Journal of Cleaner Production 334 (2022) 130211

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Barriers and enablers to sustainable finance: A case study of home loans in an Australian retail bank

H. Cheung *, A. Baumber, P.J. Brown

Transdisciplinary School, University of Technology Sydney, Sydney, Australia

ARTICLE INFO

Handling editor: Zhifu Mi

Keywords:
Barriers
Enablers
Climate risk
Barriers frameworks
Political-institutional
Socio-cultural

ABSTRACT

Large financial institutions are inextricably linked to the climate risks and opportunities affecting their customers and have the potential to stimulate action on climate change though their lending decisions and policies. Ensuring that the prices of assets, including residential property, reflect climate risks is essential in averting the systemic risk climate change poses to financial stability. By undertaking a case study of a major Australian bank through interviews and focus groups with twenty-six participants, we identify factors influencing climate-related decisions affecting home loans and draw together a framework of barriers and enablers building on prior literature. The framework's six categories are economic market failure, economic non-market failure, political-institutional, socio-cultural, behavioural and organisational, with more specific factors within each category. Interdependencies and relationships between factors mean they cannot be perceived or addressed in isolation. Further theorising of the stages of decision-making within the case bank reflect a need for proactive, comprehensive action embedded in core value creating processes and internal governance, that interact with and are deeply connected to the broader society and environment in which the bank operates.

1. Introduction

In a world where corporations have amassed power greater than states (Rhodes, 2016), the role of private financial institutions in transitioning to a decarbonised society is becoming increasingly important. This has been recognised by recent global efforts including: the UNEPFI Principles of Responsible Banking which has seen 265 banks become signatories, representing more than 45% of global banking assets (UNEPFI, 2021); the European Union's High Level Expert Group on Sustainable Finance; the United Kingdom's Green Finance Taskforce; the Network for Greening the Financial System; rise of social banking and Global Alliance for Banking on Values which now has 67 members; and the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD). In an Australian context, the Climate Measurement Standards Initiative aims to tailor the broad framework of the TCFDs on a national scale; the Australian Sustainable Finance Initiative has developed a Sustainable Finance Roadmap; the Reserve Bank of Australia (RBA) has examined climate change risks to Australian banks; and the Australian Prudential Regulation Authority (APRA) has instigated a Climate Vulnerability Assessment.

The increasing focus on financial institutions' response to climate change recognises the power of these institutions, their part in contributing to global warming, and their susceptibility to increased risks from financial instability and economic losses if global temperature rises cannot be limited to 1.5 °C (Carney, 2015; Dafermos et al., 2018; Scott et al., 2017). Global GDP losses have been estimated at over USD23 trillion for our current trajectory of a 4 °C increase by 2100 (Kompas et al., 2018). Based on banks' social, fiscal and historic responsibility and their extensive resources, there is potential for them to contribute to climate resilience in a just way (Prattico, 2018).

However, delivering financial and climatic stability as interconnected public goods will require "deep transformations in the governance of our complex adaptive socioeconomic and financial systems" (Bolton et al., 2020 p.2). The current misalignment between banks' pursuit of private interests and the development of societal objectives represents a clear "credit market failure" (Campiglio, 2016). This is evident in the continued USD3.8 trillion investment in fossil fuels by 60 of the world's largest private banks since the signing of the Paris Agreement (Rainforest Action Network, 2021); the shifting of risk from banks and shareholders to the public through bailouts related to the Global Financial Crisis (GFC); and recent scandals involving the facilitation of suspicious transactions by criminal networks (BBC, 2020).

* Corresponding author.
E-mail address: hollie.cheung@alumni.uts.edu.au (H. Cheung).

https://doi.org/10.1016/j.jclepro.2021.130211
Received 5 March 2021; Received in revised form 15 December 2021; Accepted 18 December 2021
Available online 22 December 2021

The research objective of this article is to identify the barriers and enablers to the incorporation of climate change into decision-making around home lending within Australian retail banks. Global warming compounds existing vulnerabilities within our (financial) system, including housing, where the residential mortgage market is an under-researched aspect of banking in this context. The potential for climate-related stranded assets has major implications on the USD217 trillion global real estate market, which includes USD162 trillion of residential property (Savills, 2013) and USD11.2 trillion of residential mortgage debt held by lenders (Goodman, 2020). Alongside transition risks to business lending, physical risk to mortgage portfolios poses the largest threat to the Australian banking system (Bellrose et al., 2021). Further, the financialisation of housing (O'Callaghan and McGuirk, 2021) in part by repackaging it into further financial products and funds, 'expands the tentacles of property asset value throughout global finance networks', where 'stranded real estate assets provide a vehicle for intensifying the threat of climate-related stranded assets because they reach further into and have broader exposure in capital markets than fossil fuel assets' (Muldoon-Smith and Greenhalgh, 2019, p.63). This is similarly reflected in Battiston et al.'s (2017) climate stress test of the financial system, finding aggregate estimates for bank exposures on loans as a fraction of the bank's capital to be 73% for housing (compared to 11.4% for fossil fuels and utilities), additionally including loans to households assumedly most for mortgages, adds another 208% of exposures to the housing sector as a fraction of capital.

Numerous features of the residential mortgage market make it suitable for studying environmental credit market failure. As with fossil fuels, residential properties are immobile assets with multi-decadal maturities, making them vulnerable to physical climate risk (Muldoon-Smith and Greenhalgh, 2019). Furthermore, mortgage applications are subject to the discretionary approval of local loan officers, whose perceptions of climate change can affect decisions. Residential energy use also accounts for a significant portion of GHG emissions (e.g. 20% in the US). In addition, the flow-on effects of market failures around residential mortgages are substantial due to home loans making up a significant proportion of banks' balance sheets, with other financial institutions (e.g. insurers and superannuation funds) also having exposure and real estate being the largest asset and liability for many households (Baldauf et al., 2020; Duan and Li, 2021; Goldstein et al., 2020; Schütze, 2020), doubling as social insurance and the asset in asset-based welfare in Western welfare states (Conley and Gifford, 2006; Doling and Ronald, 2010).

In this paper, we seek to identify factors influencing climate risk and opportunity decisions in large financial institutions through a case study of the home loan unit within a large Australian commercial retail bank. The underlying research question considers:

What are the factors, both barriers and enablers, impacting climate-related decisions within a large financial institution?

This paper contributes to literature on climate-related risk to financial institutions, particularly the asset of residential mortgages and its influence on internal decision making, the use of barriers framework approaches and transdisciplinary research methods. To study this issue in a real-life context, Transdisciplinary Co-Production and Participatory Action Research (TDCP PAR), involving interviews and focus groups was employed. To systematically analyse a large institution (a bank) in the context of a complex challenge (climate risk and homes), we have utilised a barriers framework approach to identify barriers and enablers to climate-related decisions. Sorrell et al.'s (2004) Barriers Framework is one of the most widely applied taxonomies in sustainable development. Mindful of limitations, we used this as a starting point and incorporated other categories and factors found in literature and organically throughout the research process.

This paper is structured as follows, Section 2 contains background on climate change, commercial retail banks and home loans, and an overview of the transdisciplinary approach and barriers frameworks. Section 3 outlines materials and methods, Section 4 presents results including most salient factors, Section 5 contains the discussion, including strategies for enabling climate-related decisions, limitations and suggestions for future research. Section 6 concludes.

2. Background and theoretical framework

2.1. Commercial banks and climate risk

Climate risk can be divided into physical risk, which arises directly from climate and weather-related events, and non-physical risk, which includes reputational and liability risk (e.g. negative public perceptions or demands for compensation) as well as transition risks related towards new consumer preferences, technologies and regulatory conditions (Scott et al., 2017; TCFD, 2017). These non-physical risks are interdependent (Zenghelis, 2012) and can impact financial stability where they affect the value of financial assets or insurance liabilities (Christophers, 2017). Moreover, climate-related risks are drivers of conventional prudential risk including, credit, market, liquidity and operational risk (Feridun and Güngör, 2020).

Following the GFC, the interconnected nature of the financial system was widely noted as contributing to its collapse (May et al., 2008) and recently the ability of climate change to instigate financial crisis has been noted through investigations of the Tragedy of the Horizon, a Climate Minsky Moment and Green Swan events (Bolton et al., 2020; Carney, 2015). Lamperti et al. (2019) find that climate change may increase the frequency of banking crises between 26 and 248%, where rescuing insolvent banks may cause an additional fiscal burden of approximately 5–15% of GDP per year. The impact of climate policy shock may be exacerbated by interbank distress contagion and common asset exposures, with potentially numerous rounds of cascading effects (Roncoroni et al., 2021). As commercial banks are instrumental in providing financial services to a diverse range of economic actors, they are exposed to the full range of climate risks encountered by their customers and commercial partners.

The exposures of financial actors to climate-related risks relate to three main financial instruments: equity holdings, bond holdings and loans (Battiston et al., 2017). Bond holdings and loans are particularly relevant to commercial banks, with bank lending being an important source of external finance for businesses and playing an important role in the creation of new credit in the economy (Campiglio, 2016). As such, significant exposure to climate risk for commercial banks creates a systemic risk of restricted lending and reduced credit supply across the broader economy (Lamperti et al., 2019; Scott et al., 2017). Noting that the consideration of climate "risks" within the private and financial sector has been criticised as using familiar language for performative work to turn dangers into opportunities for continued capital accumulation and expansion, allowing businesses to manage uncertainty and complexity while emphasising "a vision of human mastery over nature" to reinforce the status quo (Wright and Nyberg, 2015 p.72) and avoiding ethical discourse and morals (Christophers, 2017; Goldstein et al., 2019).

