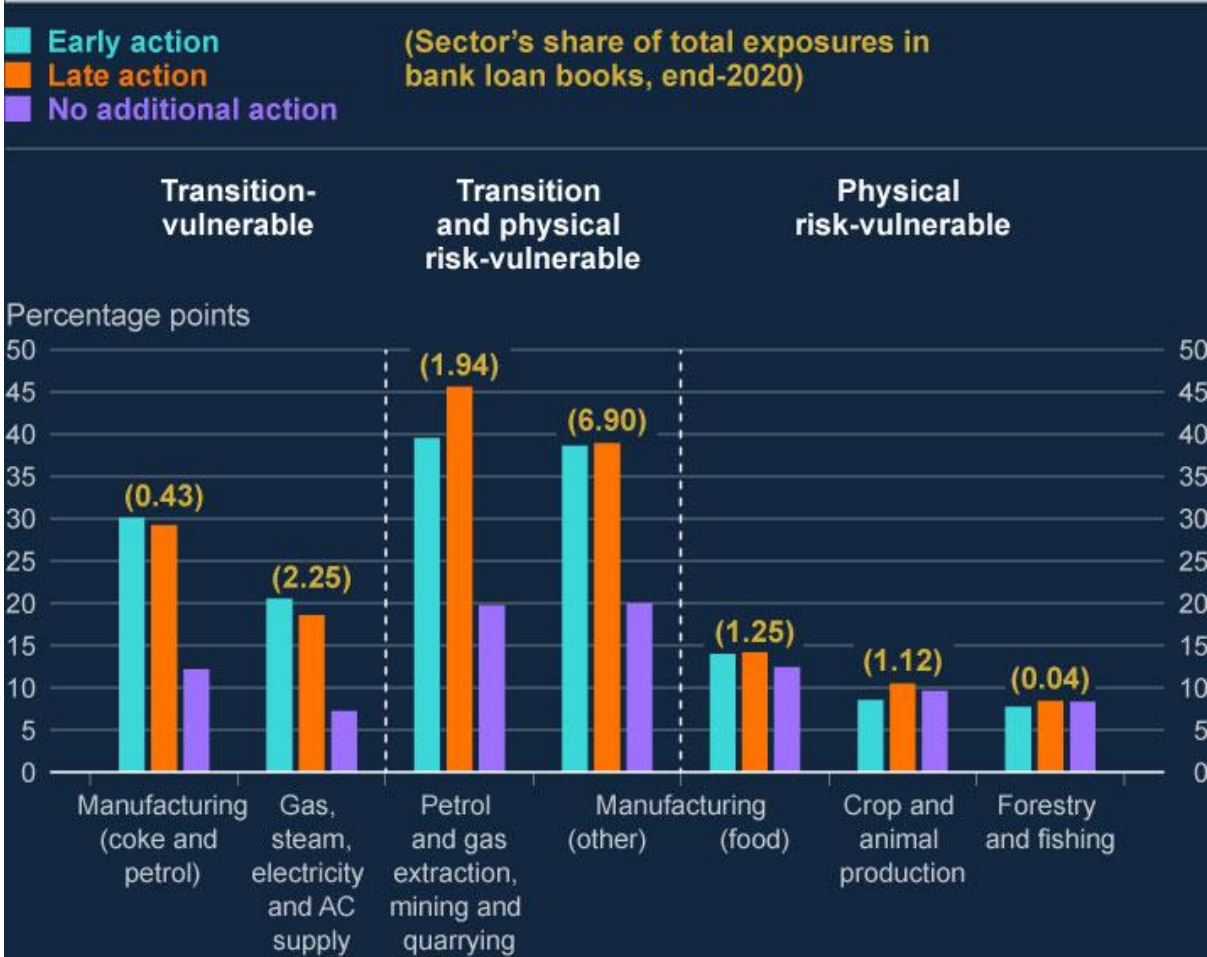
Banks' climate losses as a proportion of counterfactual losses (a) (b)



(a) Cumulative impairment losses on bank lending relative to estimated counterfactual losses based on a hypothetical scenario in which there are no additional headwinds from climate risks.
(b) The No Additional Action 'illustrative adjustment' is a Bank staff adjustment to participants' submitted projections. It accounts for gaps in the modelling of losses in this scenario acknowledged by participants.

