INFORMATION PAPER

Climate Vulnerability Assessment Results

November 2022

Disclaimer Text

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Contents

Glossary

ABA	Australian Banking Association
ADI	Authorised Deposit-taking Institution
APRA	Australian Prudential Regulation Authority
CFR	The Council of Financial Regulators (CFR) is the coordinating body for Australia's main financial regulatory agencies. It comprises APRA, the Reserve Bank of Australia (RBA), the Australian Securities and Investments Commission (ASIC) and The Treasury.
Climate risk	Financial risks arising from climate change, including physical (both acute risks associated with extreme weather events; and chronic risks associated with gradual shifts in climate), transition and liability risks
CPG 229	APRA Prudential Practice Guide: CPG 229 Climate Change Financial Risks
CVA	Climate Vulnerability Assessment
GVA	Gross Value Added provides a measure of the value of goods and services produced in an area, industry, or sector of an economy
NGFS	The Network for Greening the Financial System (NGFS) is an international group comprised of nearly 100 global central banks and supervisors, including APRA and the RBA. It was established in 2017 to enhance the ability of the financial system to manage the systemic risks posed by climate change, and to mobilise the capital for green and lower emissions investments.
Scope 1	All direct greenhouse gas emissions arising from a business' own activities
Scope 2	Indirect greenhouse gas emissions from the use of purchased electricity, heat or steam
Scope 3	Other indirect emissions not covered in scope 2 that occur in the value chain of the institution including both upstream and downstream emissions. Relevant scope 3 emissions for finance sector entities includes the scope 1, scope 2 and material scope 3 emissions from businesses to which they have a financial exposure, or the scope 3 emissions of emissions intensive inputs to their businesses

Chapter 1 - Introduction

Climate change will impact many industries, markets, and communities. These impacts pose potential challenges to the stability of the financial system and individual financial institutions[1].

Financial regulators globally are responding to these challenges by seeking to understand the impacts of climate change on the stability of the financial system, as well as implementing supervisory approaches that seek to ensure regulated institutions identify and effectively manage the risks and opportunities associated with a changing climate. While the broad effects of climate change are well recognised, measuring the extent and severity of the impacts to individual financial institutions and the broader financial system remains a developing area.

The Australian Prudential Regulation Authority (APRA), on behalf of the Council of Financial Regulators (CFR – see Box 1), conducted the Climate Vulnerability Assessment (CVA) across 2021-22 to assess the nature and extent of climate risks to financial institutions. The CVA was carried out by Australia's five largest banks - Australia and New Zealand Banking Group, Commonwealth Bank of Australia, Macquarie Bank, National Australia Bank and Westpac Banking Corporation – and explored the potential financial risks to these banks, primarily through the lens of credit risk, as this was considered the most readily measured and material transmission channel of climate risk for the banks.

1.1 Climate scenario analysis

The CVA adopted a scenario analysis approach that was designed to capture quantitative and qualitative assessments of physical and transition risk impacts (see Figure 1) at both portfolio and counterparty-levels. Two different future climate scenarios, aligned to the internationally recognised scenarios developed by the Network for Greening the Financial System (NGFS), were used in the CVA:

- a Delayed Transition Scenario: which explores a future with delayed policy action on climate change, followed by a rapid reduction in global emissions after 2030; and
- a Current Policies Scenario: which explores a future with continued increase in global emissions beyond 2050.

These scenarios are not forecasts of future climate trajectories; rather, they are explorations of potential future climate pathways, with different physical and transition risk assumptions embedded in each. The scenarios used present only two of a wide range of possible futures; however, they are valuable for understanding the financial impacts that may flow from different future climate pathways, and for understanding how the banks and other stakeholders may respond to markedly different future climate paths.

[1] See Bank of England Climate change: possible macroeconomic implications (October 2022).

1.2 Objectives

In conducting the CVA, APRA had three key objectives related to assessing the nature and extent of financial risks that large banks in Australia may face over the period to 2050 due to climate change. Its three key objectives were:

1. measuring the potential financial risks to banks, the financial system and economy posed by both physical and transition climate risks;
2. understanding how banks may adjust their business models and implement management actions in response to the different scenarios; and
3. improving banks' climate risk management capabilities.

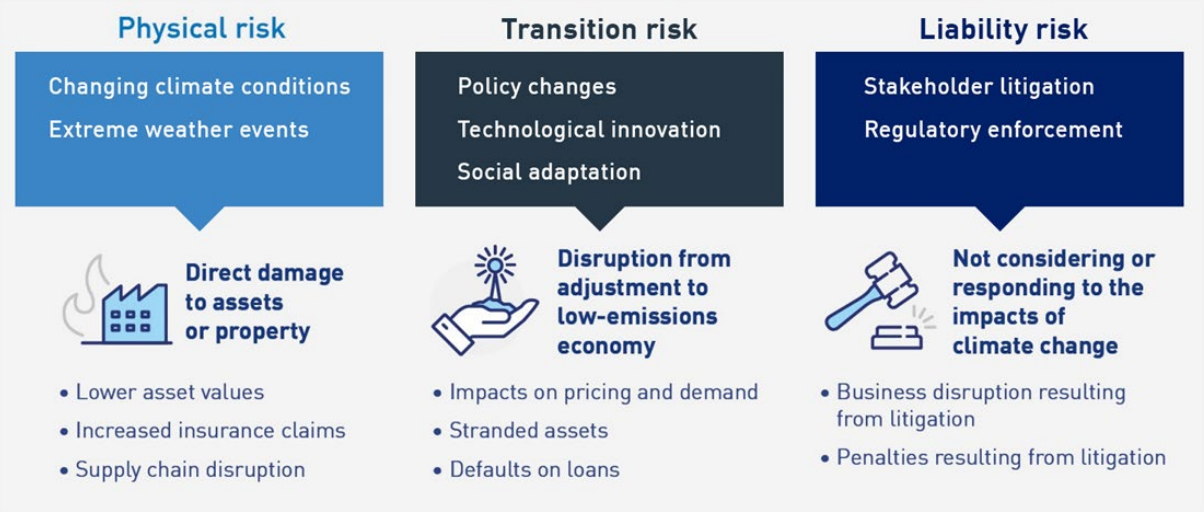
1.3 Approach taken

APRA adopted a collaborative approach with industry to deliver the CVA. Facilitated by the Australian Banking Association (ABA), APRA engaged with the participating banks on a range of issues before finalising the scope and design of the exercise. Once the CVA was underway, the ABA facilitated ongoing engagement between APRA and the banks to address design and implementation issues as they arose.

The participating banks adapted their existing stress testing methods to assess the impact of the two climate scenarios on their lending portfolios. The CVA was not intended to test bank capital adequacy levels, or to inform their prudential capital requirements: its purpose was to meet the objectives set out above.

APRA published the *Climate Vulnerability Assessment Information Paper* in September 2021, which provided information on the key design features of the CVA. It also provided a comparison to similar work being undertaken by international regulatory peers[2].

Figure 1. Climate change financial risks



[2] See APRA Information Paper, Climate Vulnerability Assessment (September 2021).

Chapter 2 - Insights from the CVA

Carrying out the 2021-22 CVA saw the participating banks adopt new techniques, modelling approaches, and data sources to assess the potential impact of climate change on their businesses. The need for new modelling approaches reflects the evolving nature of climate scenario analysis and how climate risks are incorporated into financial models.

The results provided by the participating banks in the CVA suggest that lending losses would be impacted under the climate scenarios that were evaluated. However, in the absence of a severe deterioration in macroeconomic conditions, these losses are unlikely to rise to a level that would result in severe stress for the banks.

The results also indicate that the impacts would be different for each of the two climate scenarios. In addition, the results also varied by bank, by region and sector, and over time. The results provided by the banks for the counterparty assessments suggest that counterparty credit ratings would be negatively impacted under each of the climate scenarios, with the scale of impact likely to differ across different industry sectors.

This chapter sets out the key insights from the CVA, together with observations on the approach and challenges faced in assessing the financial impact of climate change risks to the banks. Detailed findings are presented in Attachment B. These findings represent a point in time analysis, and relate to the specific climate scenarios evaluated and other method decisions taken in the course of the CVA.

2.1 Key insights

Climate scenario analysis showed a measurable impact on lending losses; however, the participating banks are likely to be able to absorb these impacts

The CVA results showed that, for the climate scenarios assessed, physical and transition risks would increase overall bank lending losses in the medium-to-long term: however, there was significant variability in lending losses across the banks. This was in part due to the different modelling approaches adopted by banks, including the granularity of data used, the level of broader engagement across the business in undertaking the CVA and to a degree, differences in portfolio mix between the banks.

For the banks' mortgage portfolios, results ranged from no lending losses being directly attributable to the climate scenarios, to lending loss rates up to approximately three times higher than historic averages by 2050. For business lending, overall lending losses arising from transition risks were observed to rise substantially in both climate scenarios, although were higher under the Delayed Transition Scenario.

Overall, the modelled increases in lending losses arising from climate change would be unlikely to cause severe stress to the banks. However, the potential for higher losses arising from climate change could lead to the banking sector being more vulnerable to future economic downturns.

Climate risk impacts are likely to be more concentrated in specific regions or industries

The scenario analysis showed significantly higher mortgage lending losses in regions that were exposed to more severe and prolonged physical risks. Several sectors, including mining, manufacturing, transport, and wholesale trade, also showed higher business lending losses in the transition towards a lower emissions economy.

The impacted regions and sectors represent a small proportion of participating banks' overall lending exposures and are therefore unlikely to lead to significant increases in lending losses in aggregate. However, these conditions could present a risk to less diversified banks that have greater concentrations of their exposures in these regions and sectors.

The banks' response to increasing physical and transition risks under the scenarios included adjusting their risk appetite and lending approaches

In addition to measuring the financial impacts of climate change on the banks' lending portfolios, the banks also explored how they may adjust their business models and implement management actions in response to the different scenarios.

In response to the potential for higher lending losses from climate change, the banks commonly modelled adjustments to their risk appetite. This included tightening loan-to-value ratio limits on new mortgage loans and reducing lending to some regions (e.g. parts of northern Australia) and sectors of the economy that were highly impacted by emerging transition risks (e.g. mining, manufacturing, and transport). While the results suggest that the banks would continue their broad-based mortgage lending activities, the banks indicated that this stance was partly contingent on additional policy support for more at-risk regions

Climate scenario analysis accelerated capability development and risk awareness

Undertaking the CVA benefitted the participating banks by accelerating the development of enterprise-wide climate risk management capabilities and exploring new ways to measure climate risks. In particular, the banks noted that the CVA's multi-disciplinary scope supported cross-functional collaboration across their individual organisations. This in turn helped develop capability and risk awareness in different areas of their organisation, typically beyond the stress testing or Environmental, Social and Governance (ESG) functions that have to date managed scenario analysis and climate risks.

Climate-related data quality and accessibility remain a challenge, however this should not preclude financial institutions undertaking climate risk analysis now

Data quality assessments were undertaken by the banks to assess key climate-related attributes for both internal (bank-owned/managed) and external (third party climate and economic) data utilised in the CVA.

These assessments indicated that climate-related data quality and accessibility remain a challenge. From a transition risk perspective, inputs and estimates essential to modelling a transition to a lower emissions economy scenario remain a significant challenge. As for data

relating to physical risk, business lending asset location and future climatic data modelling remains an area for improvement. These data challenges are being experienced more broadly across industries, and APRA and the CFR recognise that understanding the gaps in the availability and quality of data is important for the development of high-quality climate risk assessments.

Although future improvements in data availability and quality are expected, data limitations do not provide a justification for delaying initiatives to better understand climate risk. The CVA has shown that climate scenario analysis approaches can deliver valuable climate risk insights now, and that these insights can inform climate-related planning and decision-making. Financial institutions can adopt a staged approach to climate risk assessment, leveraging available data while building their internal capacity, and incorporating modelling and data developments over time.