Despite acknowledgement of the fact that "corporate climate finance is an essential part of the solution to dangerous global warming" (Bowman, 2015, p.63), there is limited literature on how climate risks and opportunities are incorporated into decision-making in commercial banks. Literature on commercial banks and climate change has instead tended to focus on sustainability reporting (Islam et al., 2011), the role of microfinance (Agrawala and Carraro, 2010), Sustainable Development Goals (SDG) (Avrampou et al., 2019; Cosma et al., 2020), Corporate Social Responsibility (Hassan Al-Tamini, 2014; Hu and Scholtens, 2014) and carbon finance (Fan et al., 2011). Further studies have investigated Environmental Credit Risk Management (ECRM), asserting that sustainability risks influence counterparty risks (i.e. the default risk of a borrower, such as reputation of the debtor, ability to repay, future earnings, value of the collateral, debt to capital ratio etc.) (Weber et al., 2010). Mengze and Wei (2015) find Australian banks have modest

ECRM performance (while banks in Canada, Japan and the US performed the best), and that correct credit default predictions improve by approximately 7.7% when sustainability criteria were added to conventional credit risk indicators (Weber et al., 2010). Outside of ECRM, two notable examples of academic literature that focus on decision-making processes involving climate change within commercial banks are Furrer et al. (2012) and Bowman (2015).

Furrer et al. (2012) provide a framework for climate strategies at a range of levels, including "operations" (mitigation and offsetting), "business" (specialised products and services, integration into core business processes) and "governance" (management framework, risk management, data management, intellectual capital and disclosure, engagement and leadership). Their study indicates commercial banks often engage in "defective decoupling", where climate actions are symbolic and do not substantially alter organisational value-creation processes or develop new capabilities, and "purporatory decoupling", where organisations do not implement the actions they promise. Their analysis of 114 banks resulted in four classifications: "hesitators" (48% of the sample) that implement no or very few climate-related activities at the operations level, "product innovators" (20%) that focus their climate-related activities on developing novel products and services, "process developers" (26%) that focus their activities on governance frameworks and top management responsibility, and finally "forerunners" (5%) that integrate climate change comprehensively into their value-creating processes (Furrer et al., 2012).

Bowman's (2015) book *Banking on Climate Change* reports on 32 semi-structured interviews involving banks in Australia, the US and the UK to determine what drives early moving banks to adopt climate-related practices. Key drivers identified by Bowman (2015) are corporate reputation and risk mitigation. Conversely, identified limitations include challenges in making a compelling business case for green initiatives (relative to non-green initiatives), banking regulation and governance, and a focus on incremental rather than transformational change. Whereby green activities are often an extension of current practice that end up being siloed or peripheral rather than becoming a core part of a bank's organisational functioning. With regards to corporate regulation and governance, Bowman identified Australia as being "the least certain and least incentivising of all three jurisdictions" (Bowman, 2015, p.116). A characterisation which remains relevant today, where just 27 of 79 Royal Commission recommendations to reform the financial industry have been adopted; proposed changes in responsible lending laws could shift from "lender beware" to "borrower responsibility"; and the power of the Australian Securities and Investments Commission (ASIC) who polices the financial system is perceived to be weakened (Butler, 2021; Paterson et al., 2020; Schmulow, 2021).

2.2. Climate change and home loans

Climate-related risks do not operate in isolation and could compound existing vulnerabilities in the financial system, such as the COVID-19 vulnerability of stressed financial institution balance sheets (Litterman et al., 2020). Regardless of climate risk, housing presents a significant vulnerability within the financial system, as exemplified by the GFC. Crowe et al. (2013) find that of the 46 systemic banking crises for which house price data is available, two-thirds were preceded by boom-bust patterns in house prices, which can reduce the supply of credit for other economic activities. Failure to accurately price assets to reflect climate change, including real estate assets, has significant implications for financial stability and the (mis)allocation of resources (Furukawa et al., 2020). However, by taking proactive, substantive action, financial institutions including mortgage lenders, can reduce the costs of climate chance and help households navigate through increasing climate risk (Ouazad and Kahn, 2019).

Recent studies in the US (Litterman et al., 2020), Japan (Furukawa et al., 2020) and Germany (Schütze, 2020) have sought to understand the role of residential real estate in the management of climate risk at a national level. Other recent research primarily from the US, provides some evidence of lenders responding to climate risks, such as abnormally high local temperatures leading to smaller loans and fewer approvals (Duan and Li, 2021) and natural disasters causing lenders to favour mortgages that can be securitized so that climate risk can be transferred to Government-Sponsored Enterprises (Ouazad and Kahn, 2019). However, this contrasts with the findings of Garbarino and Guin (2021) where severe flooding in England between 2013 and 2014 did not result in lenders adjusting interest rates or loan amounts in residential mortgage refinancing. Limitations in scientific knowledge and reliable information, combined with institutional barriers, can impact on how well lenders are able to accurately respond to climate risk in home lending (Keenan and Bradt, 2020).

Further literature has also examined the connection between climate change and residential real estate prices in the US. With regard to sea level rise, Bernstein et al. (2019) find exposed houses sell for approximately 7% less than unexposed properties, while Murfin and Spiegel (2020) examine coastal home sales and projected inundation and find limited price effects. Lack of information disclosure leads to the overpricing of houses in flood risk areas, where houses advertised with climate-related information sold at 2–3% less than those without (Giglio et al., 2021). Studies have also found house prices reflect heterogeneity in beliefs about climate change, with projected flood risk believer neighbourhoods selling at a discount compared to denier neighbourhoods (Baldauf et al., 2020). There is also evidence of natural disasters leading to increased mortgage default rates, for example from wildfires in California (Issler et al., 2020).

2.3. Barriers frameworks and their applications

Prior studies in similar decision-making contexts indicate it is necessary to combine multiple theories to explain reasons for inaction on climate-related activities. One approach which has enabled the explication of multiple theoretical perspectives is the use of framework theories (e.g. Gifford's (2011) on climate inaction, Tura et al. (2019) on circular business). Arguably, one of the most comprehensive attempts at this is Sorrell et al.'s (2004) Barriers Framework which was originally developed to explain why energy efficiency initiatives were not employed. Resulting from a systematic literature review, the Barriers Framework is the most widely used taxonomy of barriers to energy efficiency and follows on from various earlier attempts to classify barriers in a comprehensive taxonomy. We take the Barriers Framework as our starting point for identifying and analysing barriers and enablers around climate-related decision making within a home loan department of a retail bank.

The Barriers Framework of Sorrell et al. (2004) is comprised of three broad perspectives underpinned by theory. The "economic" factors are divided into "economic non-market failure" and "economic market failure", informed by neoclassical economic theory. Non-market failures include heterogeneity (may not be cost-efficient in all cases), hidden costs (e.g. overheads, production disruptions), lack of access to capital and a high level of risk aversion. Market failures include imperfect information leading to missed opportunities, split incentives (where those implementing an action do not directly benefit), adverse selection (e.g. based on price rather than actual performance) and principal-agent relationships (e.g. transparency, control). Behavioural factors include bounded rationality (e.g. "rule of thumb" decision-making), form of information (specific, simple, personalised etc.), credibility and trust, inertia and values (especially those held by top management). The key organisational factors are power (status of climate action within organisation) and culture (characterised by environmental versus other values).

This framework is relevant as an initial starting point for two main reasons. Firstly, both contexts involve negative externalities, whereby those who benefit from the use of cheap fossil fuels do not necessarily

bear the costs of their climatic impacts (Granoff et al., 2016). Secondly, many of the key barriers and enablers identified within a banking context are also reflected in the Barriers Framework. Such as the importance of values held by top management and the need for climate action to be embedded in company culture (Furrer et al., 2012), and that the business case needs to be considered alongside behavioural and organisational factors (Bowman, 2015), to name two examples which indicate the usefulness of Sorell et al. (2004) outside of an energy efficiency context.

However, recent studies (Cagno et al., 2013; Chai and Yeo, 2012; Langolis-Bertrand et al., 2015) discuss limitations of the Barriers Framework and suggest modifications. Langolis-Bertrand et al. (2015) argue for a greater focus on political-institutional barriers, such as political obstruction, conflicting guidelines in governance structures and a lack of policy coordination, which Sorrell et al. label "contextual factors" rather than barriers. Cagno et al. (2013) also suggest two additional categories; "technology" and "information". It is also argued that the Barriers Framework focuses on barriers largely in isolation, without consideration of their interactions and interdependencies (Cagno et al., 2013; Chai and Yeo, 2012). Cagno et al. (2013) identify three "implicit interactions" between barriers: causal relationships (where an increase of Barrier B is due to Barrier A), composite effects (when several barriers operate simultaneously), and hidden effects (when a firm assumes an effect is due to Barrier A because they are unaware of Barrier B).

In addition to these suggested modifications, systems thinking and transdisciplinary approaches have the potential to address limitations of framework approaches and the financial sector's approach to climate change more broadly. Systems thinking draws attention to the complex interactions between numerous stakeholders and recognises the non-linear nature of many of these relationships (Chai and Yeo, 2012). Transdisciplinarity aspires to relate different epistemics (i.e. ways of knowing) from science and practice when dealing with complex, societally relevant real-world problems (Scholz and Steiner, 2015). Bolton et al. (2020) argue that transdisciplinary approaches are needed for the financial sector "to capture the multiple dimensions (e.g. geopolitical, cultural, technological and regulatory ones) that should be mobilised to guarantee the transition to a low-carbon socio-technical system" and enable a "redefinition of the problem at stake" (2020, p.65).

The need for transdisciplinary approaches is highlighted by the results of a recent systematic review of 21 leading finance journals, which found only 0.06% (n = 12) of 725 articles published between 1996 and 2015 related to climate finance (Diaz-Rainey et al., 2017). Shue and Kanbur (2018 p.2) similarly argue that different strands of knowledge need to be brought together "to support the public and policy discourse, which does not - and cannot afford to - see things in separate silos". The TCFD (2019, p.55) also highlight a "need for a more holistic view and increased involvement of a number of business units" in the context of siloed operations within firms.