Sizing participants' exposures

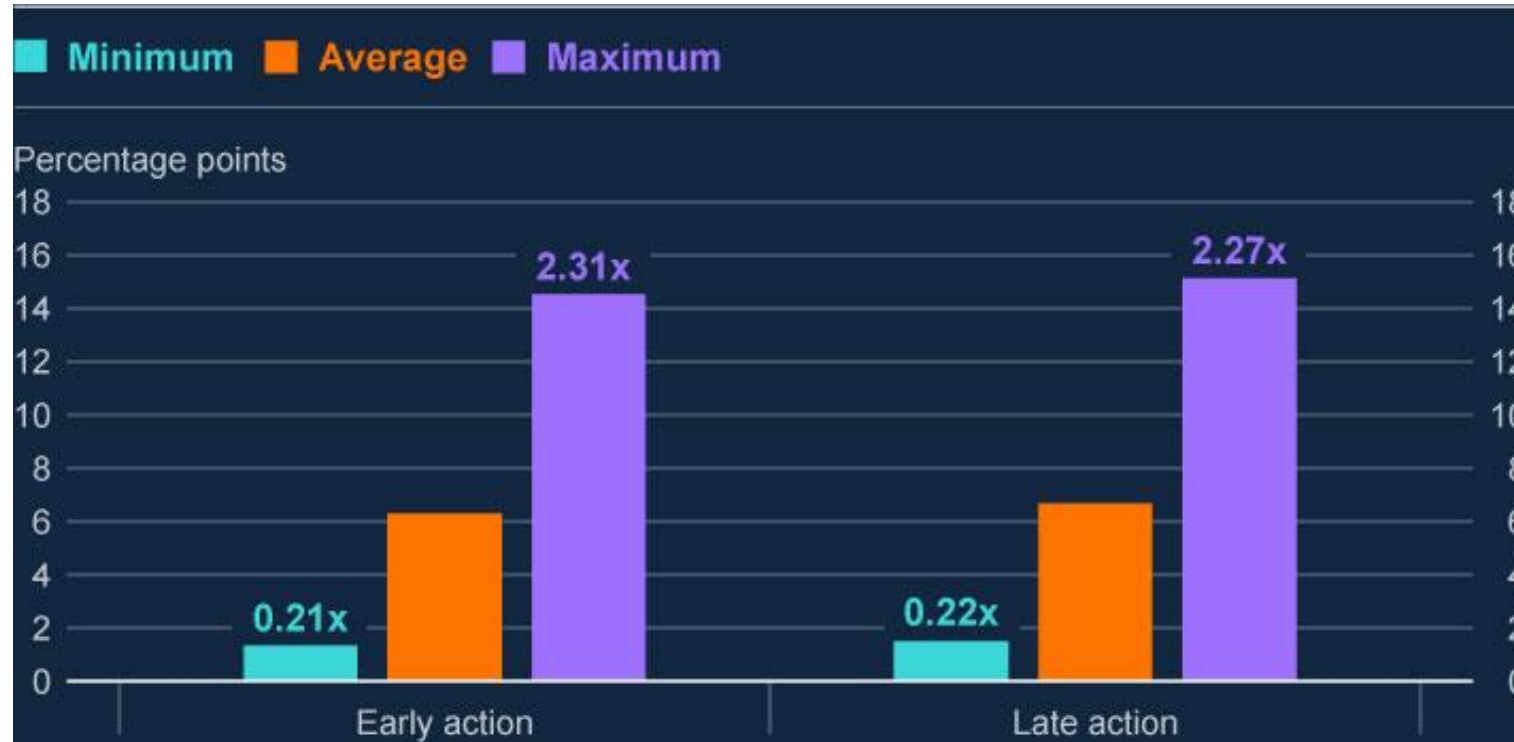
Percentage point changes in impairment rates for bank lending to more climate-vulnerable sectors (a)



(a) Cumulative thirty year impairment rate on bank lending to selected sectors over the CBES scenarios, minus year 0 impairment rate.