2.2 Approach and challenges

APRA took an exploratory approach to the CVA and collaborated with the banks to address emerging design and implementation issues. This approach provided a foundation for the industry and APRA to better understand the key challenges in climate scenario analysis, including the:

- extended time horizon of the scenario, which is beyond typical business and capital planning cycles;
- unprecedented nature of climate change, where historical and traditional backward-looking risk assessment methods are unlikely to adequately anticipate future impacts;
- limitations in the availability and access to credible internal and external climate-related data that is of sufficient granularity and relevance to the scenario; and
- far-reaching impact that climate risks present to different business types, geographical locations, and economic sectors – including secondary effects[3] not explicitly incorporated in the CVA.

When assessing the results provided by the participating banks, APRA observed that there were significant differences in the scale of the impacts reported across the banks for their portfolios (e.g. loan loss results between the different banks' mortgage portfolios). While some of these differences may have arisen due to differing portfolio compositions between the banks, APRA considers that the more significant drivers of the differences between bank results are likely to be: the use of new techniques and modelling approaches developed to integrate climate risk into traditional bank credit risk models; differences in the data used by some of the banks; and the participating banks having different levels of maturity in their ability to capture the impact of climate change-driven effects in their internal models.

[3] Secondary effects refer to subsequent and less predictable outcomes indirectly caused by climate change. For example, reduced access to general insurance could lead to increased costs for borrowers, wider community impacts or public policy changes.

Notwithstanding the differences in the banks' current climate risk approaches, the CVA has stimulated further development of their overall climate risk assessment capabilities, as well as identifying areas for improvement.

analysis to report on their climate resilience and identify climate-related risks and opportunities[8].

3.2 Raising awareness and preparedness domestically

Financial regulators in Australia are increasingly adopting climate scenario analysis and modelling to identify and assess the financial impacts of climate change. Through the CFR Climate Change Activity Stocktake,[9] the RBA has outlined its plans to conduct further analysis of climate risks to the financial system, drawing on the scenario development undertaken through the CVA. The RBA will also support the work of APRA by extending its own analysis of climate risk to include both banks and insurers. Treasury is also investing in expanding its climate modelling capability, including assessing the impact of climate change on the economic and fiscal outlook. In parallel to understanding the climate-risk exposures of financial institutions and the financial system, ASIC continues its work on improving standards of climate-related governance and disclosure by listed companies.

APRA, together with the CFR agencies, will consider how the experience gained from the CVA may be applied to similar activities in other sectors, including insurance and superannuation, as well as the broader banking sector in future.

3.3 Interconnected cross-industry impacts of climate change

The CVA also highlighted the interconnected nature of climate risk across financial institutions from different sectors, and the need for this to be considered in scenario analysis initiatives. For example, while the CVA considered aspects of underinsurance, it did not measure the extent to which secondary effects may impact communities. This is an area for development in future scenario analysis and climate vulnerability assessment initiatives.

This is just one example of where further work by regulators and industry to understand how climate risk can emerge across industries, including banking, insurance and superannuation would provide broader insights into the systemic impacts of climate change on the financial system. Other initiatives such as APRA's 2022 climate risk self-assessment survey, and similar initiatives by international regulators, are also likely to continue to be used to complement the findings of scenario analysis and climate vulnerability assessment initiatives, both domestically and internationally.

[8] See IFRS - ISSB confirms requirement to use climate-related scenario analysis (October 2022).

[9] See CFR Climate Change Activity Stocktake 2022 (September 2022), which outlines the recent activities and planned further work of the CFR Climate Working Group.

Attachment A: CVA Design

The CVA adopted a scenario analysis approach to capture quantitative and qualitative assessments of climate risk impacts on the participating banks. This approach included physical and transition risk impacts arising from two climate scenarios and included both portfolio and counterparty assessments. Scenario analysis is a useful tool, and an internationally accepted practice, for identifying the potential impacts of climate change and assessing the resilience of financial institutions[10].

A.1 Scope

The CVA was conducted with Australia's largest five banks: Australia and New Zealand Banking Corporation, Commonwealth Bank of Australia, Macquarie Bank Limited, National Australia Bank and Westpac Banking Corporation.

The quantitative assessment was primarily focused on credit risk, as the most readily measured and material transmission channel of climate risk to the financial risk of banks. While climate risk may also impact market, liquidity and operational risks, these risks are more challenging to assess in a common scenario exercise: they were examined qualitatively in the CVA via a questionnaire completed by the banks[11].

A.2 Portfolio assessments

The exposures of the five participating banks are dominated by Australian-based lending. The CVA therefore considered physical and transition risks arising in Australia or arising internationally with direct material impact on Australian lending.

The banks were required to assess residential mortgages and business lending exposures, which account for approximately 75 per cent of their Australian lending exposures. To account for differences in their risk profiles, physical climate risk to business exposures was separated into two classifications: agriculture-focused lending, and non-agriculture-focused lending.[12]

APRA provided several scenario datasets to the participating banks to support the completion of the CVA. While these datasets provided a baseline level of data to inform their assessments, the banks were permitted to use additional datasets to supplement and enhance the data provided by APRA. Table 1 sets out the portfolio exposure scope of the CVA, and the datasets APRA provided. Additional data was supplied by the banks.

[10] See APRA Prudential Practice Guide CPG 229 Climate Change Financial Risks (November 2021).

[11] See Table 2 in APRA Information Paper, Climate Vulnerability Assessment (September 2021).

[12] APRA recognises assessment of corporate physical risks is complex. The operations of large counterparties can span multiple physical geographies, across different industry sectors. For those reasons, the participating banks were only asked to assess the physical risks facing a small number of counterparties, rather than across their entire business lending portfolio.

Table 1. Portfolio exposure scope and baseline climate data inputs provided by APRA

		Physical risk	Transition risk
Mortgage exposures	**Scope**	Impact on Australian-based residential mortgage exposures from physical risks[13].	Impact on Australian-based residential mortgage exposures, in selected regions, from changes in economic activity.
	Data	Postcode-level risk index projections for tropical cyclone, precipitation stress, river flood, fire weather stress, drought stress and heat stress provided by Munich Re. Postcode-level data on rates of non-insurance provided by the Australian Competition and Consumer Commission[14].	A five-yearly temporal resolution for each climate scenario from transition risk modelling.
Business exposures	**Scope**	Agriculture: Impact on Australian-based lending exposures from physical risk to primary agriculture activities for three commodities: beef cattle, dairy and grain.[15] Non-agriculture: Impact on Australian-based non-agriculture business lending from physical risk was addressed at a counterparty (individual company) level only across sectors classified as high-risk for physical climate risk events.	Impact on Australian-based business exposures from changes in economic activity.
	Data	National resource management (NRM) sub-cluster level data on the change in selected climate variables on key agricultural regions of Australia, provided by the Commonwealth Scientific and Industrial Research Organisation.	A five-yearly temporal resolution for each climate scenario from transition risk modelling.

[13] Insurance coverage modelling was included within the mortgage exposure analysis, as changes to physical climate risks have the potential to impact insurance affordability and availability, which may in turn impact patterns of underinsurance and non-insurance. Combined with more frequent and severe climate events, this could impact lending losses by region.

[14] Metropolitan areas were aggregated into a single figure and not at postcode-level.

A.3 Other assessments

Counterparty assessments

Assessments of a subset of counterparties were carried out by the banks and used to supplement portfolio-level analysis, including the vulnerability of counterparties to physical and transition risks, and the subsequent impact to bank credit risk profiles.

The assessments covered 25 current, material, non-financial sector corporate exposures for each of the five banks. The banks selected a range of significant counterparties, with guidance provided by APRA that this selection should include counterparties from both emissions-intensive sectors (e.g. electricity generation) and physical climate risk-exposed sectors (e.g. agriculture).

Data quality assessment

A core component of quantifying the impacts of climate risk is access to appropriate and relevant data. To better understand data challenges in the CVA results, the participating banks completed data quality assessments on the data underpinning their quantitative portfolio assessments.

The data quality assessment measured climate-related attributes for both internal (bank-owned/managed) and external (third party climate and economic) data utilised by banks. The data quality assessment was focused on Australian residential and business exposures to both transition and physical climate risk, across several attributes such as the resolution of physical risk data, climate hazard coverage and regional economic activity resolution.

Supplementary information

The participating banks also provided documentation summarising key elements involved in preparing and analysing their results. This included the internal assessment and analysis of results, challenges and limitations in completing the CVA, and insights from their assessments that may inform their future approaches to climate risk management.

A.4 Climate scenarios

The CVA used two climate scenarios, the Delayed Transition Scenario and Current Policies Scenario, aligned to the internationally recognised scenarios developed by the NGFS (Figure 2). The NGFS scenarios are not forecasts of future climate trajectories: rather, they are explorations of potential future climate conditions, with different physical and transition risk assumptions embedded in each scenario including temperature targets, policy responses and technology development.

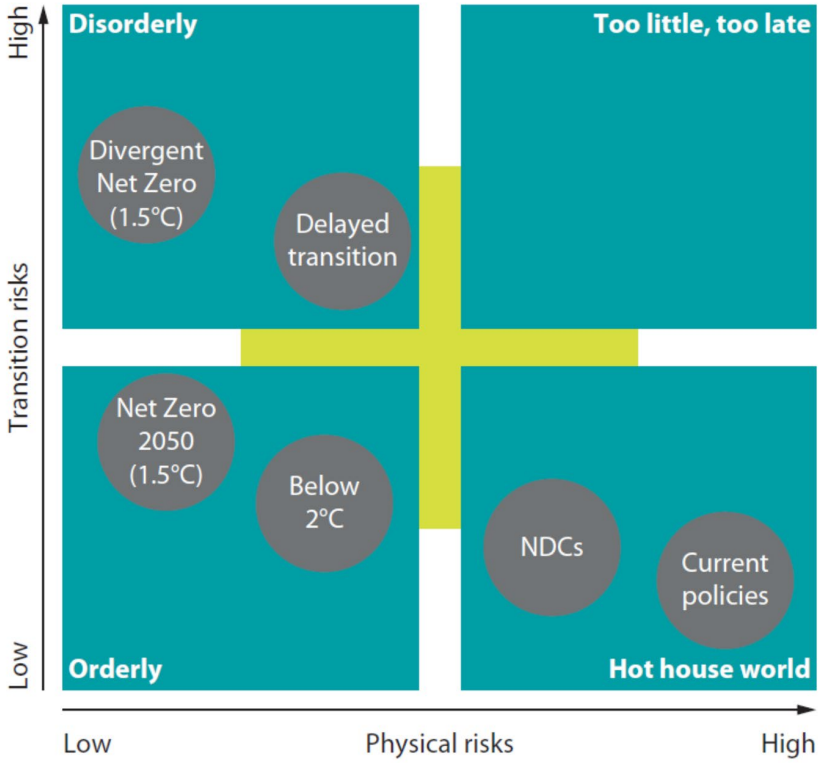
The NGFS scenarios used for the CVA are only two of a wide range of possible scenarios; however, they are valuable in quantitatively exploring the financial impacts to banks and understanding how the banks may respond to the potential impacts under markedly different

[15] These three commodities were chosen as they are material in relation to agriculture lending exposure for Australian banks and may be impacted by physical climate risk.

climate futures. Basing the CVA on NGFS scenarios supports comparability of outcomes between the participating banks as well as similar activities undertaken by prudential regulators internationally.

Importantly, the climate scenarios used were developed at a point in time: the CVA built on the NGFS Phase II scenarios (Table 2)[16]. International and domestic climate policy changes since this time were not incorporated in the modelling for the CVA. The NGFS has made further developments since the CVA under the NGFS Phase III scenarios[17].

Figure 2. NGFS scenarios framework, showing the Delayed Transition and Current Policies scenarios



Source: NGFS Climate Scenarios Database – Technical Documentation V2.2 (June 2021)

[16] See NGFS Phase II scenarios released in June 2021.

[17] See NGFS Phase III scenarios released in September 2022.