3. Material and methods

3.1. Methodological approach

A transdisciplinary case study approach was undertaken to explore the factors influencing climate-related decisions within the home loan unit of a large Australian commercial retail bank (hereafter referred to as BankX). Case studies lend themselves to exploratory research (Eisenhardt, 1989) and are capable of gathering empirical evidence to facilitate an understanding of theory and concepts, sensitive to the specific economic, social and cultural context (Eriksson and Kovalainen, 2008). Case studies are especially effective in approaching complex phenomena with a large number of relationships and variables (Gummesson, 2019).

The case study incorporated key principles of a transdisciplinary research approach (Klein, 2012; Polk, 2015; Polk and Knuttson, 2008; Repko, 2008; Scholz and Steiner, 2015), including: application to a complex, societally relevant real-world problem (decision-making on climate risk in banking); the integration of concepts and methods (through a diverse research team with expertise in business sustainability, environmental policy and social science); mutual learning (with partners at BankX); and processes of reflexivity to explore how worldviews, priorities, values, assumptions and social norms influence knowledge generation. This project embodies what Polk (2015) labels Transdisciplinary Co-Production (TDCP), with a stakeholder from the bank ("ContactX") jointly initiating, managing and carrying out the research process to produce new knowledge. It is also an example of Participatory Action Research (PAR), as a collaborative process of research, education and action orientated toward social transformation, leading to the construction of new meaning (Kindon et al., 2007).

3.2. Case introduction

Retail banking is highly concentrated in Australia, with the "Big Four" of Australia New Zealand Banking Group (ANZ), Commonwealth Bank of Australia (CBA), National Australia Bank (NAB) and Westpac Banking Group (Westpac) having an 80% market share combined (Janda and Kroie, 2019). While the Four Pillar policy was devised in 1990 to prevent mergers between the Big Four and to maintain competition, Australia remains one of the most concentrated retail banking markets in the world, with a level of bank profits that is the highest of all developed economies as a share of GDP (The Australia Institute, 2016).

Aside from issues of competition, Australian banks have also attracted significant controversy for contributing to grave social and environmental harms. Including: breaching anti-money laundering and terror financing laws; the 2019 Royal Commission into Misconduct in the Banking, Superannuation and Financial Services Industry report exposed numerous examples of unlawful conduct, decisions and operations falling short of community expectations; and a lack of climate action including lending AUD35.5 billion to the fossil fuel industry between 2016 and 2019 (Market Forces, 2020a). Pressure from activist groups led to the Big Four ruling out financing the controversial Adani Carmichael coalmine in central Queensland (Market Forces, 2020b).

In Australian housing trends more broadly there are serious housing affordability concerns. OECD (2021a; 2021b) shows between 2000 and 2020 house prices have risen 120% in real teams, the nation has one of the highest mortgage debts as a percentage of GDP at over 90% (in 2020). Alongside this Australia has the second highest housing related CO_2 emissions per capita (in 2019) (OECD, 2021a) and seen a residualisation of social housing from 12% of total housing output in the mid 1980s to 3.9% by 2011/2012 (Gurran and Bramley, 2018). The market for residential properties in Australia is valued at around AUD6.6 trillion (Steffen et al., 2019), with the Big Four's mortgage books totalling AUD1.3 trillion, approximately two-thirds of their portfolios (Bellrose et al., 2021; Shapiro, 2018).

Bellrose et al. (2021) argue that overall climate-related losses from residential property for the Australian financial system are likely manageable. Banks' own scenario analysis of their home loan portfolios supports this, finding 1% is considered high risk under RCP8.5 by 2060 (CBA, 2018), 2% by 2050 in a 4 °C scenario (Westpac, 2021), with flood-related risks (ANZ, 2020) and cyclones (NAB, 2021) being examined. Steffen et al. (2019) similarly find losses will be highly concentrated on about 5–6% of properties, however with enormous effects on those affected, where any falls in house prices or defaults arising from (climate-related) disturbances likely to have substantial impacts on bank profits and potential ramifications on the national economy, with governments insurers of the last resort. Indeed, under a business-as-usual emissions pathway estimated climate-related loss to the property market is expected to rise to AUD571 billion by 2030, AUD611 billion by 2050 and AUD770 billion by 2100 (Steffen et al., 2019). Using VaR (Value at risk) analysis Bellrose et al. (2021) find that by 2050 1.5% of properties are projected to have a reduction in housing values by 10% or more with 254 climate-sensitive suburbs, increasing to 9% by 2100 (3%

of which with a 20% reduction in house prices) and 1,438 climate-sensitive suburbs. Climate change may result in 400,000 more loans (2.5% of all loans) having a Loan-to-value ratio (LVR) greater than 80% (Bellrose et al., 2021). Further, one in 19 properties could effectively be uninsurable by 2030 (Steffen et al., 2019).

This is not a distant future, but a reality that has already arrived with the recovery from the devastating Black Summer 2019/2020 megafires still underway. While not explored in-depth in this study, the impact of underinsurance must also be noted. Booth (2021) and Lucas et al. (2020), identify a 'crisis of underinsurance' in disaster prone areas and 'pockets of underinsurance' Australia-wide. Already in areas such as northern Australia, high, unaffordable premiums are leading to a rise in uninsured homes (ACCC, 2019). Socio-economic inequality is another factor, where already disadvantaged and vulnerable communities (and their homes) will be disproportionately affected by climate change, particularly rural and regional areas (Hughes et al., 2016) and those prone to urban heating such as Western Sydney (Climate Council, 2021).

3.3. Data collection and analysis

To explore factors influencing climate-related decision-making at BankX, semi-structured interviews and focus groups were undertaken with research participants chosen in consultation with ContactX. These participants were selected based on their past or current climate-related experience at BankX, with ContactX also interviewed and involved in both focus groups. All research was undertaken in accordance with the human research ethics approval from the University of Technology Sydney.

Semi-structured interviews were selected as they allow for the collection of in-depth information without predetermining the results (Cook, 2008) and enable participants to explore issues in a way which suits them best (Yin, 2015). A total of eleven semi-structured interviews with thirteen interviewees were conducted in October–November 2019 amid the Black Summer megafires, with one interview involving three participants. Participants ranged in business units from retail, corporate responsibility and institutional banking and also ranged in management level from graduates, analysts, associates, Executive Managers and General Managers. The interview questions (see Supplementary Material) began broadly around decision making, before narrowing to a focus on factors relating to climate risk and opportunity. All interviews were conducted face to face, apart from one conducted over the phone. Interview duration ranged from 27 to 54 min. Following Guest et al. (2006) and Saumure and Given (2008), no further interviews were planned once saturation had been reached, which occurred after the 12th interviewee.

Two 90-min focus groups were conducted in November 2019 with a total of thirteen participants from procurement, payments, innovation, investor relations, data science and market risk. Focus groups were framed as "collective conversations" (Kamberelis and Dimitriadis, 2008) to provide a voice to those who may be marginalised or inhibited by institutional structures (Liamputtong, 2015). By allowing participants to take an active role, focus group interactions can create meaning through intra and interpersonal debates (Cook and Crang, 2007). The focus groups involved similar interview questions on barriers and enablers, and the diversity of participants and depth of knowledge allowed further investigation and evaluation of BankX's approach and decisions on climate change through two additional activities. One, each participant placed BankX on Oppenheimer and Lakey (1965) "Spectrum of Allies" diagram in respect to climate action (collated in Fig. 1 in Section 4.2), two, collaborative mapping of climate-related decision making processes broadly in BankX (collated in a system map Fig. 3 in Section 5.3). See Supplementary Material for focus group structure.

The interviews and focus groups were audio recorded with consent and transcribed using NVivo Transcription for analysis. Using Sorrell et al. (2004) Barriers Framework as a starting point combined with adaptations from other sources (e.g. Langlois-Bertrand et al., 2015), an abductive, direct content analysis coding approach which allowed for iterations to the taxonomy (Hsieh and Shannon, 2018) was employed to identify factors. This approach allowed for a systematic analysis of the frequency of the text's characteristics (Maier, 2018) while reducing data and assigning material to categories in a coding frame (Schreier, 2014). Qualitative content analysis was conducted using NVivo 12 (QSR International) on transcripts from interviews (n = 11) and focus groups (n = 2) to identify and code factors relating to climate risks and opportunities and to assess the frequency at which these factors appeared in the transcripts.

The identified factors were arranged into a hierarchy from first order (i.e. broader) to third order (i.e. more specific), with first order factors grouped into overarching categories. Each factor was classed according to whether it was a barrier (i.e. perceived as inhibiting consideration of climate risk or opportunity in decision-making), an enabler (i.e. seen to facilitate consideration of climate risk or opportunity) and/or a potential enabler (i.e. speculation it could drive more climate resilient decisions, that have not yet eventuated but could in the future).

Following coding, an NVivo matrix coding query was undertaken to identify coding intersections between factors. Identifying perceived relationships between factors is important, recognising factors cannot be seen in isolation (Cagno et al., 2013; Chai and Yeo, 2012). Based on frequency, a causal diagram (Fig. 2 in Section 5.2) was constructed to visually represent: the most commonly perceived factor within a category, the most (and second most) commonly perceived cross-category, and the most (and second most) commonly perceived first order factor in a different category.

4. Results

4.1. FICRIF

Overall, 24 first order factors were identified from the interviews and focus groups, along with 26 second order factors and three third order factors. These factors were arranged into six different categories: Economic market failure, Economic non-market failure, Organisational, Behavioural, Political-Institutional, Socio-Cultural in Table 1: Financial Institutions' Climate-Related Influencing Factors (FICRIF). Seven first-order factors were cited in all interviews and focus groups: asymmetric information, imperfect information, power, risk, hidden costs, competing priorities and bounded rationality. Due to the higher-frequency of occurrence for these factors, most of the second and third order factors that were able to be identified fell beneath these first order factors. Other first order factors for which two or more second order factors were able to be identified include: access to capital, inertia, structure, regulatory requirements and culture. The FICRIF has been organised in such a way to enable prioritisation, without missing key foundational information. It is intended to be read left to right, first identifying the category, the first order factor, and if relevant the second or third order factor.