Sizing participants' exposures

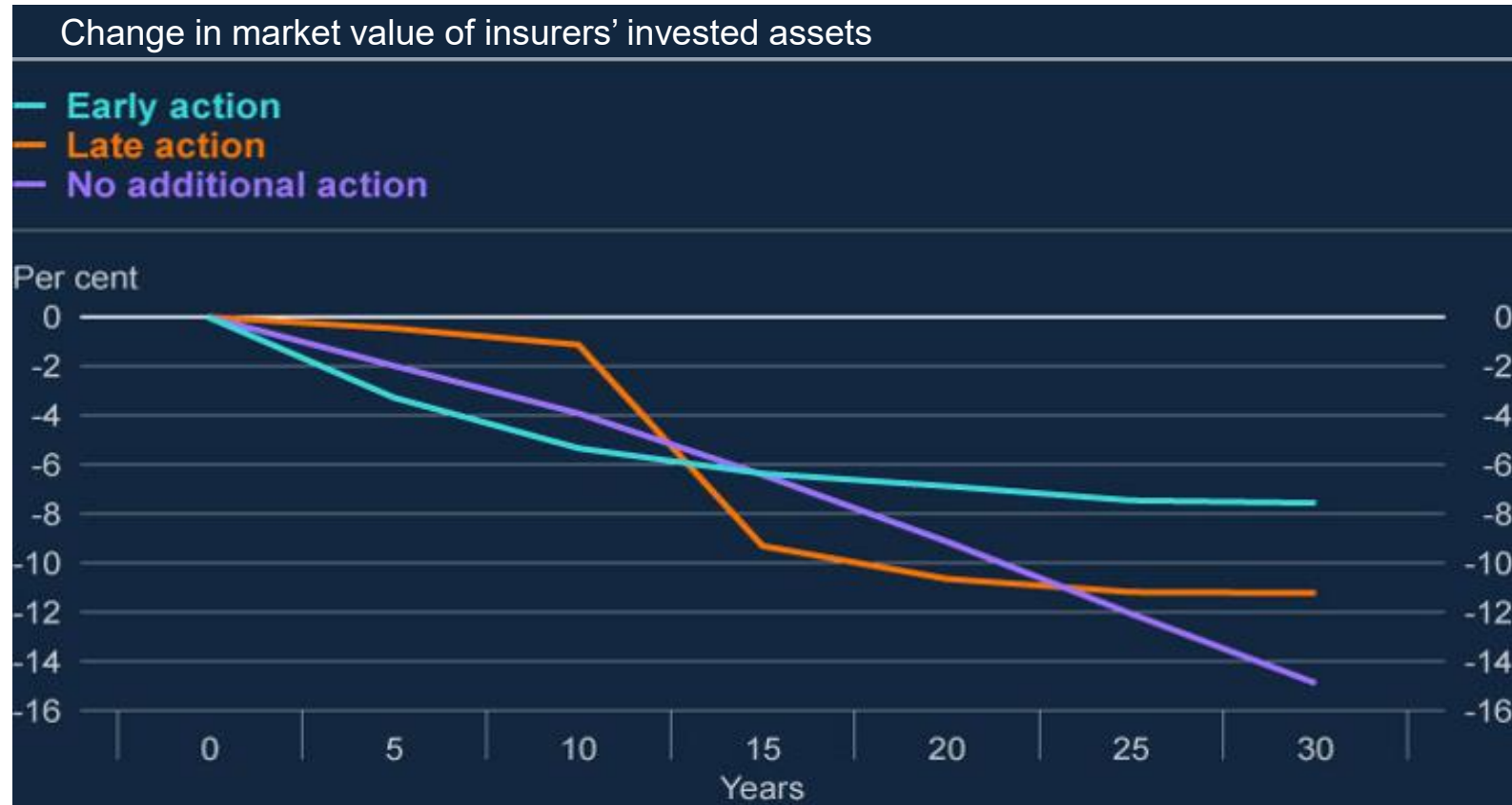
Change in impairment rate on banks' lending to shared corporate counterparties (a)



(a) Minimum and maximum bars constructed by applying respectively the minimum and maximum loss rates across firms' submissions for each counterparty to all firms' exposures to that counterparty.