Table 2. Key features of the two NGFS scenarios used in the CVA[18]

	Delayed Transition Scenario	Current Policies Scenario
Overview	Explores a future with higher transition risks, arising from a delayed transition to a lower emission global economy. The NGFS model assumes current climate policies until 2030. A rapid reduction in global greenhouse gas emissions after 2030, consistent with limiting global warming to less than 2°C.	Explores a future with higher physical risks, arising from a continued increase in global GHG emissions. The NGFS model assumes that only currently implemented policies are preserved. Global greenhouse gas emissions continue at an elevated level beyond 2050.
NGFS category	Delayed	Hot House World
Policy ambition	1.8°C	3°C +
Policy reaction	Delayed	None – current policies
Carbon dioxide removal	Low use	Low use
Regional policy variation	High variation	Low variation

A.5 Transition risk modelling

For transition risk modelling, key features of the NGFS scenarios were used as inputs to Australian-focused economic modelling carried out using G-Cubed, a multi-country, multi-sectoral model with a detailed representation of the Australian economy. The G-Cubed general equilibrium model was developed by McKibbin and Wilcoxen[19] and implemented by McKibbin Software Group. It was used to provide the transition risk modelling outputs, thereby increasing the sectoral granularity of the NGFS scenarios.

G-cubed includes coverage of 10 regions (including Australia) and 20 sectors: five energy sectors, eight electricity generation sectors and seven goods and services sectors. Only CO_2 emissions from energy use were included in the model, with all emissions being aggregated back to primary fossil-fuel industries for the purposes of emissions pricing. As a result, three sectors in G-Cubed experience a direct emissions price (where applicable) – coal mining, gas

[18] This reflects the NGFS Phase II scenarios used in the CVA. The NGFS has since released Phase III scenarios that include updated scenario conditions, including 1.6 °C for policy ambition under a Delayed Transition Scenario.

[19] McKibbin W and Wilcoxen P (2013), A Global Approach to Energy and the Environment: The G-cubed Model Handbook of Computable General Equilibrium Modeling, Chapter 15, North-Holland, pp 995-1068

extraction and utilities, and oil – with other sectors (such as electricity generation) experiencing an emissions price through value-chain price pass-through from the primary fuel source.

The model was also extended to provide reporting of key metrics at a state-level, and disaggregated sector reporting from 20 ANZSIC sectors to 43 sectors[20]. Due to the absence of non-CO_2 gasses and emissions from agriculture in the model, the participating banks were asked to consider the impact of emissions pricing on agriculture independently of the outcomes for the agriculture sector from G-cubed. Certain manufacturing and transport sectors also required additional consideration by banks for the same reason. Specific modelling inputs and decisions have been summarised in Table 3.

Table 3. G-Cubed parameters for Australia-focused economic modelling

Sector resolution	**International**	20 sectors
	Australia	20 sectors disaggregated to report at 43 Sectors
Region resolution	**International**	10 regions (Australia, China, India, Europe, Japan, Russia, USA, and other regional composites)
	Australia	Australian output disaggregated to state and Statistical Area Level 4 (SA4) outcomes[21]
Timesteps	**Global**	Annual, 2019-2050
Emissions Pathway	**Global**	CO_2 emissions from energy consistent with Global Change Assessment Model (GCAM) 5.3 Delayed Transition Scenario and Current Policies Scenario
Electricity Sector	**Global**	Seven discrete electricity generation technologies (Coal, Oil, Gas, Nuclear, Wind, Solar, Hydro), with one 'other' catch-all electricity sector.
Technology Costs	**Global**	As per G-Cubed model calibration
Shared Socioeconomic Pathway (SSP)	**Global**	SSP2

[20] The Australian and New Zealand Standard Industrial Classification (ANZSIC) provides a basis for the standardised collection, analysis and dissemination of economic data on an industry basis for Australia and New Zealand.

[21] Statistical Area 4 (SA4) is one of the spatial units defined under the Australian Statistical Geography Standard (ASGS). It is a hierarchical geographical classification, defined by the Australian Bureau of Statistics and used in the collection and dissemination of official statistics. There are currently 108 SA4 regions, with most SA4 regions having a population of over 100,000 people. The CVA used SA4s to represent labour markets and the functional areas of Australian capital cities.

A.6 Balance sheet approach

Regulatory solvency stress tests are typically conducted on either a static or limited-dynamic balance sheet approach, where the size and composition of a bank's balance sheet remains largely unchanged over the scenario horizon. This enables comparative analysis of the impact on the stress scenario on a bank - if it were to continue lending as it had been - over the three to five years of a typical scenario.

However, the extended time horizon of the CVA, and the resulting changes to segments and industries in the economy over this period, present unique challenges to this traditional balance sheet element of stress test design. To address this, two balance sheet approaches were used for the CVA, each serving a separate objective.

Static balance sheet approach

The static balance sheet approach measures the potential financial exposure of the participating banks to physical and transition climate risks having regard to their current lending exposures. It assumes a fixed total exposure balance, with portfolio/sectoral allocation only varying by replacing defaulted loans in sectors or postcodes once physical and/or transition climate risks have crystallised. For example, exposure to sectors with contracting Gross Value Added (GVA) post-2030, or mortgages in a postcode with an elevated physical risk score, would see defaults in these sectors replaced with equivalent exposures in other sectors or postcodes.

This approach removes the need for banks to assume constant financing for industries where their value relative to the economy changes significantly.

Proportional balance sheet approach

The proportional balance sheet approach allowed the participating banks to implement management actions in line with changes in the structure of the economy, such as varying their total exposure and portfolio/sectoral allocation, within defined constraints. Previously announced and unannounced management actions were treated similarly, with both needing to be consistent with changes in sector GVA provided by G-cubed.

Further investment to enhance climate risk management capabilities and data would improve the quality of climate vulnerability assessments.

Climate scenario analysis is an emerging and maturing discipline, with capabilities, modelling and supporting data continuing to develop. Given the long time horizon of the CVA, there is uncertainty in how climate risks will evolve over the period to 2050: climate change, and the associated climate risks, may evolve in a significantly different manner to those presented under the two scenarios.

This presents a key area of uncertainty in the participating banks' results and may underestimate or overestimate the true extent of impacts arising from climate risks. Further investment by banks to mature their capabilities will be required to support improved assessment of their exposures to climate risks in a quantitative, data driven manner. Continued development of this capability would likely involve multiple functions across banks.

B.2 Residential mortgages

The CVA assessed separately the impact on Australian-based residential mortgage exposures from physical and transition climate risks.

Physical risk impacts

The participating banks in aggregate assessed $1.7 trillion of their Australian mortgage exposures to physical risk impacts, which comprises approximately 52 per cent of their total Australian lending exposures.

The physical risks assessed included the potential for higher incidences of loans defaulting from rising occurrences of extreme physical climate events and greater direct damage to property that decreases the value of homes collateralising mortgage loans - increasing the losses borne by banks[23]. The banks explored new techniques to quantify this risk, by translating climate and hazard specific information from the scenarios, into a form that could be used by their existing modelling capabilities.

The projected lending losses varied significantly across the five banks, reflecting differences in the lending portfolios of banks, the exploratory nature of the CVA and variation of modelling approaches adopted by banks. Two banks modelled material mortgage lending losses, with loss rates for individual banks increasing by up to approximately double the long-term historic average by 2030 and rising by up to triple the long-term historic average by 2050. One bank could not directly attribute any lending losses to physical risk under either climate scenarios, while another bank estimated minimal losses over the 30-year scenario horizon. The wide range of estimates suggest that banks face significant challenges in modelling lending losses using climate, weather, and natural peril information – notably the scarcity of historical experience and observed losses from which to estimate potential future losses.

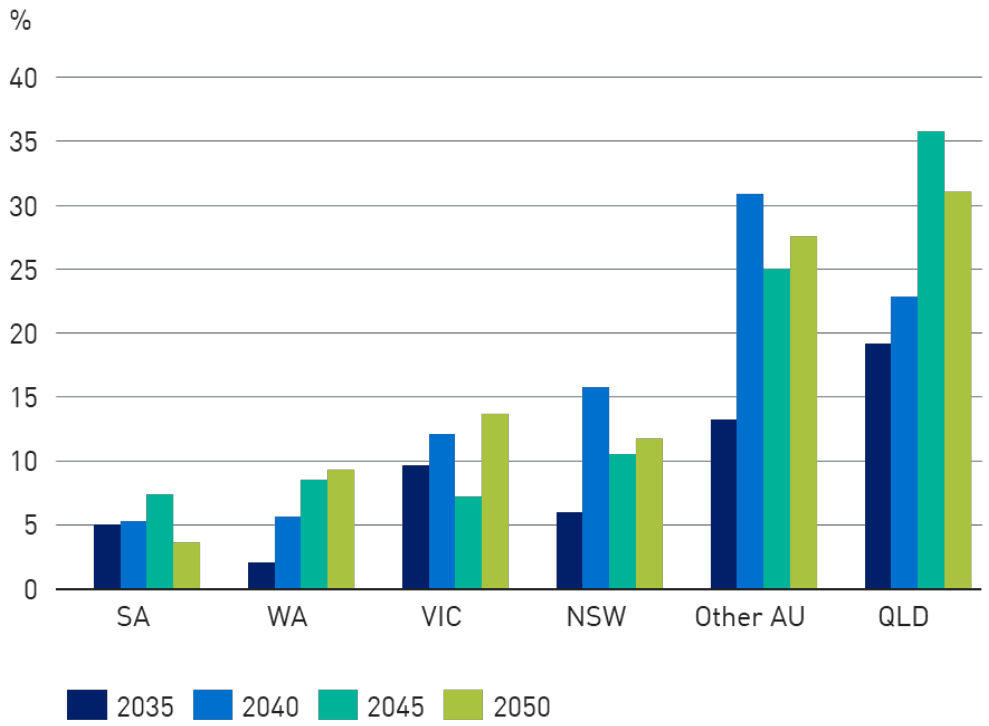
[23] Impacts to lending losses from physical climate risks in this section are before recoveries from lenders mortgage insurers.

When comparing the two scenarios, the estimated lending losses from physical climate risks were marginally higher under the Current Policies Scenario than under the Delayed Transition Scenario. This divergence in lending losses between the two scenarios was observed to occur primarily from 2031-2050, the period during which deviations in future temperature paths between the two scenarios grow larger. Several banks commented that the 30-year time horizon was not long enough to completely assess the impact of physical risks on their mortgage portfolios, with greater impacts from physical risks expected to emerge towards the end of the century.

Overall, the modelled increases in lending losses arising from climate change would be unlikely to cause severe stress to the banks. However, losses in some specific geographical areas did increase significantly, characterised by a small number of isolated regions experiencing a substantial increase in climate risk.

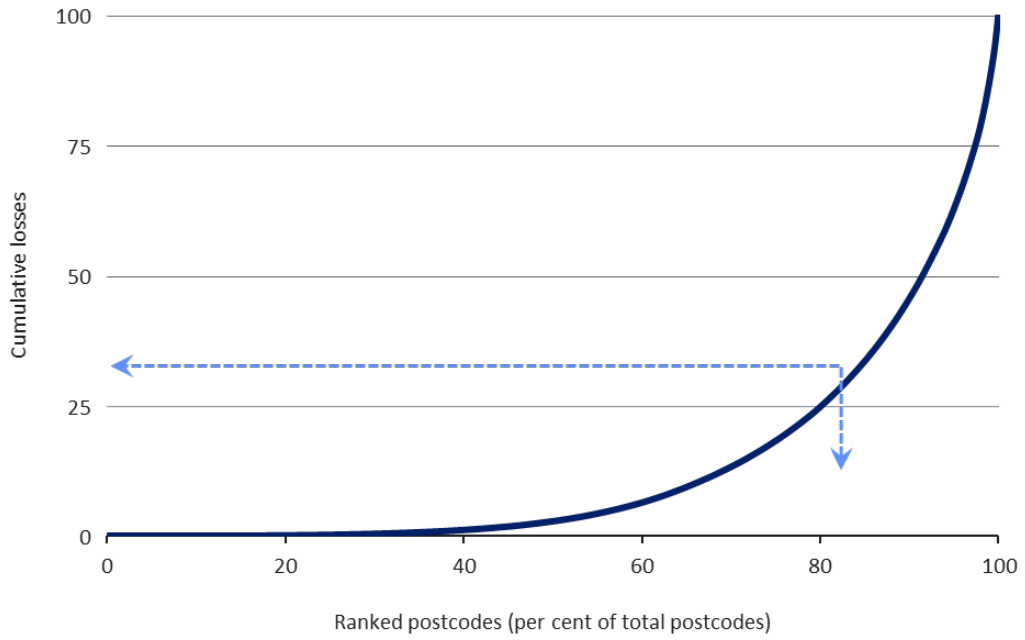
Once these exposures were aggregated together with larger geographical areas, Queensland and the Northern Territory (within Other AU) showed the most meaningful increases in loss rates from 2030 to 2050 (Figure 3). Mortgage exposures in 80 per cent of postcodes incur around 25 per cent of total losses - with virtually no losses in the lowest 40 per cent of postcodes by climate risk - while the most impacted 20 per cent of postcodes account for around 75 per cent of total losses (Figure 4).