Economic market failure was the most salient category, with the corresponding first order factors of imperfect information and asymmetric information. On **imperfect information**, interviewees cited the uncertainty and lack of information as a barrier. Particularly in confidence of engaging with customers, *"Is this information robust and strong enough for us to tell the customer you can't get a house, approve your loan or we won't price you as aggressively?"* (InterviewC) and limited customer and industry knowledge, for example there is no information on what grade a house is, therefore *"it's about how do you start, we're years away from being able to get this"* (InterviewG). The difficulty in forecasting was also prominent, *"the bank can't do anything with forecast that's 50 years ahead. What we can do is small chunks in the future."* (ParticipantB).

Information asymmetry is a specific form of imperfect information where parties to a transaction have access to different levels of information. This was seen to lead to adverse selection around customer demand and engagement, *"there's pressure from [investors and*

Table 1
Financial Institutions' Climate-related Influencing Factors (FICRIF) Framework. B = Barrier, E = Enabler, PE = Potential enabler. The numbers next to each factor indicate how many interviews and focus groups it was cited in (maximum = 13).

Category	First order factor	Second order factor	Third order factor	B	E	PE
Economic market failure	**Asymmetric information [13]**	**Adverse selection [13]**	Customer demand [9]	✓	✓	✓
			Customer engagement and information [11]	✓	✓	✓
			Work experience altering behaviour [3]		✓	
		Principal-agent relationship [9]		✓		
	Imperfect information [13]	Current lack of information [6]		✓		✓
		Continually changing, interconnected environment [4]		✓		
		Operationalisation [8]		✓		
		Connections between climate work and homes [4]		✓		
	Competing priorities [13]	**Split incentives [8]**		✓	✓	
	Risk [13]	Physical risk[a] [8]		✓		✓
		Liability risk[a] [1]		✓		
		Transition risk[a] [2]		✓	✓	✓
		Reputational risk[b] [4]		✓	✓	✓
		Business unit specific risks [5]				✓
		Systemic risk[c] [7]		✓		
		Tragedy of the horizon[d] [10]		✓	✓	✓
	Credit market failure[e] [7]			✓		
	Imperfect competition [5]	First mover disadvantage [4]		✓		
Organisational	**Power [13]**	Business unit's internal power [3]		✓	✓	
		Differentiation in leadership sentiment [12]		✓		
		Power imbalance [10]		✓		
		Champions [11]			✓	✓
		Shareholders [7]		✓		✓
	Culture [11]	Customer focus and ethical controls [4]		✓	✓	✓
		An organisational culture of amorality and suppressed individual values [8]		✓		
	Inertia [12]	Organisational inertia [12]		✓		
		Symbolic not substantive action[f] [2]		✓		
	Organisational structure [12]	Siloed capability [10]		✓	✓	✓
		Embeddedness [12]			✓	✓
Behavioural	**Bounded rationality [13]**	Business-as-usual [8]		✓		
	Credibility and trust [9]			✓		✓
	Form of information [10]	Internal communication of information [10]		✓	✓	✓
Economic non-market failure	**Access to capital [12]**	Time [1]		✓		
		Money [7]		✓		✓
		Personnel [3]		✓		
	Hidden costs [13]	Outside of core role [5]		✓	✓	✓
		Length of project implementation time [5]		✓		
	Heterogeneity [8]			✓		
Political-institutional[g]	Regulatory requirements [12]	Royal Commission [6]		✓	✓	✓
	Engagement with external groups [9]				✓	✓
	Government rhetoric and capability [9]			✓	✓	✓
	Organisational external power [9]			✓	✓	✓
Socio-cultural[h]	Interrelatedess [10]				✓	✓
	Demographic [5]			✓		
	Metanarratives [1]			✓		
	Public attitudes [9]			✓		✓

Categories and factors that align with Sorrell et al. (2004) are shown in **bold**, others have been marked with a letter and correspond as follows.
[a] Scott et al. (2017).
[b] TCFD (2017).
[c] Battiston et al. (2017); Lamperti et al. (2019), May et al. (2008).
[d] Carney (2015).
[e] Campiglio (2016).
[f] Furrer et al. (2012).
[g] Langlois-Bertrand et al. (2015).
[h] Bowman (2015).

shareholders to be more responsible in lending and investment]. The problem is that [BankX] is kind of blind to that. I feel like no matter how loud customers are, sometimes the bank just doesn't really listen." (InterviewK). Conversely, improved communication practices to overcome information asymmetries were cited as a potential enabler, "hav[ing] that conversation with customers in some way … *'hey we have an awareness that you're buying a beachfront property, and coastal inundation could really become a problem in 5, 10, 15 years.'"* (InterviewD).

Risk was another widely cited first order factor within the economic market failure category that was broken down into a range of second order factors. These included physical risk from a changing climate, the "Tragedy of the Horizon" (mismatch between the short-term financial decision-making and long-term impacts of climate change), systemic risk, business-unit specific risk (unique to home lending) and reputational risk. While the largely uncontrollable nature of physical risk was seen as a potential barrier to climate-related decision-making, other participants felt that the acceptance of climate impacts as fact could drive greater action and build partnerships with consumers, community

and government. Reputational risk was seen to pose a potential barrier to the ability of BankX to attract and retain customers, it was also seen to be an enabler of a "*race to the top*" (InterviewE) because "*you want to make sure that you're not introducing anything else that's going to cause any damage to the brand.*" (InterviewC).

Power, within the organisational category, was widely cited as both a barrier and enabler. Regarding leadership sentiment, the bank's chairperson was "*one of the greatest change agents on climate related matters and is very well versed in the topic*" (InterviewE). Although power imbalances were highlighted, *"There's four people in the bank … And if you don't get one of them, it won't happen."* (Participant B). The bank was perceived as having "*champion culture, if you are willing, able to persevere and show resilience*" (PartcipantA), although persuading others, finding the money and delivering a large-scale project can take many years (InterviewD). *"The third lane of corporate intervention",* with organisational external power as an enabler was noted, "*we've got huge scale, great resources, access to capital — It's just about applying what [we] have as a bank: lots of people, lots of financial services capabilities and a whole range of different domains and going, 'Okay what can we do to get people to make a decision that hopefully will go towards addressing whatever that problem space is?'*" (InterviewF).

The internal power of the home loan unit within BankX was also noted, due to the profits it generates and the attention it attracts from the media and regulators. This scrutiny can be both a barrier to action, "*a lot of pockets might have scrutiny but it wouldn't necessarily be to the same level or the same number of things happening concurrently.*" (InterviewH) and an enabler, "*we're slightly unique because the home buying business, it's a very large business … We have an ability to mobilize things that might not necessarily be things we're told to do.*" (InterviewD). Unfortunately, this internal organisational power faces additional barriers of competing priorities and lack of capital, *"It is a genuine care and acknowledgement of the [climate] risk and yes an appetite to do more. It's just a very practical challenge around prioritisation when a lot of those priorities are quite immovable."* (InterviewH); within an organisational BAU approach where *"a lot of people in the business see [climate change] as still an environmental threat not an economic one"* (InterviewA) and participants relayed an *"underlying dismissiveness"* in climate-related discussions (ParticipantA) which prevented proactive, substantive action on climate change.

Hidden costs, competing priorities and bounded rationality were the other three first-order factors that were cited in every interview and focus group. More detailed explanations of these and other factors identified from the interviews and focus groups are contained in the Supplementary Material for this article.

This paper focuses primarily on the context in which climate-related decisions are made and factors affecting it. Further research is required to determine solutions to overcome barriers and leverage (potential) enablers. One way to overcome organisational inertia and power imbalances identified as salient barriers, is a well-designed and operated Environmental Management Control System to effectively integrate environmental issues into strategy making and implementation and align corporate decision making, employee behaviours and actions with environmental objectives (Guenther et al., 2016). Some other activities might include hiring specialised knowledge to increase internal capability and embeddedness of skilled climate-risk in home loans, more broadly identifying climate-related risks and opportunities in core value creating processes, noting that a Climate Taskforce within the home loans business unit was under formation at the time of interviews.

4.2. Banks approach to climate change

On balance, BankX's response to climate change, especially with regards to home lending, was broadly seen by case study participants as incremental and reactive, characterised as *"baby steps, not leaps and bounds"* (ParticipantB). Although responses in other areas of the business were seen as more adequate, comprehensive, proactive and integrated into decision-making. Two business units that were identified as taking a substantive approach to climate change were agriculture, "*because they're feeling it"* and institutional, with retail banking *"a little bit behind"* (InterviewA). In the rating exercise undertaken in the focus groups, overall BankX was perceived by most participants to be either a neutral or passive opponent of action on climate change rather than an ally (Fig. 1).

Notably, despite the multitude of barriers and BankX's perception as a neutral-passive opponent, there was no shortage of desire to address climate change from the research participants, who worked tirelessly to consider and act upon environmental and social issues mostly outside of their core roles. This was evidenced by the focus groups, which catalysed the formation of a climate action group within BankX, an outcome which demonstrates the transformative potential of PAR and TDCP.