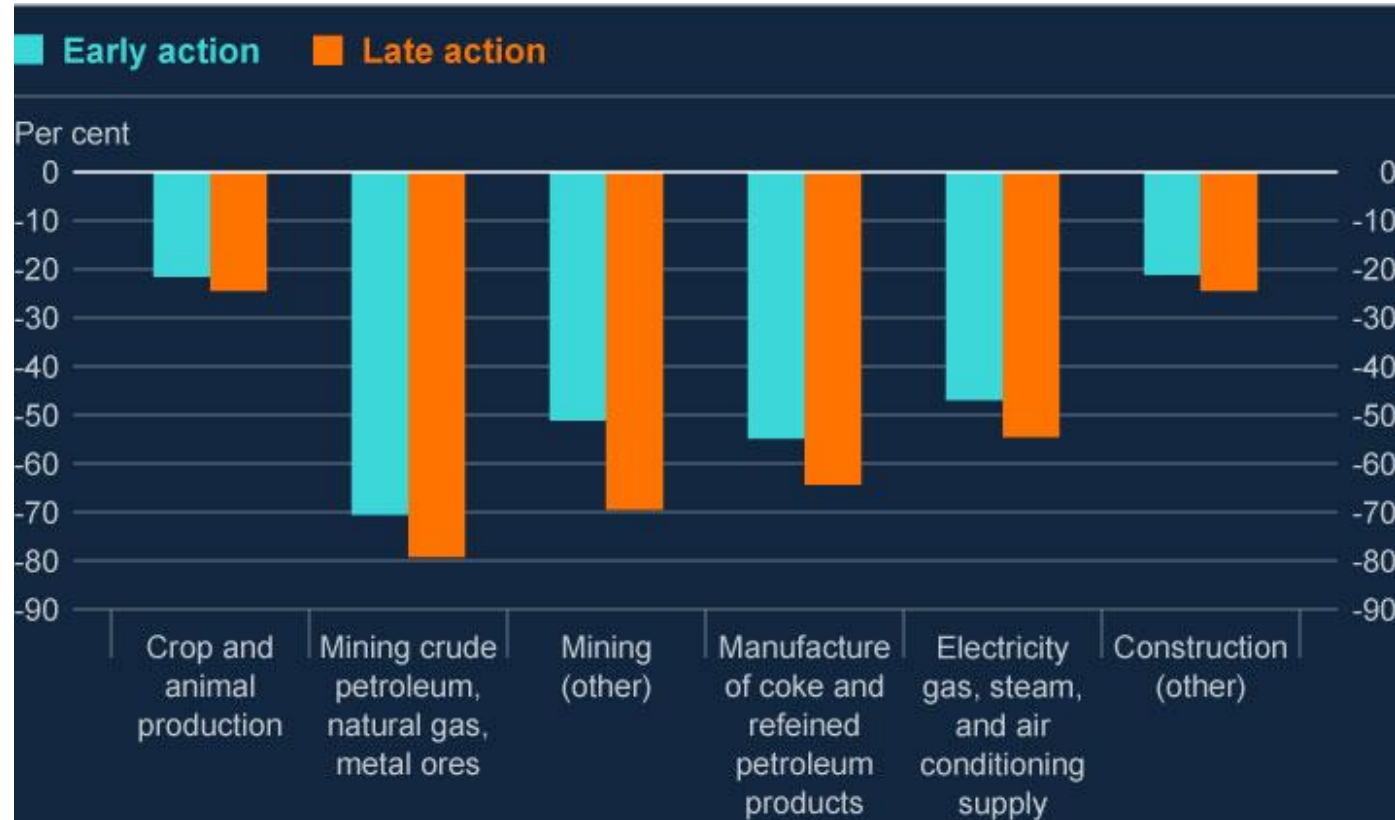
Sizing participants' exposures

For insurers, projected investment losses are largest in the NAA scenario



Sizing participants' exposures

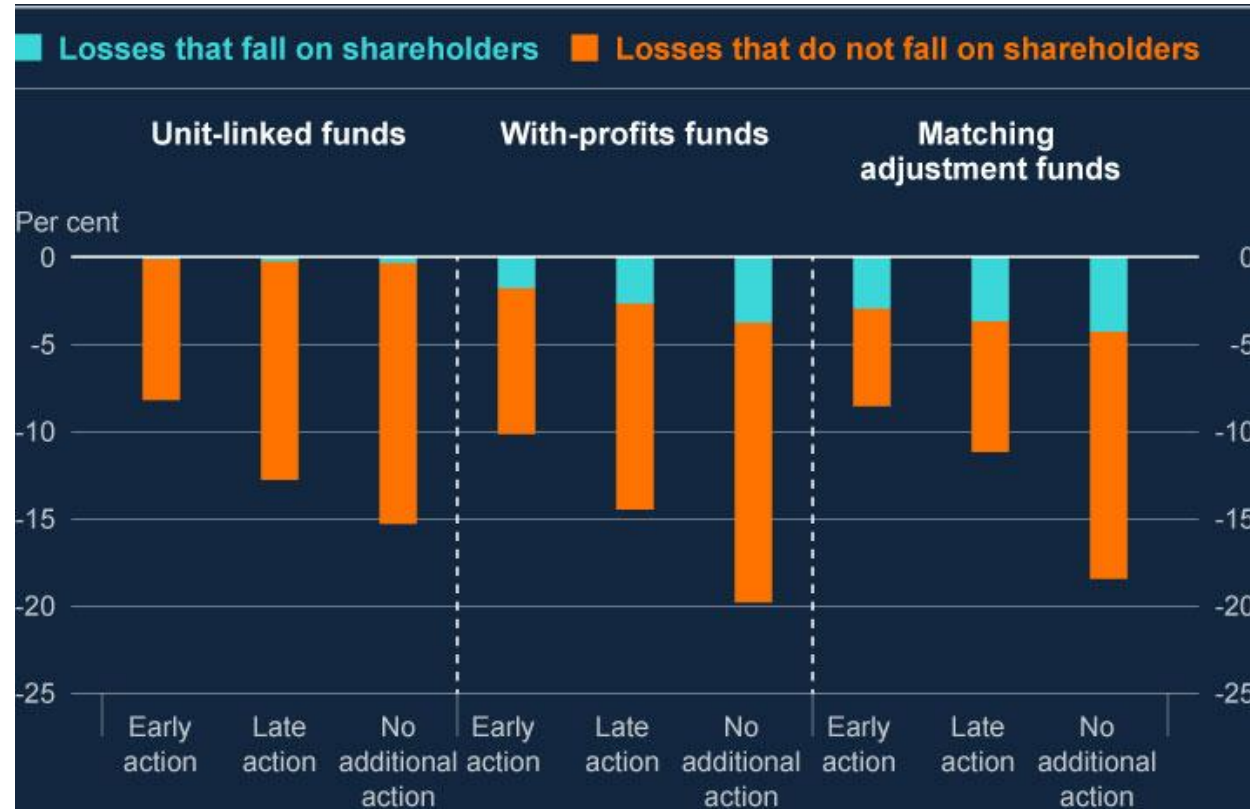
Insurers' equity Investment Losses at Year 30 (a)