Figure 3. Weighted average per cent increase in loss rates from 2030, by region



Current Policies Scenario, static balance sheet

Figure 4. Cumulative losses in residential mortgages, by ranked postcodes



Current Policies Scenario, static balance sheet

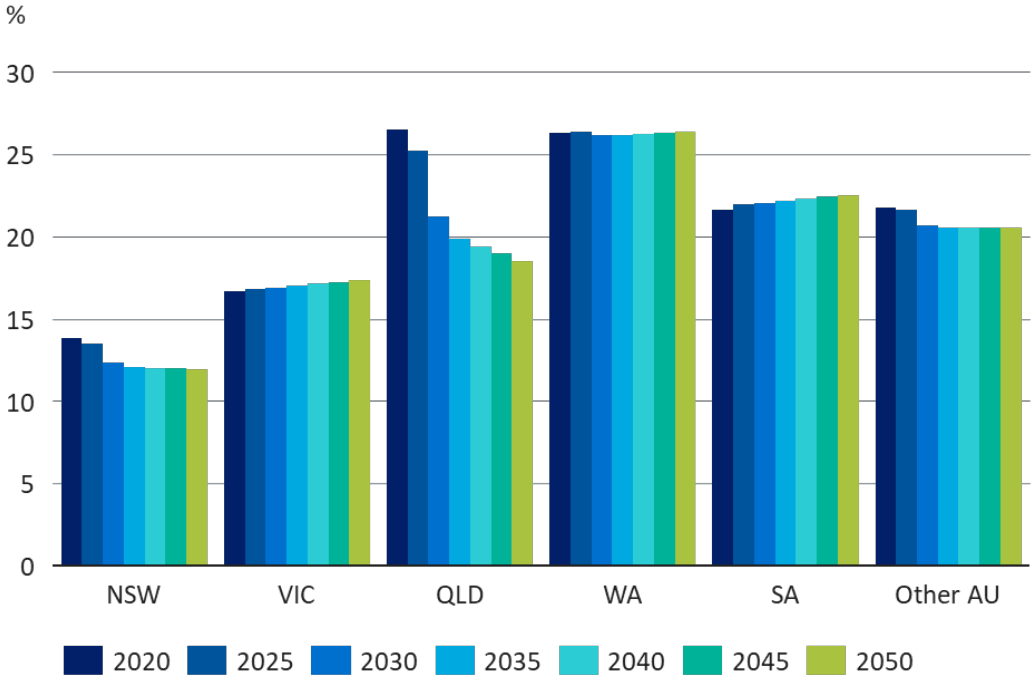
Management responses to physical risk impacts

Banks may alter their lending activities to moderate the impact of increasing climate risks: this type of management response was included in the climate risk modelling conducted by the participating banks. However, across both scenarios, the results suggest that the banks would continue their mortgage lending activities, with no broad-based withdrawal of mortgage lending in response to increasing physical climate risk.

The rate of lending losses under each scenario did not materially change for the banks when evaluated using the proportional balance sheet approach. However, several banks noted that their modelling assumed some form of policy intervention to support their continued lending to highly impacted regions. Removing this assumption may lead to reduced support for these regions than the results suggest.

In exploring potential responses to physical risk impacts under the scenarios(s), some of the participating banks projected that they may tighten LVR limits as part of revisions to their risk appetite, significantly reducing their exposure to high LVR mortgages in higher risk areas to mitigate the impact of lending losses. This is observed in state aggregate results (Figure 5), with Queensland's share of high (>80 per cent) LVR loans falling from 26 per cent to 19 per cent as loss rates rise. Some banks indicated their risk appetite would be much lower than this, with maximum LVRs for new loans falling closer to 70 per cent.

Figure 5. Proportion of exposures with greater than 80 per cent LVR, by region



Current Policies scenario, proportional balance sheet

Transition risk impacts

The transition to a lower emissions economy may result in differing economic impacts in different regions, particularly where a significant proportion of employment or economic activity is dependent on emissions intensive industries, or industries that are otherwise exposed to challenges in an emissions-constrained economy.

The participating banks modelled the impact of transition risks to their mortgage lending exposures at SA4 regions: this is a higher level of aggregation of regions than postcodes used in the physical risk assessment Most banks noted significant challenges in modelling transition risk impacts on their mortgage portfolios at the SA4 level, particularly when attempting to downscale data from the two climate scenarios – which were modelled at the national and state level – to an SA4 level. To assist the banks' modelling efforts, APRA provided key macroeconomic data at an SA4 level under both scenarios, including unemployment and house price assumptions.

The banks were required to assess the impacts to a minimum of 10 SA4 regions. To facilitate comparability, five regions that were likely to experience elevated transition impacts were specified by APRA, with each bank also selecting a further five (or more) SA4 regions based on their own risk expectations, geographical spread of exposures, and other relevant considerations. Overall, the participating banks modelled eight SA4 regions in common,[24] with mortgage lending to these regions accounting for approximately two per cent of the total lending exposures for the banks.

[24] The eight common regions include the five specified from APRA, plus a further three common regions that were modelled in common by the participating banks.

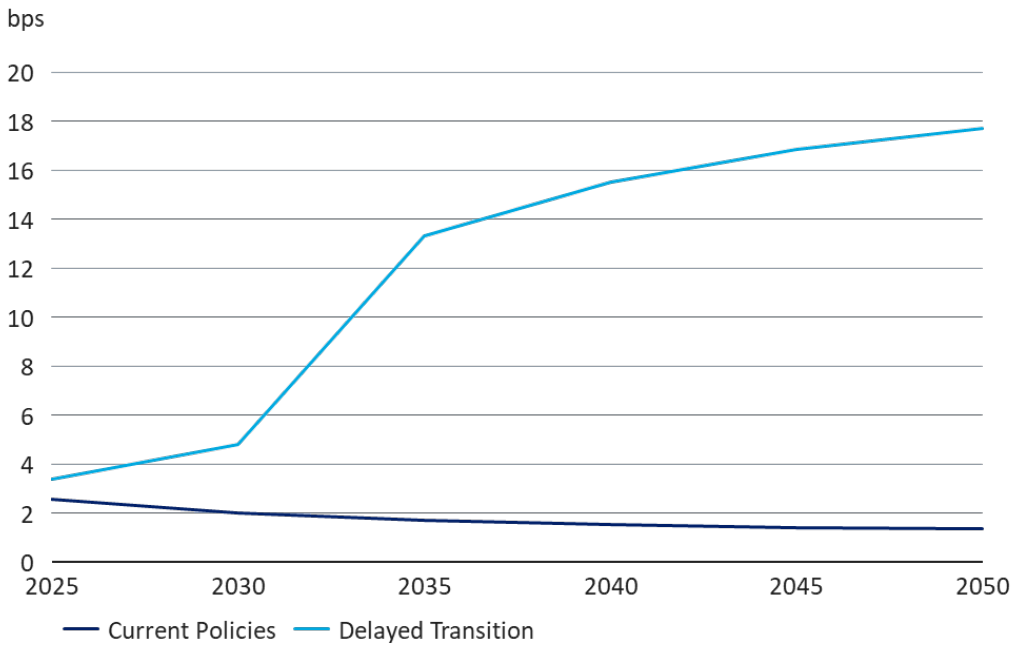
Under the Current Policies Scenario, lending losses arising from banks' mortgage portfolios across the eight common SA4 regions did not materially increase (Figure 6). This outcome likely reflects that the Current Policies Scenario broadly represents a continuation of current economic drivers, and therefore minimises the economic stress experienced at a regional level in Australia.

The Delayed Transition Scenario presented a very different outcome, with loss rates across the eight common SA4 regions around six times higher than the long-run average by the end of the assessment period, consistent with the broader change that would accompany a delayed transition to a lower emissions economy. Most of this increase occurs in the five years to 2035: this in-part reflects the scenario design, with 2030 the point where emissions constraints deviate from the Current Policies Scenario.

After 2035, there are smaller rises in loss rates occurring in the following years, suggesting that it is the initial adjustment towards a lower emissions economy that represents the largest challenge for banks, rather than the longer-term movement. These results also suggest that potentially acute impacts may be experienced in the most exposed regions. These regions, however, represent a very small proportion of the overall mortgage exposures of the participating banks. As a result, these findings are unlikely to result in a significant increase in overall lending losses for the banks.

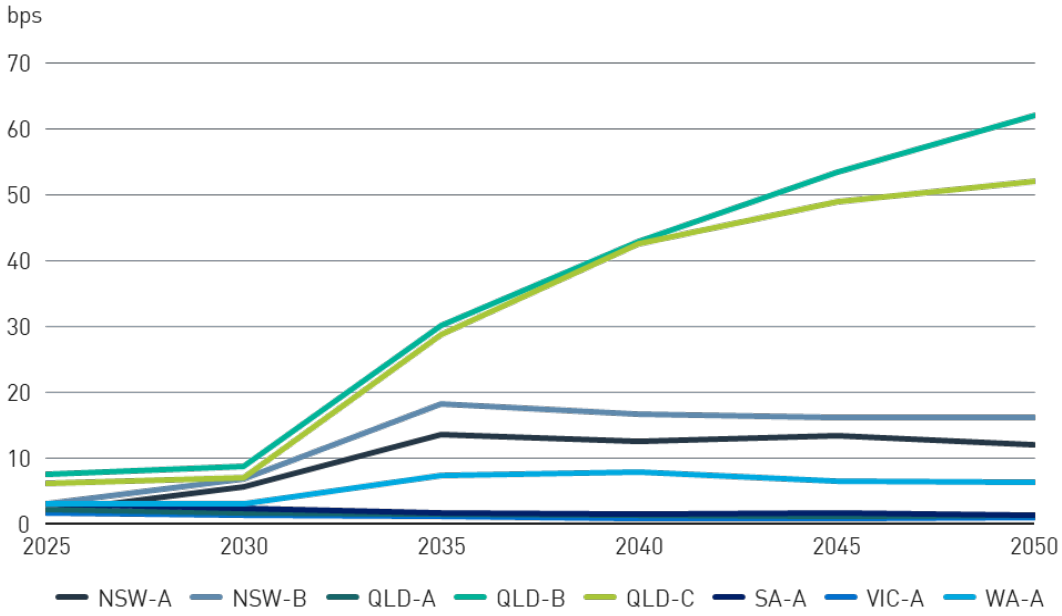
Significant differences in aggregate loss rates were observed between the banks across each of the eight common SA4 regions, largely driven by differences in how banks modelled the impacts of transition risks on individual portfolios (Figure 7). Some banks' results suggest there would be a short spike in losses that would subside as the economy transitions in a disorderly manner, while other banks estimated a sustained period of higher lending losses (Figure 8).