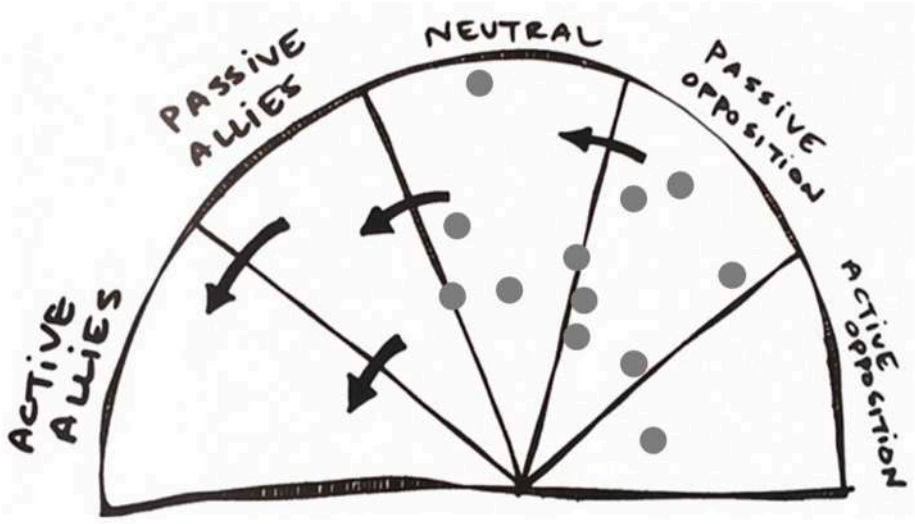

Fig. 1. Perceptions of BankX on a climate ally spectrum by participants in focus groups (adapted from Oppenheimer and Lakey, 1965; Bloch, 2019).

5. Discussion

5.1. Extending previous research on climate risk in banks and barriers frameworks

The FICRIF framework is designed to be adaptive and iterative rather than static, in line with transdisciplinary principles of mutual learning and adaptive complex systems (Klein, 2012). This study confirms the usefulness of Sorrell et al. (2004) Barriers Framework as a starting point in systematically analysing an organisation operating in a very different context (home lending) to that in which the framework was designed (energy efficiency). When all results are combined, every factor from the Barriers Framework was perceived to be present in the firm, highlighting its versality and the broad applicability of its factors and categories. However, application to the case study also highlighted some of its limitations and the need to incorporate other categories and factors from a range of sources. While the factors shown in Table 1 reflect the results of this case study, further refinement is expected through application to further case studies of financial institutions and climate risk. A more detailed version of the FICRIF framework is provided in the Supplementary Material for this article.

Economic market failure, particularly first order factors such as asymmetric information, imperfect information and split incentives were especially prominent in the case study results from BankX. This is consistent with energy efficiency (Sorrell et al., 2004) and sustainable business studies (Vermunt et al., 2019); where the dominance of economic indicators in decision-making has been identified as a key barrier (Tura et al., 2019). Broadly, climate-related imperfect information is a widely identified market failure in the financial sector (Battiston et al., 2017; Carney, 2015; Scott et al., 2017) where companies and investors' low level of awareness to climate-related financial risk is a key obstacle to action (Campiglio et al., 2018). More specifically to homes, imperfect information is a key barrier inhibiting pricing of climate risks (Baldauf et al., 2020; Garbarino and Guin, 2021; Giglio et al., 2021; Keenan and Bradt, 2020; Murfin and Spiegel, 2020). Risk has been classified as a market failure in the FICRIF, in contrast to Sorrell et al. (2004), who classify it as a non-market failure. This reclassification recognises the role of climate risk as a negative externality that the home lending market fails to adequately consider in the pricing or positioning of products and services. This is symptomatic of a larger market failure where ESG risks are deemed externalities and GHG emissions are considered the 'biggest market failure the world has seen' (Stern, 2008). Bowman (2015) study of climate-related practices in banks similarly finds risk mitigation to be a driver and Bellrose et al. (2021) note banks must further integrate climate risk into their mortgage processes and report on it to enable external assessment of risks. Further, split incentives was found to be a second order factor of the broader first order factor "competing priorities".

The Organisational category, primarily first order factor power and second order factors (differentiation in leadership sentiment, power imbalance, business unit's internal power, champions and shareholders) were also prominent in results. Differentiation in leadership sentiment and power imbalances reflect "defective decoupling" between symbolic climate actions and core business (Furrer et al., 2012), also evident in factors across other categories (e.g. adverse selection, tragedy of the horizon and organisational inertia). Considering Bowman (2015) framework for why banks go green, there is an interplay of the micro intra-organisational level where managerial decision making is central in the two factors of differentiation in leadership sentiment and power imbalances, alongside the meso inter-organisational level where business case drives climate action in the champions factor. Championing of climate change by top managers and shifts in values and culture to fully incorporate climate-related decision-making in value-creating processes were seen as key enablers for a firm to move from being one of Furrer et al. (2012) "hesitators" and "product innovators" to being "process developers" and "forerunners".

Four of the categories (*Economic market failure*, *Economic non-market failure*, *Organisational* and *Behavioural*) are drawn from the Barriers Framework of Sorrell et al. (2004), while two additional categories were included from other literature: *Political-institutional* from Langlois-Bertrand et al. (2015) and *Socio-cultural* from Bowman (2015). The inclusion of Political-Institutional and Socio-Cultural categories in the FICRIF attempts to address the failure of markets to include environmental and social aspects, which are critical to corporations achieving sustainability. The FICRIF builds upon economic sociology, climate justice, intersectionality and metanarrative theory by acknowledging the "embeddedness" of a firm within the broader environment it operates in that cannot be disassociated from its internal workings (Granovetter, 1985). Climate action and related initiatives sit within a fraught political context in Australia, which spills over to the private (banking) sector. For example, a senior government leader threatened to revoke government guarantees for ANZ bank deposits after the bank publicly supported net zero by 2050 (Kehoe, 2020).

Regulatory requirements (first order factor in Political-Institutional) were a prominent factor at BankX, as in Bowman (2015) study of Australian banks. However, one key difference was the Royal Commission report handed down in 2019, which was cited as both an enabler of action on climate change (to improve bank's reputation) and a barrier (by consuming resources and making banks more risk-focused). Modern slavery was noted as a prominent example of substantive change outside of the home loan area, enabled by regulation and embedded within BankX's practices, "*It's law, so it is not having a choice … Essentially what will be put in place and disclosed … will then be proved to the court of public opinion … what we put out will be looked at by our peers and they can try to match it or better it … which is the race to the top which is a good thing.*" (InterviewE). Given that climate change will require similar social, cultural, legal and economic transformations, this requires changing the rules, goals and paradigm of the system (Wright and Meadows, 2008).

5.2. Linkages between factors

During data analysis, a wide range of linkages between categories and factors of influence became evident, where particular factors were commonly perceived in conjunction with others or prevalent across categories. As displayed in Fig. 2, the most commonly perceived cross-category is Economic market failure, while Economic market failure's most commonly perceived cross-category is Behavioural. The first order factors of bounded rationality, competing priorities and imperfect information were also commonly perceived among categories.

The discovery of linkages between factors of influence is consistent with studies finding implicit interactions and interconnections between barriers (Cagno et al., 2013; Chai and Yeo, 2012). This highlights the importance of viewing the FICRIF as a set of interlinked factors rather being divided into discrete categories. Other studies in adjacent areas, such as the SDGs, highlight the need to identify possible synergies and trade-offs to identify factors which may reinforce or undermine one another (Fonseca et al., 2020). To the authors' knowledge, this study is first to integrate such a wide variety of factors and identify critical linkages in the context of climate risk and opportunity decisions within large financial institutions. Using initial guidance from Fig. 2, future