(a) Chart shows sectors for which equity losses are highest in the early and late action scenarios.

Sizing participants' exposures

Proportion of life insurers' investment losses that fall on shareholders (a) (b)



- (a) Chart shows estimated fraction of losses which fall on insurers' shareholders for three types of insurance funds. In unit-linked funds the policyholder generally bears the risks associated with the underlying investments. With-profit funds are a type of 'pooled investment' fund. The risk from changes in the underlying investments is shared between policyholders, with support from shareholder funds.
- (b) The matching adjustment recognises that insurers who match certain long-term liabilities, such as annuities, with assets that they can hold to maturity, are not materially exposed to the risk of having to realise those assets in unfavourable market conditions. It permits those insurers to discount their liability cash flows at a higher rate than the basic risk-free rate, resulting in a lower liability value. Consequently, the matching adjustment is a mechanism to allow insurers to recognise upfront, as loss-absorbing capital resources, a proportion of the spread they hope to earn over the lifetime of their investments.

Sizing participants' exposures

Submitted and estimated investment loss ranges for life insurers in each scenario (a) (b)

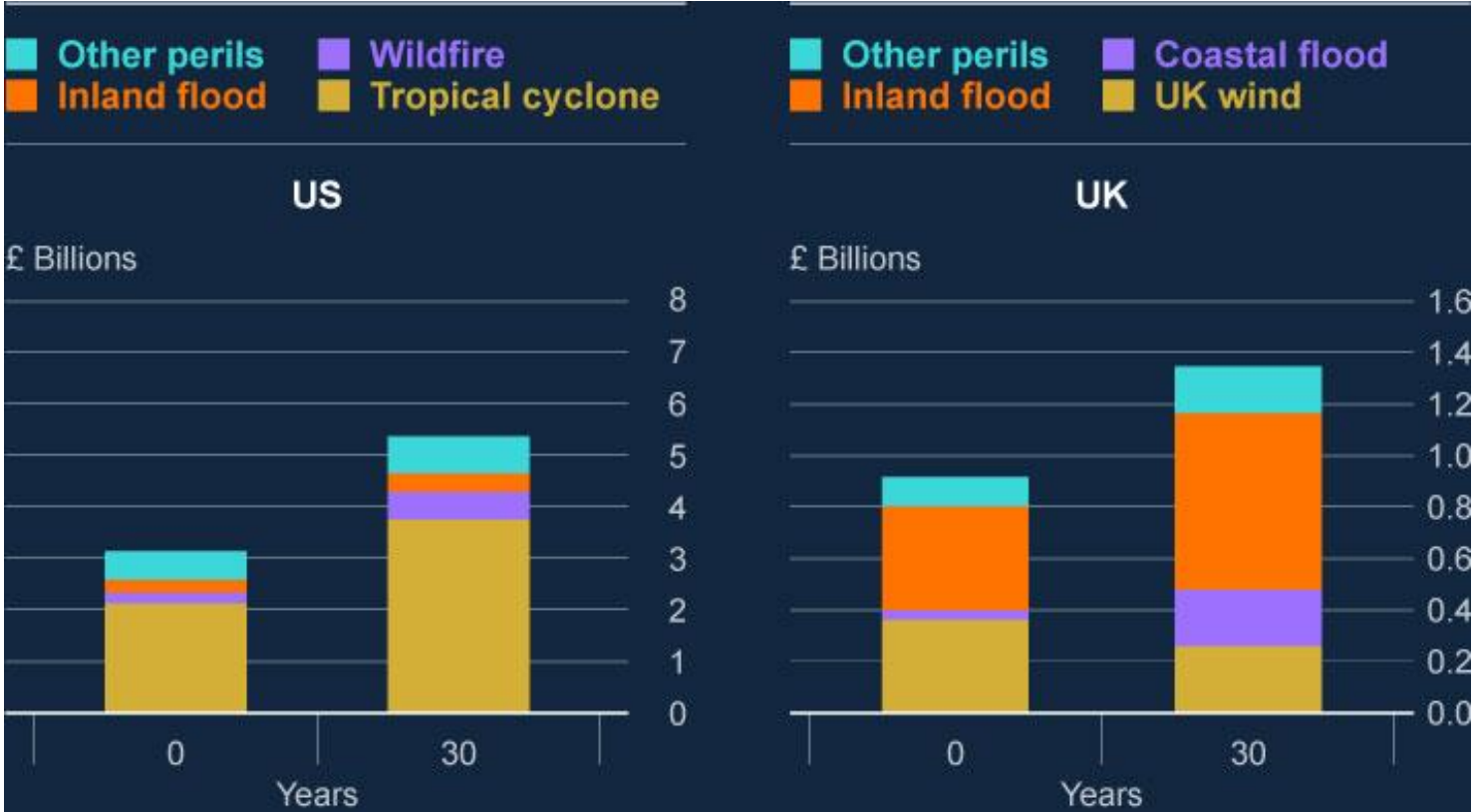


(a) Firms' projections: the range of submitted investment losses across individual life insurers.

(b) Staff estimates: the range of estimated investment losses across individual life insurers based on applying a common methodology to all firms, accounting for differences in asset types and the sectoral mix of exposures.

Sizing participants' exposures

Average annual losses on liabilities in the NAA scenario (a)



Climate-related litigation

Climate-related litigation cases over time (a) (b)



(a) Based on data from the Climate Change Laws of the World database, maintained by the Grantham Research Institute in partnership with the Sabin Center for Climate Change Law, and the US Climate Case Chart, maintained by the Sabin Center.
 (b) Due to difficulties in compiling global data on climate change litigation across jurisdictions and languages, these figures may be partially incomplete.