Figure 6. Aggregate annualised loss rates for the eight common SA4 regions



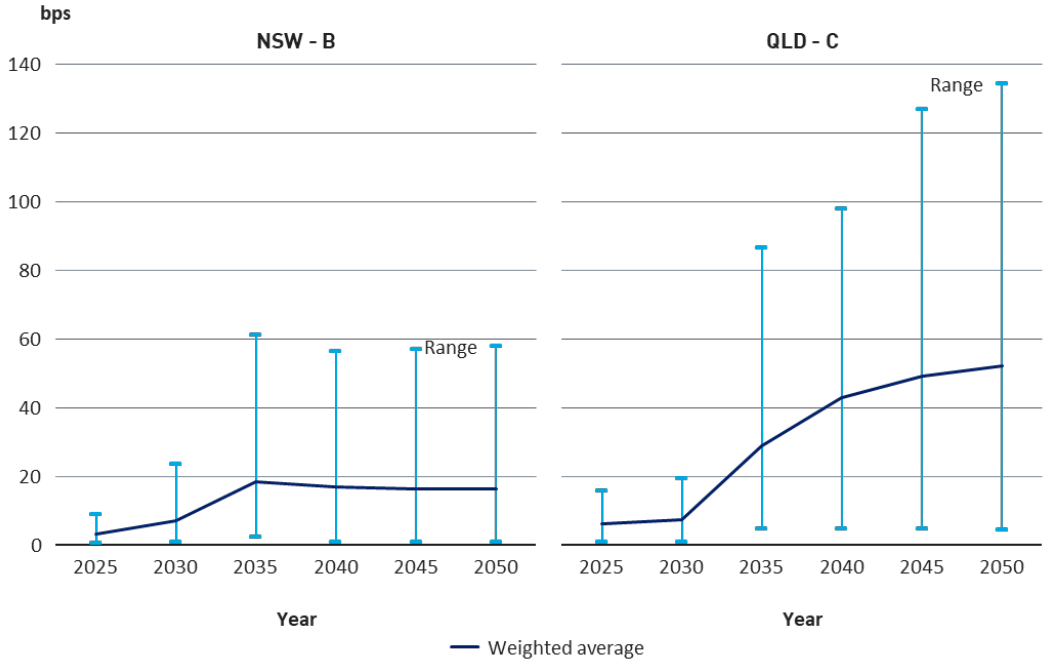
Current Policies and Delayed Transition Scenarios, static balance sheet

Figure 7. Annualised loss rates for each of the common SA4 regions



Delayed Transition Scenario, static balance sheet

Figure 8. Range of annualised loss rates for two of the common SA4 regions



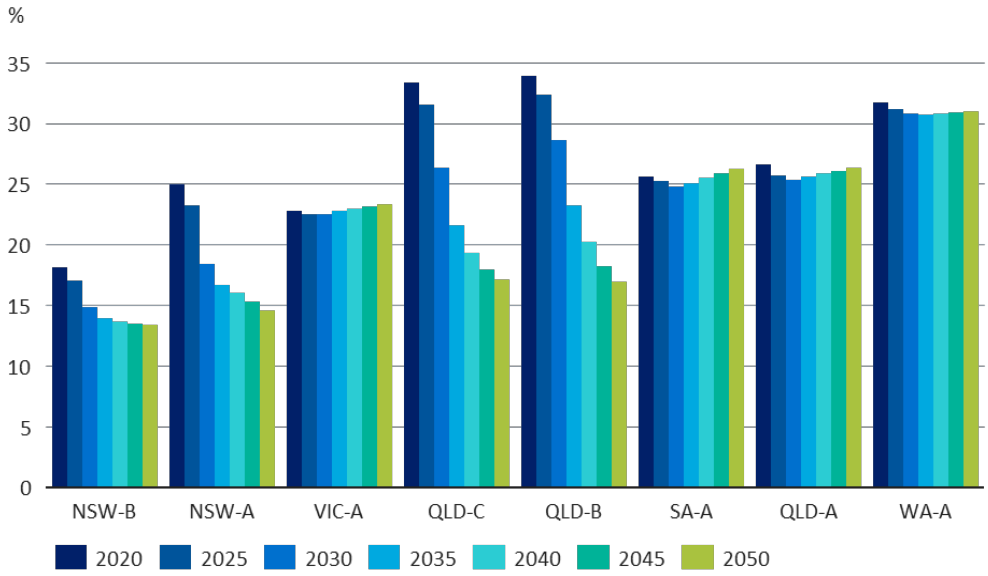
Delayed Transition Scenario, static balance sheet

Management responses to transition risk impacts

In exploring potential responses to transition risk impacts under the scenario(s), the participating banks projected that they would continue to originate home loans across the eight common SA4 regions; however, some banks stopped originating mortgages within some SA4 regions that experienced heightened transition risks in their modelling.

In keeping with the banks' responses to physical risks, commonly modelled actions in response to transition climate risks were revisions to risk appetite, with falls in lending to higher LVR loans. Reduced exposures to high LVR mortgages were more pronounced in SA4 regions experiencing greater rises in losses (Figure 9). These responses resulted in a substantial reduction in lending losses under the Delayed Transition Scenario across the common SA4s; however, they remained significantly above current levels (Figure 10).

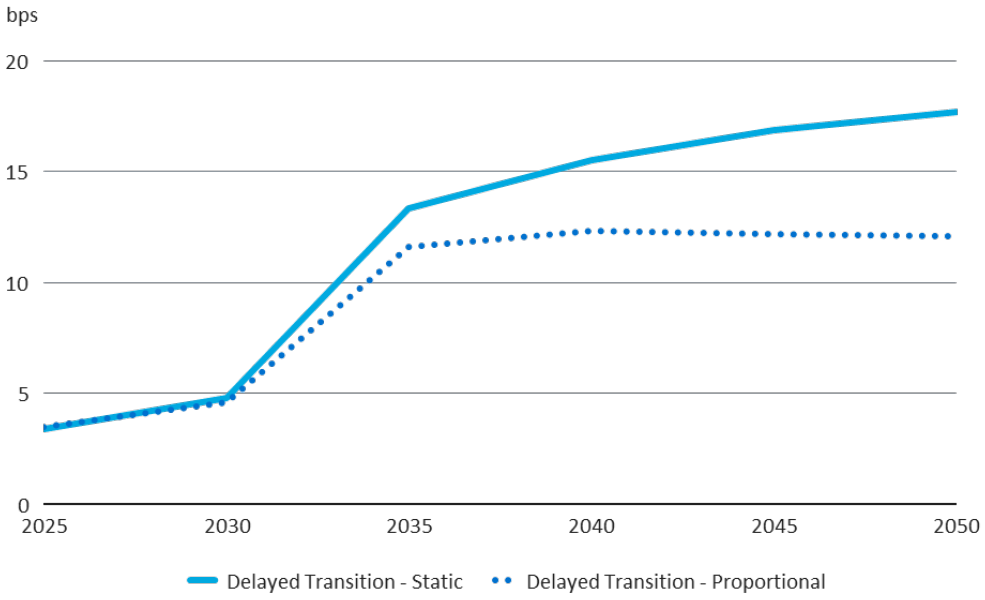
Figure 9. Share of exposure with LVR above 80 per cent[25]



Delayed Transition Scenario, proportional balance sheet

[25] The eight common SA4 regions have been anonymised.

Figure 10. Aggregate annualised loss rates for the eight common SA4 regions



B.3 Business lending

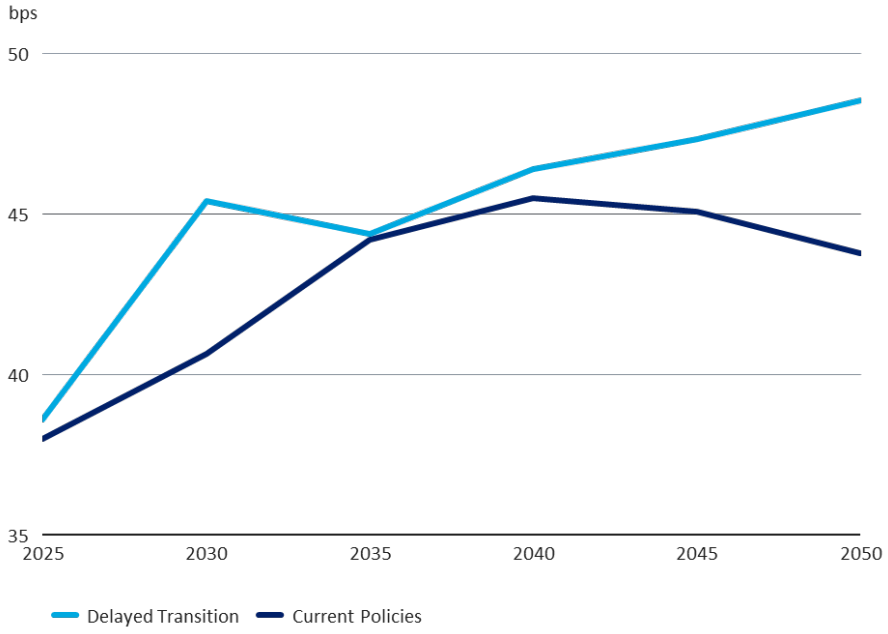
The participating banks assessed the impacts of transitions risks to their domestic business lending exposures, which represent approximately 20 per cent of their total Australian exposures.[26]

Emissions intensive and energy intensive sectors are expected to experience considerably higher direct (e.g. higher emissions prices, lower demand for fossil fuels) and indirect costs (e.g. reduced economic activity in surrounding geographical regions) in transitioning to a lower emissions economy that has the potential to have a material impact on business operations and financial performance. Banks with lending exposures to these sectors face a higher possibility of rising defaulting loans and higher losses given default from potential reductions in the value of collateral securing the loans if they become stranded assets.

Overall lending losses arising from transition risks within banks' lending activities to businesses were observed to rise substantially in both climate scenarios. Lending losses to businesses were relatively higher under the Delayed Transition Scenario, reflecting the impact on businesses operating in sectors of the economy that contract during the transition to a lower emissions economy (Figure 11).

[26] This includes bank lending for corporates, small and medium enterprise (SME) corporates and commercial property. For simplicity, sovereign, financial, derivative, and off-balance sheet exposures were out of scope.

Figure 11. Aggregate annualised loss rates



Current Policies and Delayed Transition Scenarios, static balance sheet

The participating banks noted several challenges in completing a detailed assessment of the impacts of transition risks to their business lending portfolios within the constraints of the CVA. These challenges included adapting existing credit risk models for the climate risk scenario, and consideration of sectoral impacts not captured by common scenario modelling. Due to these factors, the depth of each bank's assessment varied considerably; for example, the number of sectors considered discretely by banks ranged from seven to 43 sectors.

Aggregate increases in lending losses under the Delayed Transition Scenario arose predominantly from the mining, manufacturing, and transport sectors (Figure 12). These sectors represent four, eight and eight per cent respectively of business lending exposures assessed. However, this number is offset by some sectors – agriculture and wholesale trade - with lower losses under the Delayed Transition Scenario after the initial policy shock (2031-2050).