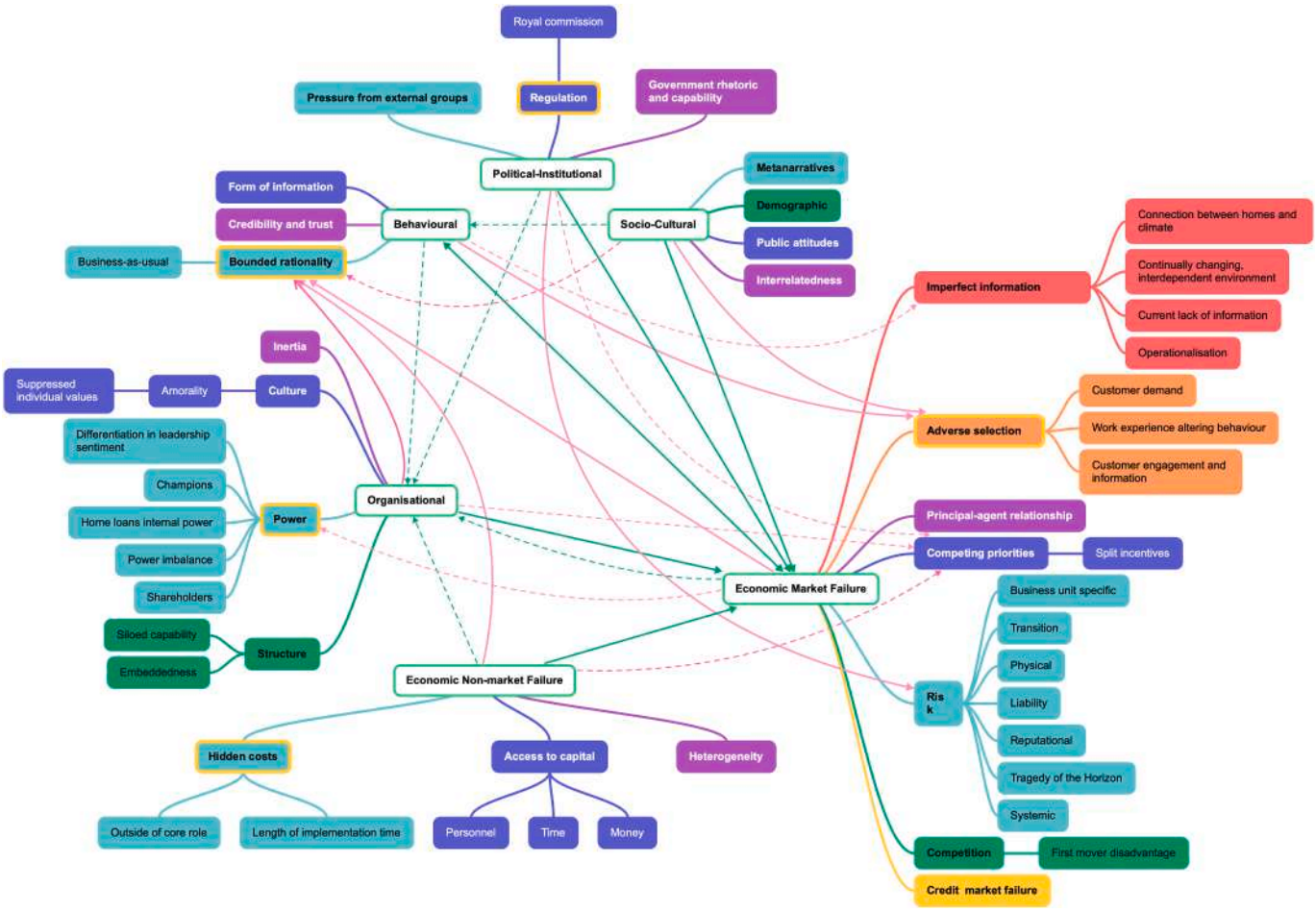

Fig. 2. Most salient linkages between categories and factors of influence.
Key: Green bordered boxes (categories), Yellow bordered boxes (most commonly perceived factor within the category), Green arrow (most commonly perceived cross-category), Green broken arrow (second most commonly perceived cross-category), Pink arrow (most commonly perceived first order factor), Pink broken arrow (second most commonly perceived first-order factor).

research could theorise these linkages, the perceived hierarchies between factors and how the FICRIF could be better formatted to accommodate these.

5.3. *Strategies for enabling climate-focused decision-making in financial institutions*

Beyond understanding the context in which climate-related decisions are made by identifying influencing factors on home loans, focus groups also enabled evaluation of the organisation's broader approach to climate change. Classified by participants as a "neutral" or even "passive opponent" to climate action (Fig. 1 Section 4.2), a system map has been constructed to visualise the bank's internal system and its interplay within a wider ecosystem of external people, organisations, the national economy and natural environment it operates within (Fig. 3). Using insights from focus groups and input from ContactX, five decision stages were identified: commitment, information, strategy, integration and implementation.

While Fig. 3 shows five decision-making stages (within the dotted line), the case study participants indicated that external pressure is a big influence, that is *"shoved down the boards throat"* through activism (ParticipantA) and resulted in commitment from senior management at the board level and the subsequent gathering and disclosure of information (e.g. scenario analyses). However, for many of the bank's climate projects, participants felt there was a lack of alignment to broader group climate strategy, and lack of meaningful consideration to substantively address challenges specific to different business units and integrate identified climate-risk within their systems. Implementation of projects without these stages resulted in somewhat reactive and isolated projects.

This highlights that board level attention to climate risk is key but must be comprehensively integrated into internal governance frameworks (Feridun and Güngör, 2020), or else projects may not meet desired goals. Participants' observations of BankX's "bolted-on" climate projects are aligned to other studies associated with a failure to substantively alter core capabilities or value creating processes (Bowman, 2015; Furrer et al., 2012; Gifford et al., 2011; Goldstein et al., 2019). The missing links of integration and strategy also indicate the lack of a "coherent and consistent" organisational approach informed by and conforming to an overarching BankX group climate policy that similarly feeds into every business unit and project undertaken. Meaningfully addressing barriers and enablers means embedding climate risks into strategies. Overall climate risk management frameworks are essential for banks (Feridun and Güngör, 2020) with a comprehensive strategy woven around each initiative (Okafor et al., 2021). Participants noted

the challenges and limitations that arise from BAU approaches to climate change strategy, e.g. "*we had one two three [year strategies]. It's like the business can't think of 50 years, it can't even get five years, even 12 months is insane*" (ParticipantB).

These findings are consistent with a number of models for stages of climate-related strategy development (Hoffman, 2007), including in the insurance sector (Johannsdottir and McInerney, 2018). Alongside this, models mapping "Waves of Sustainability" within organisations have also been devised (Griffiths et al., 2007), with specific consideration given to commercial banks (Furrer et al., 2012) and considered procedures for designing finance interventions (Wiek and Weber, 2014).

To fully embed climate risk in decision making, all group and business unit strategy must be set within the climatic boundaries outlined by scientists (TCFD, 2019; UNEPFI, 2019), instead of pursuing projects and opportunities out of line with scientific recommendations. One participant noted, "*Where [BankX's] currently at is probably where we defensively [could have] been in the 1990s in relation to climate*" (ParticipantB). BankX's interaction with their customers is a contradictory one, conforming to what Bowman (2015) labels the "client service reputation". Which mobilises banks to innovate and become active, but prevents far reaching radical voluntary entrepreneurialism. On one hand the bank is internally perceived as a provider of products and services determined by consumer demand, *"It's an important exercise to see what's the customer take up of this, what's their interest in this, what's their thoughts to [BankX] actually stepping into this space"* (InterviewC). On the other hand, participants noted the limitations of consumer sovereignty and recognised proactive producer power as a potential enabler.

In the case of BankX, there was an observed failure to consider the interdependent relationship between individual "financial wellbeing" and the national financial wellbeing of Australia's economy, where the latter is a precondition to the former and both will be adversely impacted by climate change. With increases in temperature, the potential climate damages to homes, insufficient or no insurance and accumulation of bad debt (non-performing loans) – may have cascading effects on bank solvency, including contagion effects to other financial institutions which could threaten financial stability (see Fig. 4). Where it is not the banks who suffer the loss of their failures but the Australian public. Although it was not unrecognised by participants, "*We ostensibly exist to enhance the financial well-being of our customers and our core role as an institution is risk management. The biggest risk to the future financial well-being of our customers is climate change*". (ParticipantB).

As mentioned previously, a well-designed and operated Environmental Management Control System could assist with embedding environmental objectives from commitment to implementation stages. While system-level interventions that alter societal rules, norms, goals and paradigms may also be effective in causing decision-makers to change their actions and decisions (Wright and Meadows, 2008), such systemic changes require coordinated action from multiple stakeholders beyond a single financial institution (Bolton et al., 2020), especially in residential mortgages, an area so integral to the national economy, financial institutions and households' balance sheets. This highlights the important potential role of green macroprudential regulation and policy in mandating that financial institutions abide by set standards and take substantive, proactive action (Battiston et al., 2017; Campiglio, 2016; Campiglio et al., 2018; Carney, 2015; Dafermos et al., 2018; Granoff et al., 2016; Stern, 2008).

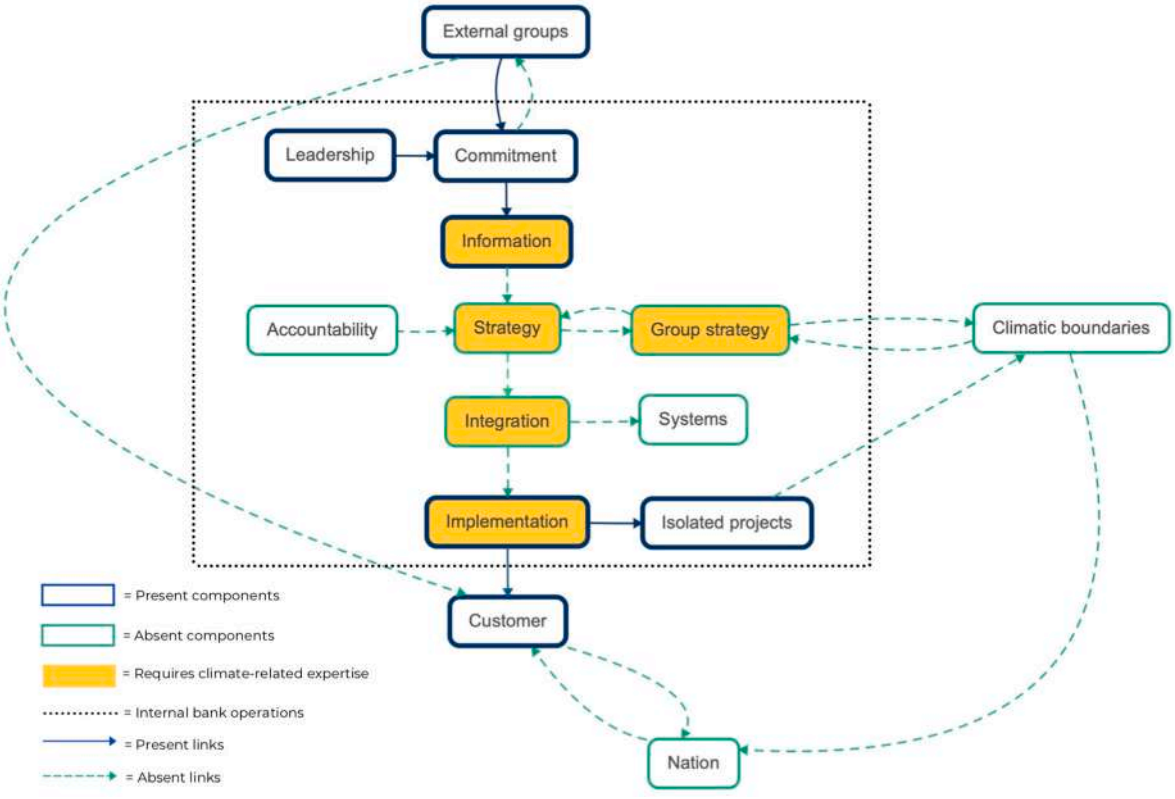

Fig. 3. System map showing decision making stages and the wider ecosystem*.
*Stages are displayed in a linear fashion for ease of representation, but in reality involve various iterations and continual interaction.