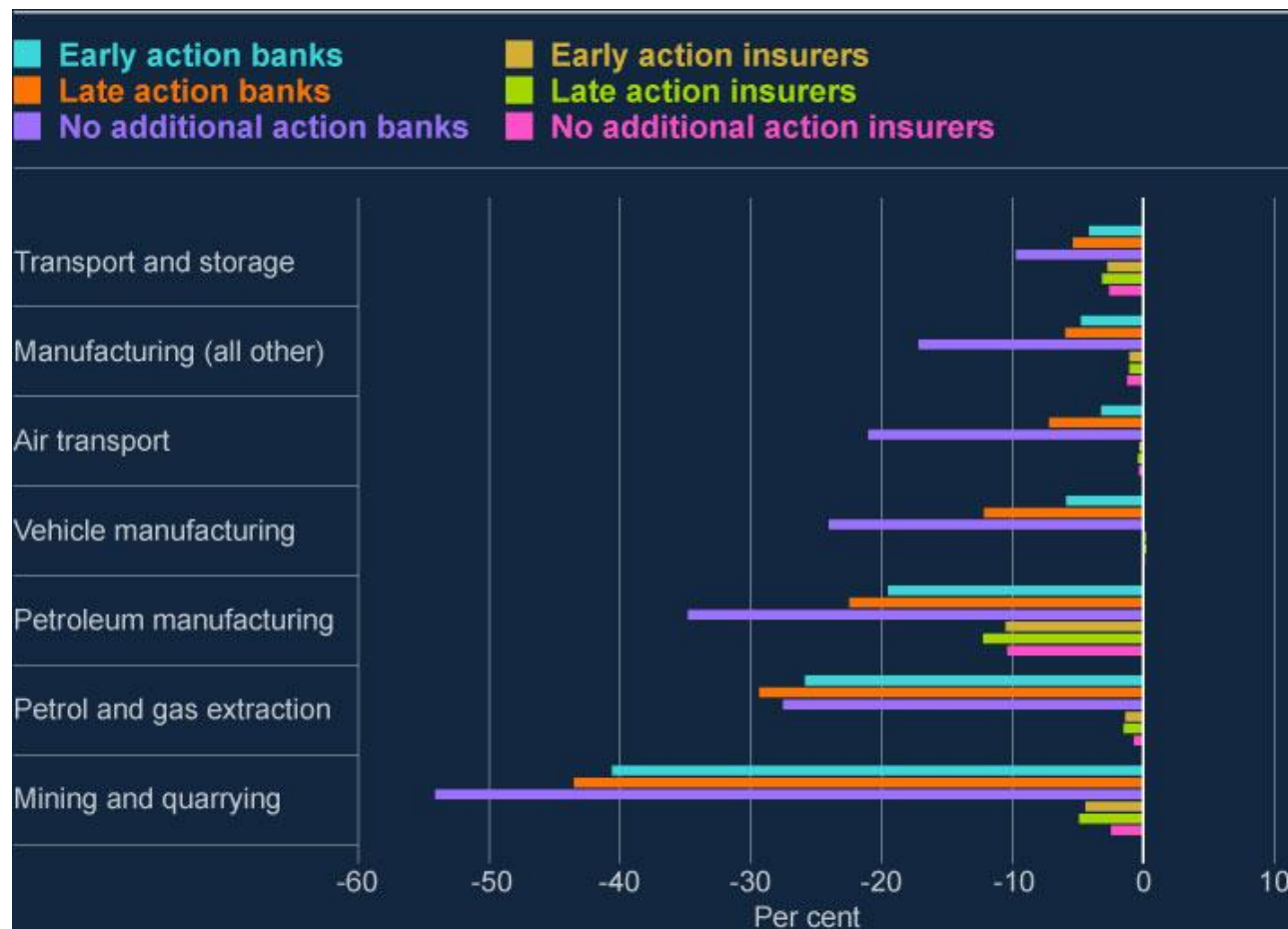
Estimated share of policies which may pay out in response if selected hypothetical legal cases were successful (a) (b)



(a) Data from ten participating general insurers. For seven hypothetical legal cases brought against their insureds, Insurers were asked what percentage of their directors & officers, professional indemnity, and general liability insurance policies would be likely to