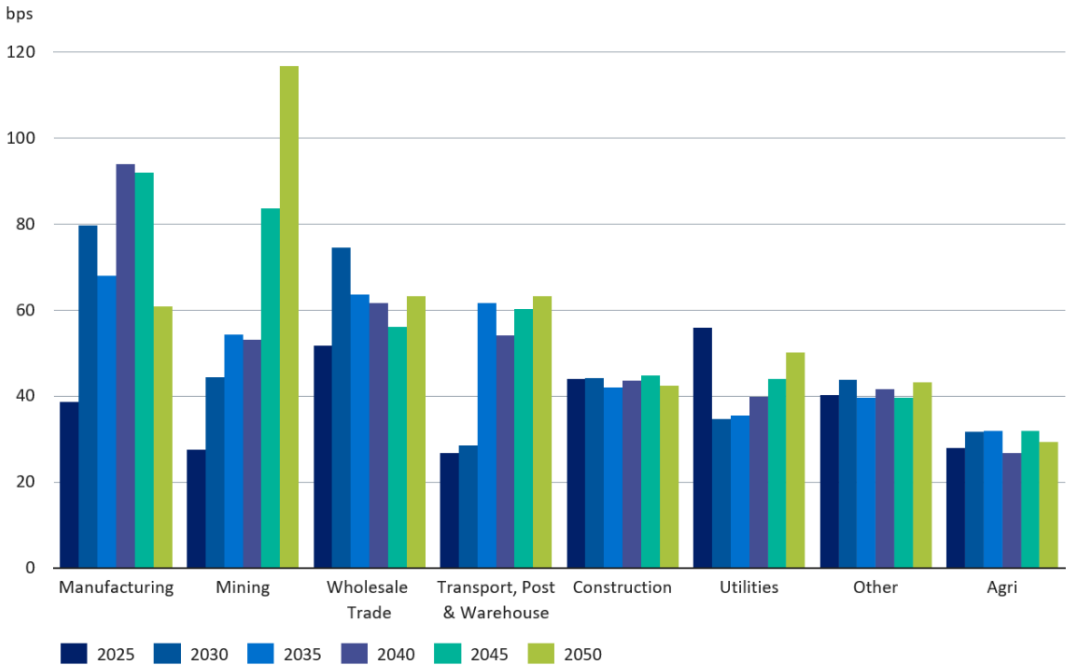
Significant variability in aggregate loss rates was observed between the participating banks, largely driven by differences in how each bank modelled the impacts of transition risks on individual sectors.

In exploring potential responses to rising lending losses under the Delayed Transition Scenario, the banks projected that they may respond by changing the composition of their business lending portfolios, particularly through significant reductions in their exposures within the mining sector, where the impact of transition climate risks were most acute. In aggregate, this reduced exposure to Coal Miners (90 per cent) and Oil & Gas Extractors (72 per cent).

However, these changes did not result in a broad-based reduction in overall lending to businesses as banks increased lending to other sectors of the economy less impacted by transition risks. The sectors that grew under the climate scenarios present potential future

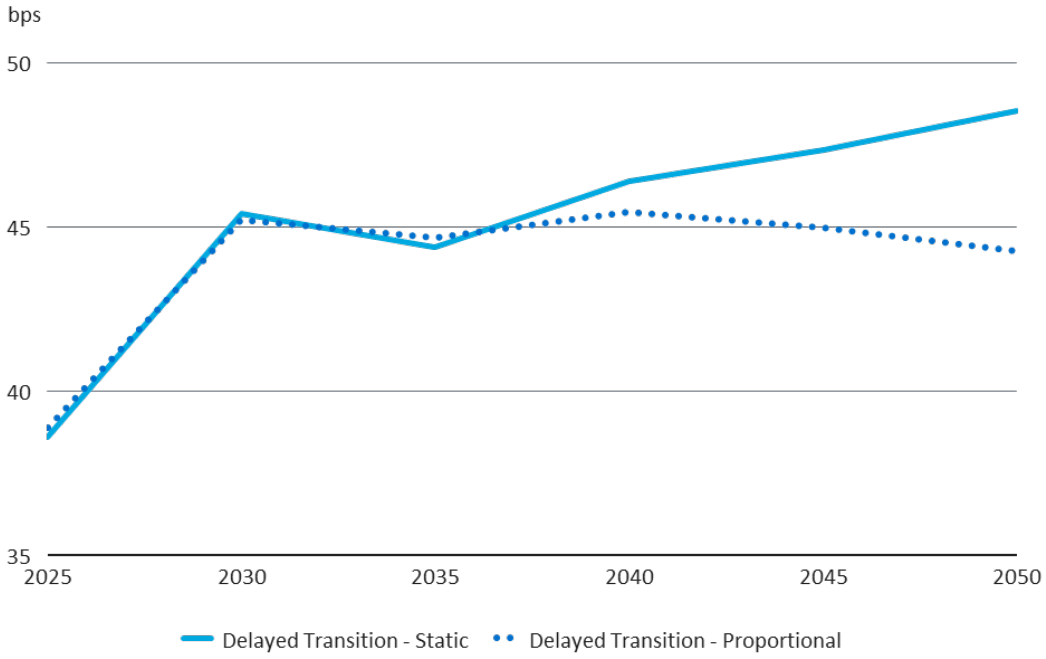
lending opportunities for the banks. Under the proportional balance sheet approach, which allows the banks more freedom to reallocate lending exposures, banks projected adjustments to their portfolios to reduce their exposure to higher impacted sectors under the Delayed Transition Scenario, resulting in a lower overall loss rate (Figure 13).

Figure 12. Annualised loss rates in business lending from transition climate risks, by ANZSIC division



Delayed Transition Scenario, static balance sheet

Figure 13. Aggregate annualised loss rates from transition climate risks, business lending



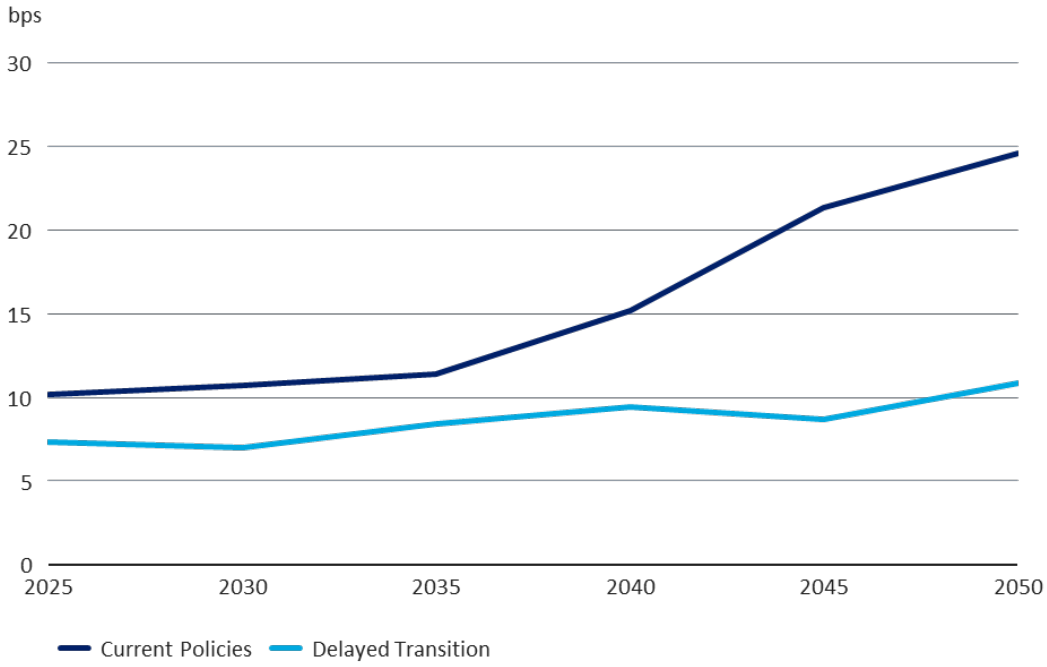
B.4 Agriculture

The participating banks assessed the impacts of physical climate risks to a total of $43 billion in business lending exposures to agricultural businesses[27] (approximately one per cent of their total Australian exposures)[28].

Increasing frequency and severity of extreme weather events can present a challenge to the productivity of agricultural systems. Agricultural businesses that face sustained periods of lower yields will be constrained in their ability to generate earnings and meet debt servicing obligations. The value of loan collateral would similarly be adversely impacted.

Total lending losses arising from rising physical risks within banks' agribusiness portfolios under the Delayed Transition Scenario did not materially increase. However, within the Current Policies Scenario, the greater occurrence of physical risks resulted in the emergence of materially higher lending losses, with loss rates observed to rise significantly from 2025 to 2050 (Figure 14). Grain and beef cattle sectors were the most impacted under the Current Policies Scenario, with loss rates rising in most major geographical regions (Figure 15).

Figure 14. Aggregate annualised loss rates from physical climate risk in agribusiness lending

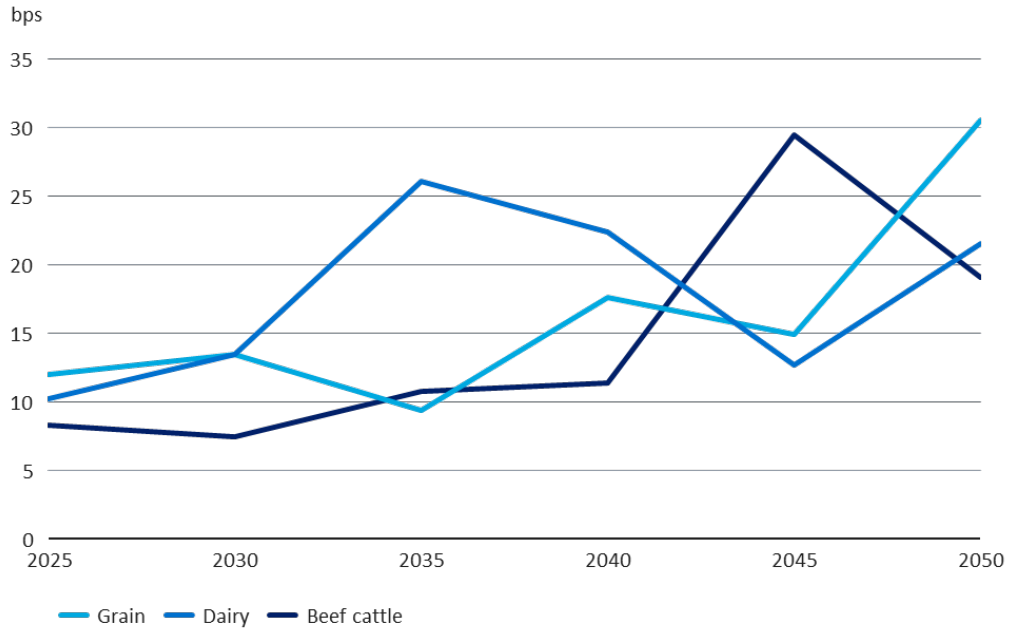


Current Policies and Delayed Transition Scenarios, static balance sheet

[27] APRA requested banks to submit agricultural business lending results with the assumption of no adaptation.

[28] Only four banks participated in this assessment given the immateriality of agriculture exposures to one of the participating banks.

Figure 15. Aggregate annualised loss rates by agriculture chain and natural resource management cluster



Current Policies Scenario, static balance sheet

The banks noted several challenges in completing a detailed assessment of the impacts of physical risk in their agricultural lending portfolios within the constraints of the CVA, including accounting for the distribution and extremes of potential future climate outcomes (such as severe heatwaves, droughts, and flooding) that may be hidden by broader averages. Overall, the participating banks continued to support their agribusiness lending activities, with no broad-based reductions under either climate risk scenario.

B.5 Counterparty Assessments

Detailed and tailored assessments of large counterparties offer alternative and complementary insights to portfolio-level modelling when assessing the impacts of climate risk. For the counterparty assessments, the participating banks conducted both quantitative and qualitative evaluations of the impacts of the two climate scenarios on the credit quality of 25 of their largest non-financial counterparties. This included analysing impacts to cash flow, climate metrics, and management actions taken by counterparties in response to emerging climate risks.