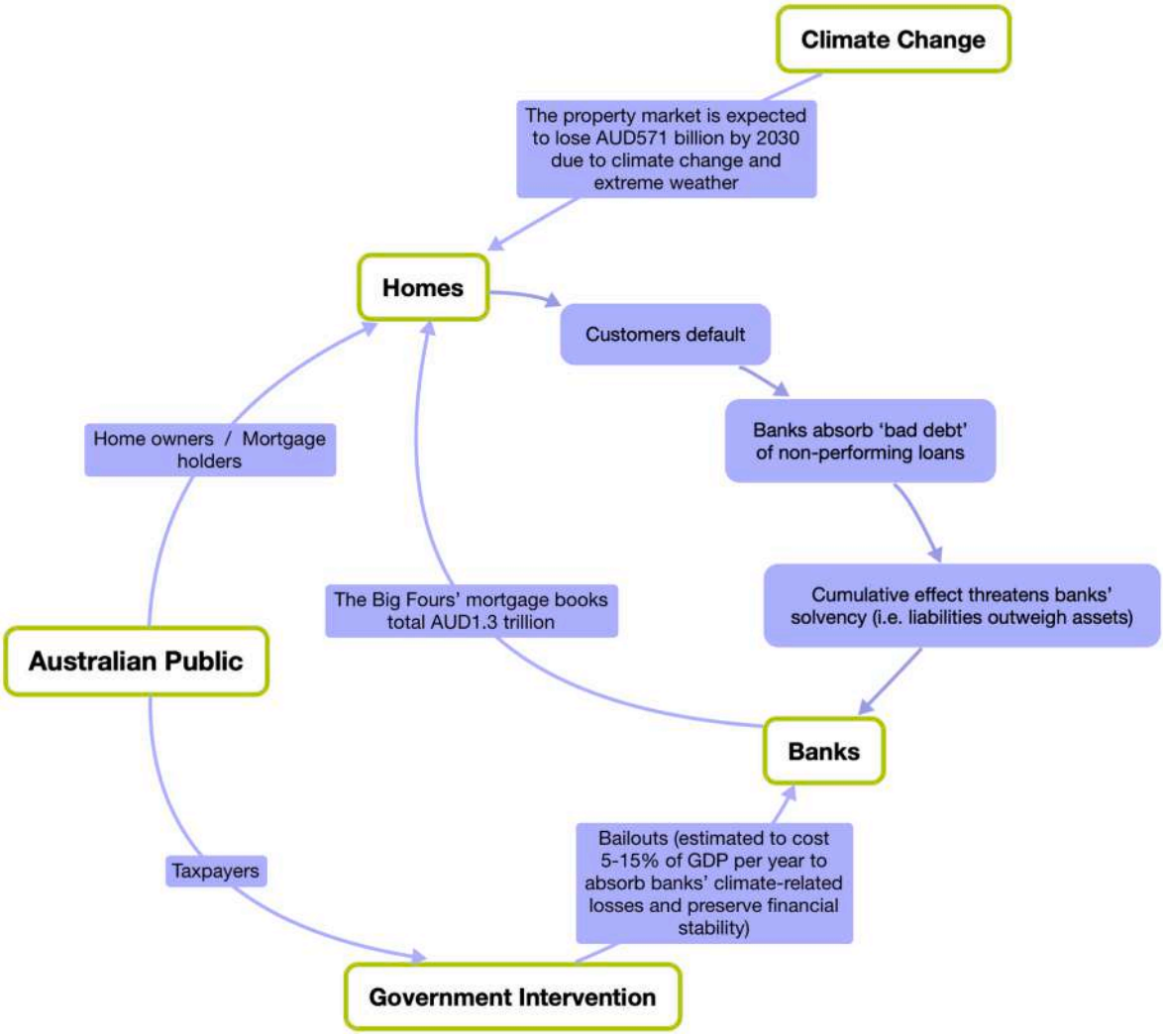

Fig. 4. The cascading effects of climate change on home loans*.
(Lamperti et al., 2019; Steffen et al., 2019; Shapiro, 2018) *noting that while not pictured, insurance also plays a significant role in such a scenario.

5.4. Limitations and suggestions for future research

While the aim of this study was to better understand climate-related decision making in financial institutions and the results may be informative to a wide variety of organisations, the data was limited to one case company (a bank), in one country (Australia) and focused on one sustainability issue (climate risk to home loans), with research conducted over a two-month period at the end of 2019. Moreover, the qualitative nature of the method could not completely eliminate respondent bias. Sorrell et al. (2004) Barriers Framework proved a useful foundation for the study, but due to the context it was developed for (energy efficiency) it can miss key factors in differing contexts and required the incorporation of additional categories and factors from a range of sources. Accordingly, further research is needed to evaluate the extent to which the findings are generalisable, how the FICRIF may be adapted for use in other contexts, and what measures are able to overcome barriers and leverage (potential) enablers.

6. Conclusion

As the world decarbonises and climate impacts worsen, it is becoming increasingly important to identify, understand and manage stranded assets in order to mitigate the systemic risk that climate change poses to our interconnected socioeconomic and financial systems. Recognising the role of financial institutions in capital allocation, this study sought to identify factors that influence climate risk and opportunity decisions in large financial institutions, while also furthering an understanding of residential mortgages as a potential stranded asset.

Drawing on a combination of semi-structured interviews and focus groups, a framework for understanding Factors Influencing Climate-Related decisions within Financial Institutions (FICRIF) is proposed. This framework is comprised of six categories, Economic market failure, Economic non-market failure, Organisational, Behavioural, Socio-Cultural and Political-Institutional, and is divided into first, second and third order factors. While the case study was limited to the home loan unit in a large Australian commercial retail bank, findings may have implications on the Australian banking and financial industry more broadly. The most salient category (economic market failure) and most salient factor (power) require recognition as barriers to climate action in future decision-making processes for financial institutions and policy-makers. It is also critical to recognise the key interdependencies and linkages between factors that require substantive coordinated action.

Examining BankX's internal system and interplay in its operating environment highlights future considerations for all actors, in banking, the financial industry, economy and academia, on the necessity of taking a systems approach that is transformative and collaborative. Internal factors of influence within a single institution such as BankX must be conceived within the wider ecosystem, where there exist distinct climate

boundaries and social justice implications from banks' potential inaction, such as public taxpayers being relied upon as insurers of last resort. Understanding key stages of climate-related decision making is necessary to ensure that climate risk is integrated and embedded into internal governance and core value-creating processes and that responses are not isolated, reactive and piecemeal. Left unaddressed, these may have cascading implications on banks' balance sheets and their solvency; which can pose a systemic risk to the economy and financial stability. Particularly in an Australian context, where the banking system is extremely concentrated; residential property plays a major role in the economy where mortgage debt as a percentage of GDP is one of the highest worldwide; and climate change poses physical risks including from bushfires, floods, storms, heat and sea level rise.

The Big Four banks, and the financial sector more broadly, have a social and fiscal responsibility to substantively respond to and address our climate crisis, particularly within their mortgage portfolio and process; based not only on past failings, but also on the present and future need to ensure holistic customer financial wellbeing and the resilience and stability of the financial and climatic system that underpin it. Hopefully, in some small way, by furthering an understanding of residential mortgages as a stranded asset, highlighting the need to consider individual firms' actions within a broader environmental and social context, and offering guidance on barriers and enablers influencing climate related decisions through the FICRIF, this study can facilitate greater realisation of financial institutions' roles and responsibilities in decarbonisation.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

H. Cheung: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Investigation, Visualization, Project administration. **A. Baumber:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration. **P.J. Brown:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This paper acknowledges the Gadigal people of the Eora nation whose lands this was written on. Acknowledging that land ownership is a colonialist structure, especially in the context of stolen land where sovereignty was never ceded. It always was, always will be, Aboriginal land. The authors would like to acknowledge and thank ContactX, who co-designed, initiated and carried out this research, including endless efforts to recruit research participants. We would also like to thank all of the research participants for giving up their time to share their knowledge and expertise and for their extraordinary efforts to further social and environmental good.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2021.130211.

References

Action Network, Rainforest, 2021. Banking on climate chaos. Available at: https://www.ran.org/wp-content/uploads/2021/03/Banking-on-Climate-Chaos-2021.pdf. (Accessed 1 October 2021).

Agrawala, S., Carraro, M., 2010. Assessing the role of microfinance in fostering adaptation to climate change. In: OECD Environmental Working Paper No. 15, 2010. OECD publishing, Paris.

Australia New Zealand Bank (ANZ), 2020. 2020 climate-related financial disclosures. Available at: https://www.anz.com.au/content/dam/anzcom/shareholder/ANZ-2020-Climate-related-Financial-Disclosures.pdf. (Accessed 1 October 2021).

Australian Competition and Consumer Commission (ACCC), 2019. High Premiums leading to rise in uninsured homes in northern Australia. Available at: https://www.accc.gov.au/media-release/high-premiums-leading-to-rise-in-uninsured-homes-in-northern-australia. (Accessed 1 October 2021).

Avrampou, A., Skouloudis, A., Iliopoulos, G., Khan, N., 2019. Advancing the sustainable development goals: evidence from leading European banks. Sustain. Dev. 27 (4), 743–757.

Baldauf, M., Garlappi, L., Yannelis, C., 2020. Does climate change affect real estate prices? Only if you believe in it. Rev. Financ. Stud. 33 (3), 1256–1295.

Battiston, S., Mandel, A., Monasterolo, I., Schütze, F., Visentin, G., 2017. A climate stress-test of the financial system. Nat. Clim. Change 7, 283–288.

BBC, 2020. FinCEN Files: all you need to know about the document leak. Available at: https://www.bbc.com/news/uk-54226107. (Accessed 5 October 2020).