pay out in the event that these legal claims were successful. Table 1 provides an overview of the hypothetical legal cases.
 (b) General liability figures not shown as a smaller number of firms submitted figures for this category.

Responses – reducing exposures to climate intensive sectors

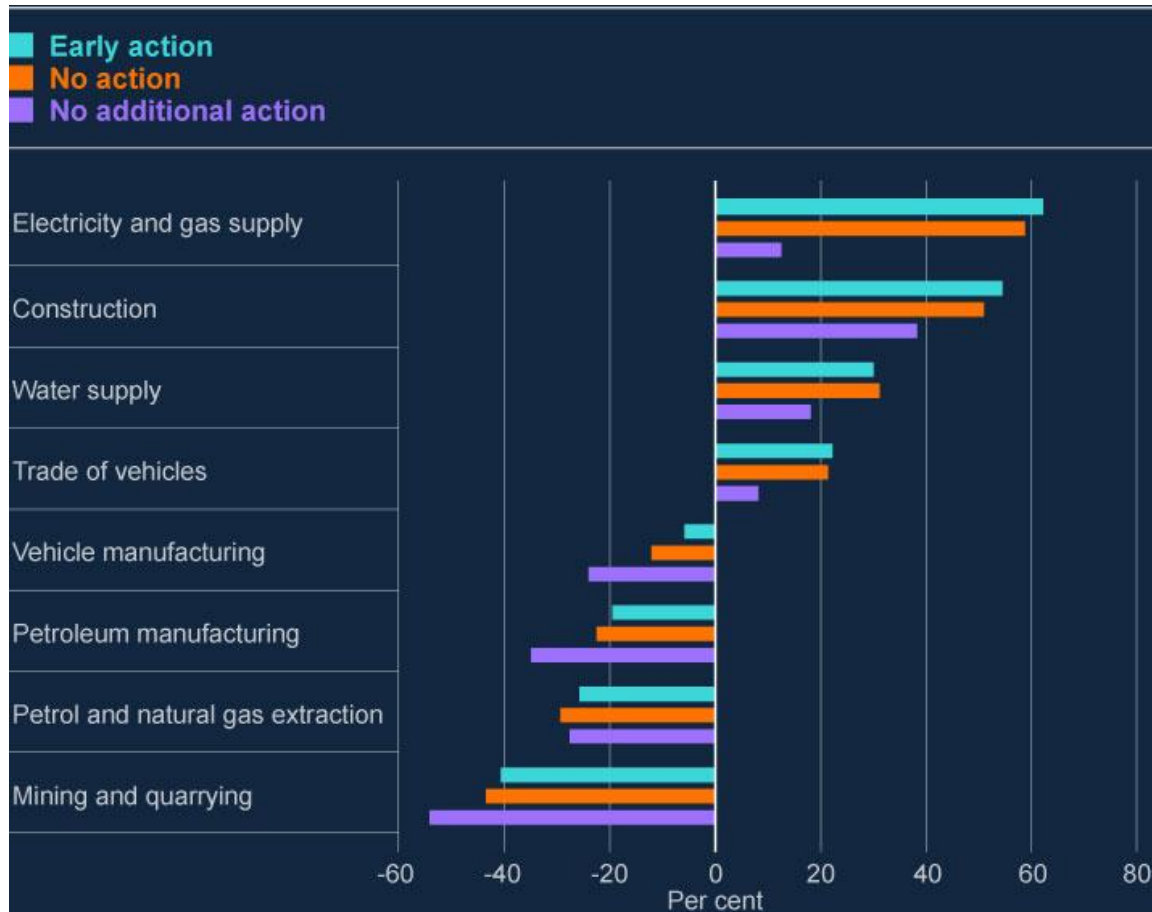
Indicative net changes in Banks' and insurers' exposure to highly impacted sectors (a) (b) (c)