Risk impact

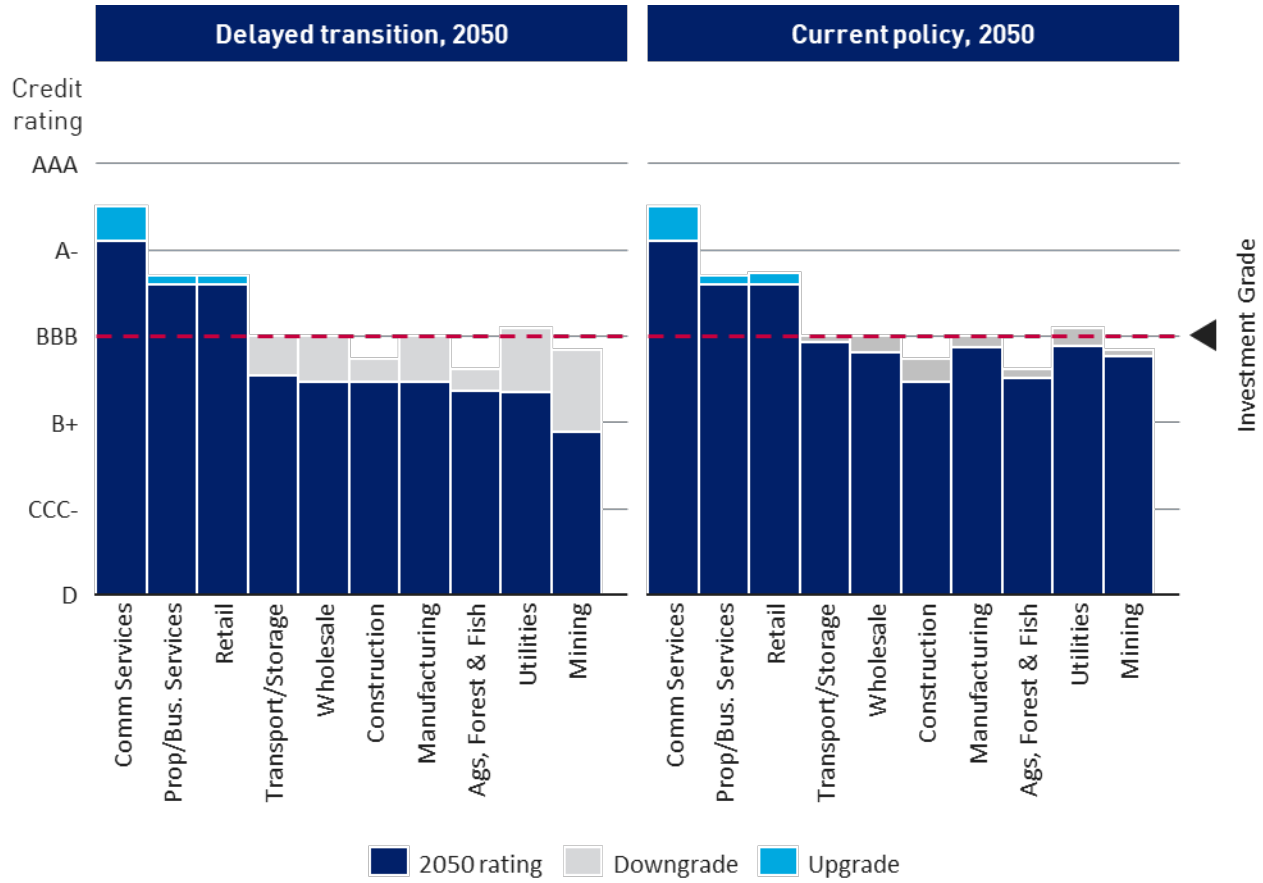
Assessments carried out by the participating banks revealed that physical and transition climate risks can result in negative credit rating impacts across some of their largest counterparties (Figure 16). This impact was more prominent within the Delayed Transition Scenario, where counterparties from emissions intensive sectors (e.g. fossil fuel extraction and related businesses, mining and certain utilities) were assessed to experience the greatest impact to their credit quality.

Counterparties assessed by the banks as being better positioned to transition towards a lower emissions economy, and as a result potentially minimise the impact from external emissions prices, saw more moderate or even positive credit rating impacts. For example, the credit rating assessments returned by the banks suggest that the communications, property/business services and retail sectors would improve their average credit rating under both scenarios.

Overall, the credit rating impacts on the counterparties were assessed by participating banks as more severe under a Delayed Transition Scenario, where banks' internal assessment of counterparty credit ratings broadly fell below investment grade across most industrial sectors (Figure 16). Approximately six per cent of counterparties were assessed to be in default by 2050, all from fossil fuel dependent industries.

By comparison, the negative impacts to credit ratings under the Current Policies Scenario were assessed as milder, as reflected by the weighted average internal ratings remaining at investment grade, and no counterparties in credit default by 2050 (Figure 16)[29]. However, these milder credit results should be treated with caution, as outside of the agriculture sector the banks' ability to assess the physical climate risks faced by their counterparties was limited.

Figure 16. Counterparty internal credit rating impact, by sector



[29] Weighted by exposure at default in dollars.

In exploring potential responses to the estimated impacts under the scenario(s), different banks considered different options or approaches, including:

- charging an additional credit spread to reflect increased risk;
- limiting leverage limits such as loan to asset ratios;
- limiting loan amounts and/or tenors; and
- exiting the counterparty relationship.

Risk drivers

Under the Delayed Transition Scenario, the banks identified that emissions pricing was a material factor in driving changes to the economy (particularly for emissions intensive sectors[30]) that in some cases resulted in lending losses for the banks. Other key risk drivers identified by the banks included changes to regulation, technology, and revenue mix reflecting changes to customer demand.

Under the Current Policies Scenario, the drivers were less clear. While the banks' qualitative assessments cited physical risks as the most common risk driver across all counterparties (Figure 17), these physical risks manifested as credit risk impacts primarily for agricultural counterparties that represented approximately 10 per cent of total counterparty exposures assessed.

For non-agricultural counterparties, representing approximately 90 per cent of total counterparty exposures assessed, only one of the five participating banks attempted to quantitively assess[31] the impacts of physical risks[32]. Instead, most of the banks made assumptions that non-agricultural parties could materially mitigate physical risk impacts through reliance on business insurance or through operational resilience measures. While these assumptions moderated the financial impact of physical risks to counterparties, it also implied a reliance on access to affordable insurance to mitigate the financial impacts of physical climate risks.

The banks also qualitatively identified a range of secondary risks from extreme climatic outcomes that could impact factors including outdoor labour productivity, public infrastructure and wider supply chain dependencies. The banks did not assess these risks for counterparties in a quantitative manner.

For physical risks facing agricultural counterparties, the participating banks predominantly focused on productivity losses arising from changes to average climatic variables such as

[30] The macroeconomic modelling carried out for the CVA applied a common emissions price across all priced sectors in each year, with no differentiated treatment for emissions intensive industries (whether domestic or export-facing).

[31] The operations of large counterparties can span multiple physical geographies, across different industry sectors. For those reasons, the participating banks were only asked to assess the physical risks facing a small number of counterparties, rather than across their entire business lending portfolio.

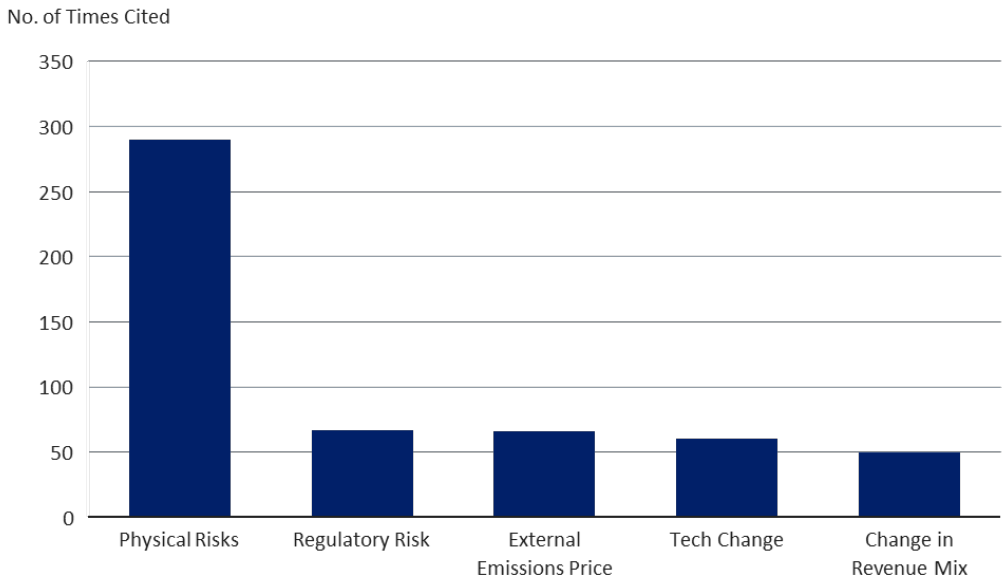
[32] The bank used average corporate annual loss estimates resulting in moderate impacts on non-agricultural assets. Those losses were broadly assumed to be mitigated by business insurance.

average surface temperature, rainfall and humidity. Broadly, banks concluded that the counterparties would be able to adapt to these changes which therefore resulted in milder financial impacts.

However, these average changes are expected to be accompanied by increasingly frequent and more severe extreme events such as heatwaves, bush fires, droughts and floods. While one of the participating banks sought to model the financial impact of extreme weather events (consistent with the change in average climate variables) into their counterparty analysis, there remains an opportunity for the banks to further develop climate risk assessment of extreme physical risk events that will accompany changes in average climate variables such as temperature.

From a transition risk perspective, some banks assessed mitigation, adaptation, and transition plans to gain deeper insights into the climate risks facing their counterparties. This included assessing counterparty strategies such as investing in new technologies, diversifying revenues streams, or even materially changing their business models. Those banks that engaged directly with counterparties were able to validate and enhance their understanding and obtain deeper insights than banks that only used publicly available information.

Figure 17. Most frequently cited counterparty qualitative climate risk drivers



Counterparties that are seeking to understand and address (where appropriate) long-term transition risks could present a lower risk to banks in the future. The results of the counterparty assessment showed that around 20 per cent of counterparties had some form of transition plan, while 35 per cent had some form of climate targets[33]. Around 37 per cent did not have any formal climate transition plans or targets (Figure 18).

The assessments also included examples of sustainability-linked factors such as a counterparty's internal recycling or water-usage programs. While these factors provided an indicator of the counterparties' awareness and action on wider sustainability issues, their value in interpreting climate-specific risks was less clear. This suggests that the banks may benefit from developing a more structured approach to counterparty assessments to methodically determine what factors are materially relevant.

One bank did not provide APRA meaningful counterparty credit analysis data, citing contractual obligations, thereby limiting APRA's ability to assess their capability for assessing the impacts of climate risk on their counterparties.

B.6 Data quality assessments

Data quality assessments were used to assess key climate-related attributes for both internal (bank-owned/managed) and external (third party climate and economic) data utilised in the CVA. These assessments indicate that there are opportunities to further improve climate-related data quality and accessibility.

Physical risk data

APRA-provided datasets were typically rated as moderate resolution[34], while external data tended to be higher resolution (Figure 19). As physical climate risks can be highly localised, higher resolution risk and asset location data, by specific hazard, provided greater confidence in the alignment between risk and asset profiles.

The usage of external data for the CVA was mixed, with two of the participating banks sourcing data from third parties for climate hazards or chronic climate variables (Figure 19).

The participating banks reported that they were unaccustomed to using data on rates of non-insurance: consequently, most banks relied on APRA-provided data for this aspect of the CVA. One bank used externally sourced, higher resolution data to understand general insurance coverage for specific climate hazards, while another bank took a more conservative approach and assumed defaulting borrowers would not have any insurance coverage due to affordability issues.

[33] Transition plan or targets were broadly described as being explicit to addressing climate change and covered topics such emissions reduction or adaption to changing climate conditions. There was no assessment on alignment to any net-zero objective or trajectory.

[34] Address-level data is considered high resolution. Postcode-level is considered moderate resolution, while national-level is considered low resolution.

Some of the banks commented there would be benefit in an industry-wide approach to develop a better understanding of how insurers will respond to climate risks in terms of changes to pricing, policy coverage, and rates of underinsurance or non-insurance. Other banks have already advanced their own in-house insurance expertise.