- Participants have climate strategies, which they broadly followed in their responses to all scenarios.
- Banks and insurers cut financing to the most carbon-intensive industries as well as engaging with corporate clients and counterparties to help facilitate their transition to net zero.
- There could be macroeconomic consequences if limits on finance to corporates involved in the supply of more carbon-intensive energy run ahead of the expansion of renewable energy supply and other measures to improve energy efficiency.

Responses – expanding into opportunities created by net-zero transition

Indicative net changes in banks' drawn balances to selected sectors in the CBES scenarios ^(a)



- Banks planned to increase lending substantially to some components of the gas and electricity supply sector in the transition scenarios. They also envisaged increasing lending to the construction sector.
- Banks and insurers envisaged far fewer new opportunities in the NAA scenario relative to the two transition scenarios

Box E: What we learned from running the CBES in two rounds

Responses – in the no additional action scenario, households and businesses vulnerable to physical risks would be particularly hard hit...

- Banks would reduce lending to properties facing greater physical risks, and **insurers would pass on the cost of higher claims into premiums, or otherwise refuse to renew insurance for some customers.**
- Participants' responses indicated that **around 7% of UK households could be forced to go without insurance in the NAA scenario.**
- UK households in regions most exposed to physical risk may **face challenges re-mortgaging their properties** because they have fallen in value and/or have become uninsurable.

Actions and Next Steps

This is not a capital setting exercise, but could help inform future work on capital requirements

Actions for the Bank

- Continue dialogue with firms in light of findings.
- PRA and the Bank work on use of capital framework to address financial consequences of climate change.
- The FPC will monitor any risks to the financial system as a result of possible large-scale withdrawals of credit from particular sectors.

Supporting work of others

- Share key lessons with the UK Government and the Bank's peers internationally.
- Publicly support the development of standards and frameworks for net zero transition.

Headline messages

- **Climate change and the transition to net-zero create risks for businesses and households globally**, and so for the financial system. Climate risks captured in the CBES scenarios are likely to create a drag on the profitability of UK banks and insurers.
- The **overall costs will be lowest with early, well-managed action** to reduce greenhouse gas emissions and so limit climate change.
- Some **climate costs that initially fall on banks and insurers may ultimately be passed on to their customers**. In particular, in the No Additional Action scenario, households and businesses vulnerable to physical risks would be especially hard hit.
- Governments set public climate policy, which will be a key determinant of the speed and shape of the transition in the global economy. **Banks and insurers have a collective interest in managing climate-related financial risks** in a way that supports that transition over time.
- **Projections of climate losses are uncertain**; scenario analysis is still in its infancy; and there are several notable data gaps. **But the CBES has already helped drive improvements in these areas**.
- **The Bank will continue to work on this important topic**, including by disseminating best practices around climate risk management and supporting data initiatives.

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Question and Answer session

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