Figure 18. Counterparties with formal climate transition plans or targets

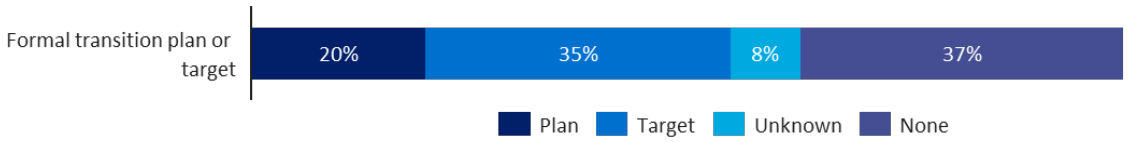
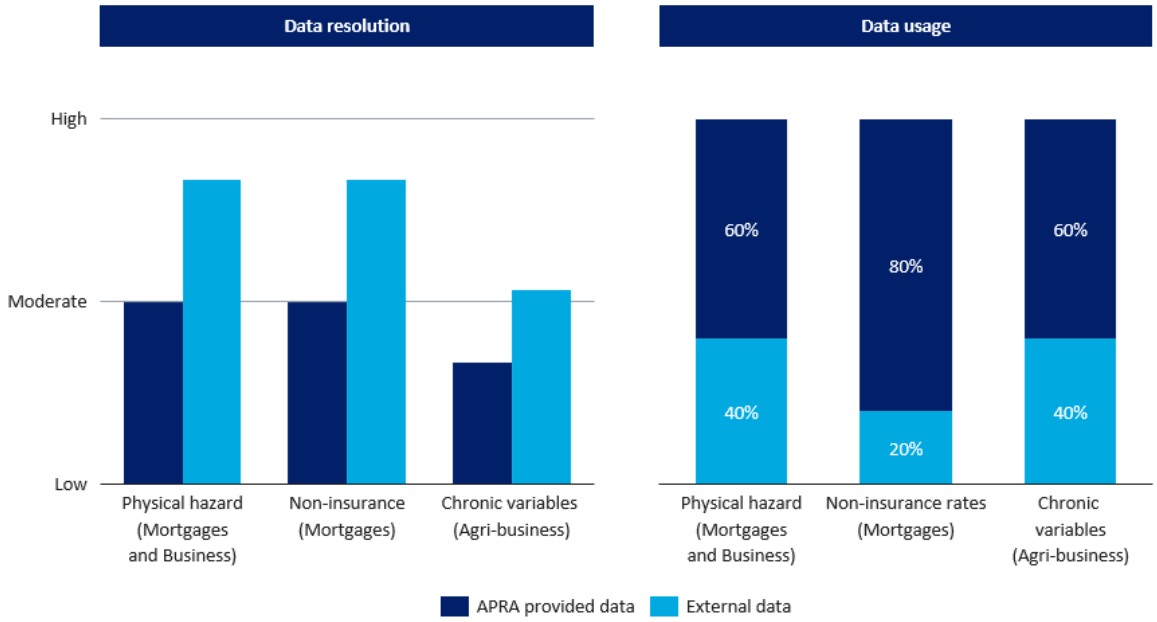


Figure 19. Average physical climate data resolution and usage in the CVA



Transition risk modelling data

APRA provided the participating banks with a common set of economic data for the transition climate risk assessments. For the purposes of the CVA, this helped avoid potentially diverging macro-economic projections.

Banks seeking to carry out independent climate scenario analysis will need to model their own transition risk data. Some of the challenges encountered on the economic data included:

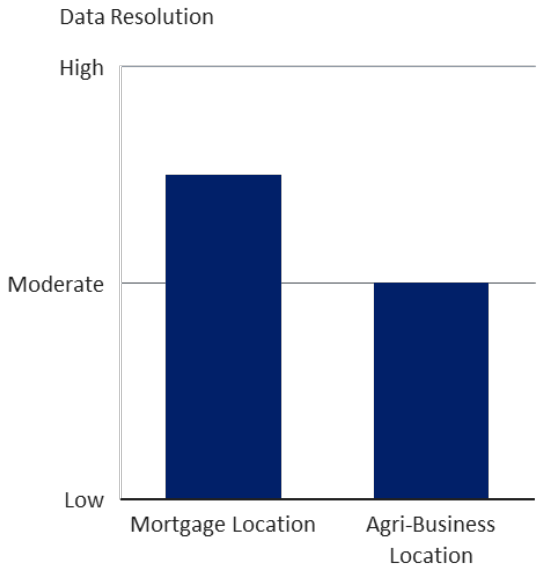
- downscaling national macro-economic impacts to specific industrial sectors or regions (e.g. GDP, consumption, inflation);
- projecting labour mobility between specific industrial sectors or regions (e.g. sub-national level unemployment trajectories); and
- estimating the impact of emissions pricing and technology evolution over long time horizons.

Internal bank data

Physical climate risks can be very localised, and the accuracy of risk assessments is dependent on the resolution of asset location data. The participating banks reported high certainty over the physical location of their exposures to residential mortgages (Figure 20).

The relationship between business lending exposure and the physical location of the business activity was less robust. Agricultural business locations were generally available at a postcode level, which translates into more uncertainty as to the exact physical location and risk of agricultural business assets (Figure 20).

Figure 20. Average spatial resolution of asset location data



Although the asset location of non-agricultural businesses was an optional component of the assessment, APRA's understanding is that non-agricultural business data was typically limited to corporate headquarter addresses with limited data available for other corporate operational asset locations such as buildings, plant, infrastructure, and other facilities. This difference in knowledge of the spatial distribution of business lending exposures presents an area for data quality development.[35]

B.7 Data capabilities

APRA facilitated access to some data for use in the CVA by the banks, such as the transition risk modelling data referred to in Section A.5. However, APRA considers that the assessment of climate risk – in common with other risks that entities manage – is best delivered by entities: this includes appropriate upskilling to address potential knowledge and data challenges.

Availability of greenhouse gas emissions data

Reporting on emissions data was not a mandatory aspect of the portfolio-level climate risk assessments carried out for the CVA; however, the participating banks did provide some relevant commentary and data as part of the counterparty assessments. The banks all viewed an external emissions price as a potentially significant driver of credit risk, with counterparties potentially exposed to emissions prices both at home and abroad. Accurate and accessible emissions data is therefore integral to assessing the financial impacts from climate risk and remains a clear development opportunity.

There is a broad view that obtaining accurate emissions data for counterparties is challenging. This view is supported by the banks' submissions which suggests that there are data availability challenges, particularly for identifying the scope 3 emissions of their counterparties. In terms of materiality, scope 3 emissions are widely perceived as the most significant category for the banks, and their submissions supported this view.

The banks sought scope 1, 2 and 3 emissions data for counterparties that had emissions arising from the downstream combustion of fossil fuels ("Category A" counterparties, such as coal miners and transporters[36]), and scope 1 and 2 emissions data for the remaining counterparties ("Category B" counterparties). The participating banks were able to identify scope 3 data for just under half (43 per cent) of the Category A counterparties[37]: the implied difficulty in identifying scope 3 data aligns with broader industry comments on the evolving nature of scope 3 emissions assessment and reporting. However, where scope 3 emissions

[35] Notwithstanding physical risk assessment of non-agricultural business lending was an optional part of the CVA.

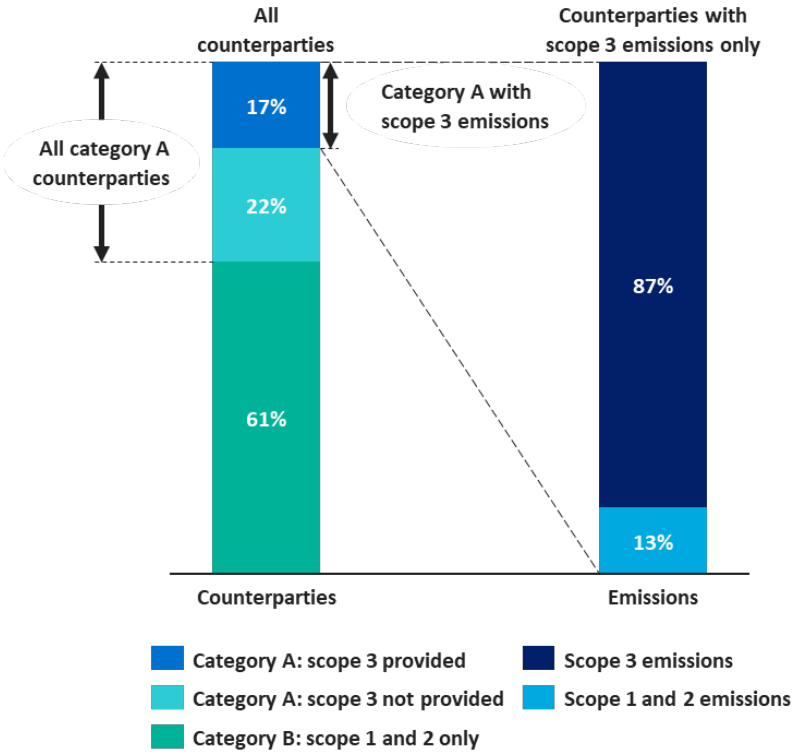
[36] While scope 3 emissions can arise from a much broader range of business-related activities (c.f. the GPG Protocol's *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*), scope 3 emissions assessment for Category A counterparties in the CVA was restricted to the emissions released from the combustion of fossil fuels produced by that counterparty (e.g. a fossil fuel miner) or that were in the value chain of the counterparty (e.g. a fossil fuel transporter).

[37] Despite scope 3 emissions not being identified for all Category A counterparties, the banks were able to identify scope 1 and 2 emissions for all Category A counterparties.

were identified, they were typically a material component of the counterparty's overall emissions footprint, accounting for the majority of scope 1, 2 and 3 emissions[38] (Figure 21).

For Category B counterparties, the banks were able to identify scope 1 and 2 emissions for over three quarters (78 per cent) of all counterparties assessed: for these counterparties, scope 1 emissions tended to be the dominant source of emissions[39]. In identifying scope 1 and 2 emissions, the banks relied on public data reported under the National Greenhouse and Energy Reporting (NGER) scheme and information disclosed by counterparties in public reports, while in some cases emissions were estimated using emissions factors from NGER determination.

Figure 21. Counterparty and emissions scope breakdown



[38] Some scope 3 data provided by the banks was considered beyond a reasonable range, and not considered further.

[39] In some cases, a combined scope 1 and 2 emissions number was provided by the banks for the counterparty assessment. Counterparties with combined emissions data were excluded from the analysis presented here.

B.8 Broader climate risk management capabilities

As climate scenario analysis and modelling are a developing area, most banks adopted a hybrid approach where internal subject matter experts[40] contributed to the CVA (typically on a project basis), and external partners were used to bridge resource and skills gaps. Some banks took the decision not to utilise external partners: rather, they focused on building climate risk capabilities in-house. Each participating bank, whether through an in-house or hybrid approach, realised benefits in retaining enduring capability uplifts from the CVA process.

Despite the data challenges and uncertainties in climate scenario analysis, undertaking the CVA benefitted the participating banks by accelerating the enhancement of enterprise-wide climate risk management capabilities and exploring new ways to measure climate risks. The banks noted that while other internal climate-related initiatives may have been underway, the CVA was a major catalyst for cross-functional collaboration that assisted in developing institutional-wide climate risk management capabilities.

The CVA required a multidisciplinary approach beyond the stress testing or ESG functions that have typically managed scenario analysis and climate risks centrally within banks to date, with input from front-line businesses, risk management and finance functions. As a result, the CVA provided a platform to improve climate risk knowledge and build risk awareness across different bank functions.

The banks also identified the CVA as a driver for reassessing and investing in climate risk resourcing and shaping organisational structures. Some of the participating banks moved climate risk analysis closer to functions that have a financial focus such as credit risk and treasury functions, with the aim to improve their ability to quantitatively analyse and assess the financial exposure to climate risks.

There was broad recognition that these developments are just the first step, and more is required to continue to iteratively uplift the banks' internal climate risk management capabilities.

[40] Internal subject matter experts supporting the CVA typically included staff from ESG, credit, finance, modelling, stress testing and front-line business teams.