Bellrose, K., Norman, D., Royters, M., 2021. Climate Change Risks to Australian Banks| Bulletin–September Quarter 2021. Bulletin (September).

Bernstein, A., Gustafson, M.T., Lewis, R., 2019. Disaster on the horizon: the price effect of sea level rise. J. Financ. Econ. 134 (2), 253–272.

Bloch, N., 2019. Spectrum of Allies. Available at: https://commonslibrary.org/spectrum-of-allies/. (Accessed 4 December 2020).

Bolton, P., Despres, M., Pereira Da Silva, L.A., Samama, F., Svartzman, R., 2020. The Green Swan: Central Banking and Financial Stability in the Age of Climate Change. Bank of International Settlements, Basel.

Booth, K.I., 2021. Is your neighbourhood underinsured? Search our map to find out. Available at: https://theconversation.com/is-your-neighbourhood-underinsured-search-our-map-to-find-out-168836. (Accessed 10 November 2021).

Bowman, M., 2015. Banking on Climate Change: How Finance Actors and Transnational Regulatory Regimes are Responding. In: International Banking and Financce Law Series, 24. Wolters Kluwer, The Netherlands.

Butler, B., 2021. Banking royal commission: most recommendations have been abandoned or delayed. Available at: https://www.theguardian.com/australia-news/2021/jan/19/banking-royal-commission-most-recommendations-have-been-abandoned-or-delayed. (Accessed 1 October 2021).

Cagno, E., Worrell, E., Trianni, A., Pugliese, G., 2013. A novel approach for barriers to industrial energy efficiency. Renew. Sustain. Energy Rev. 19, 290–308.

Campiglio, E., 2016. Beyond carbon pricing: the role of banking and monetary policy in financing the transition to a low-carbon economy. Ecol. Econ. 121, 220–230.

Campiglio, E., Dafermos, Y., Monnin, P., Ryan-Collins, J., Schotten, G., Tanaka, M., 2018. Climate change challenges for central banks and financial regulators. Nat. Clim. Change 8, 462–468.

Carney, M., 2015. Breaking the Tragedy of the Horizon—Climate Change and Financial Stability. Bank of England, London.

Chai, K.H., Yeo, C., 2012. Overcoming energy efficiency barriers through systems approach - a conceptual framework. Energy Pol. 46, 460–472.

Christophers, B., 2017. Climate change and financial instability: risk disclosure and the Problematics of neoliberal governance. Ann. Assoc. Am. Geogr. 107, 1108–1127.

Climate Council, 2021. Untouchable playgrounds: urban heat and the future of Western Sydney. Available at: https://www.climatecouncil.org.au/urban-heat-island-effect-western-sydney/. (Accessed 10 November 2021).

Commonwealth Bank Australia (CBA), 2018. Annual report 2018. Available at: https://www.commbank.com.au/content/dam/commbank/about-us/shareholders/pdfs/results/fy18/cba-annual-report-2018.pdf. (Accessed 1 October 2021).

Conley, D., Gifford, B., 2006. March. Home ownership, social insurance, and the welfare state. In Sociol. Forum 21 (1), 55–82. Springer US.

Cook, K.A., 2008. In-Depth Interview. In: Given, L. (Ed.), The SAGE Encyclopaedia of Qualitative Research Methods. Sage Publications Ltd, London.

Cook, I., Crang, M., 2007. Doing Ethnography, Geobooks.

Cosma, S., Venturelli, A., Schwizer, P., Boscia, V., 2020. Sustainable development and European banks: a non-financial disclosure analysis. Sustainability 12 (15), 6146.

Crowe, C., Dell'Ariccia, G., Igan, D., Rabanal, P., 2013. How to deal with real estate booms: lessons from country experiences. J. Financ. Stabil. 9 (3), 300–319.

Dafermos, Y., Nikolaidi, M., Galanis, G., 2018. Climate change, financial stability and monetary policy. Ecol. Econ. 152, 219–234.

Diaz-Rainey, I., Robertson, B., Wilson, C., 2017. Stranded research? Leading finance journals are silent on climate change. Climatic Change 143 (1–2), 243–260.

Doling, J., Ronald, R., 2010. Home ownership and asset-based welfare. J. Hous. Built Environ. 25 (2), 165–173.

Duan, T., Li, F.W., 2021. Climate change concerns and mortgage lending. Available at: SSRN 3449696.

Eisenhardt, K.M., 1989. Building theories from case study research. Acad. Manag. Rev. 14 (4), 532–550.

Eriksson, P., Kovalainen, A., 2008. Qualitative Methods in Business Research. SAGE Publications Ltd, London.

Fan, Z.O.U., Hui, Y.A.N.G., Qin, Y.L., 2011. Thinking on the development of "carbon finance" in commercial banks of China. Energy Proc. 5, 1885–1892.

Feridun, M., Güngör, H., 2020. Climate-related prudential risks in the banking sector: a review of the emerging regulatory and supervisory practices. Sustainability 12 (13), 5325.
Fonseca, L.M., Domingues, J.P., Dima, A.M., 2020. Mapping the sustainable development goals relationships. Sustainability 12 (8), 3359.
Forces, Market, 2020a. The Adani list. Available at: https://www.marketforces.org.au/info/key-issues/theadanilist/. (Accessed 27 July 2020).
Forces, Market, 2020b. Funding climate failure. Available at: https://www.marketforces.org.au/campaigns/banks-new/bigfourscorecard/. (Accessed 7 October 2020).
Furrer, B., Hamprecht, J., Hoffmann, V.H., 2012. Much ado about nothing? how banks respond to climate change. Bus. Soc. 51, 62–88.
Furukawa, K., Ichiue, H., Shiraki, N., 2020. How Does Climate Change Interact with the Financial System? A Survey (No. 20-E-8). Bank of Japan.
Garbarino, N., Guin, B., 2021. High water, no marks? Biased lending after extreme weather. J. Financ. Stabil. 54, 100874.
Gifford, R., 2011. The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. Am. Psychol. 66 (4), 290.
Gifford, R., Kormos, C., McIntyre, A., 2011. Behavioral dimensions of climate change: drivers, responses, barriers, and interventions. Wiley Interdiscip. Rev.: Clim. Change 2, 801–827.
Giglio, S., Maggiori, M., Rao, K., Stroebel, J., Weber, A., 2021. Climate change and long-run discount rates: evidence from real estate. Rev. Financ. Stud. 34 (8), 3527–3571.
Goldstein, A., Turner, W.R., Gladstone, J., Hole, D.G., 2019. The private sector's climate change risk and adaptation blind spots. Nat. Clim. Change 9, 18–25.
Goldstein, B., Gounaridis, D., Newell, J.P., 2020. The carbon footprint of household energy use in the United States. Proc. Natl. Acad. Sci. Unit. States Am. 117 (32), 19122–19130.
Goodman, L., 2020. Housing Finance at a Glance: A Monthly Chartbook: March 2020.
Granoff, I., Hogarth, J.R., Miller, A., 2016. Nested barriers to low-carbon infrastructure investment. Nat. Clim. Change 6, 1065–1071.
Granovetter, M., 1985. Economic action and social structure: the problem of embeddedness. Am. J. Sociol. 91, 481–510.
Griffiths, A., Benn, S., Dunphy, D., 2007. Organizational Change for Corporate Sustainability: A Guide for Leaders and Change Agents of the Future. Routledge, London.
Guenther, E., Endrikat, J., Guenther, T.W., 2016. Environmental management control systems: a conceptualization and a review of the empirical evidence. J. Clean. Prod. 136, 147–171.
Guest, G., Bunce, A., Johnson, L., 2006. How many interviews are enough?: an experiment with data saturation and variability. Field Methods 18, 59–82.
Gummesson, E., Thorpe, R., Holt, R., 2019. Case study. In: Thorpe, R., Holt, R. (Eds.), The SAGE Dictionary of Qualitative Management Research. SAGE Publications Ltd, London, pp. 39–40.
Gurran, N., Bramley, G., 2018. Urban Planning and the Housing Market: International Perspectives for Policy and Practice. Macmillan. Sydney: Palgrave.
Hassan Al-Tamimi, H.A., 2014. Corporate social responsibility practices of UAE banks. Global J. Business Res. 8, 91–108.
Hoffman, A.J., 2007. Carbon strategies: How leading companies are reducing their climate change footprint. University of Michigan Press.
Hsieh, H.F., Shannon, S., 2018. Content analysis. In: Frey, B.B. (Ed.), The Sage Encyclopedia of Educational Research, Measurement, and Evaluation. SAGE Publications Ltd, London.
Hu, V.I., Scholtens, B., 2014. Corporate social responsibility policies of commercial banks in developing countries. Sustain. Dev. 22, 276–288.
Hughes, L., Rickards, L., Steffen, W., Stock, P., Rice, M., 2016. On the Frontline: Climate Change & Rural Communities. Climate Council of Australia, Australia.
Islam, M.A., Fatima, J.K., Ahmed, K., 2011. Corporate sustainability reporting of major commercial banks in line with GRI: Bangladesh evidence. Soc. Responsib. J. 7, 347–362.
Issler, P., Stanton, R., Vergara-Alert, C., Wallace, N., 2020. Mortgage markets with climate-change risk: evidence from wildfires in California. Available at: SSRN 3511843.
Janda, M., Kroie, A., 2019. Banking royal commission report may crack the big four banks' financial dominance. Available at: https://www.abc.net.au/news/2019-02-01/how-did-the-big four-banks-become-so-dominant/10767994. (Accessed 7 October 2019).
Johannsdottir, L., McInerney, C., 2018. Developing and using a Five C framework for implementing environmental sustainability strategies: a case study of Nordic insurers. J. Clean. Prod. 183, 1252–1264.
Kamberelis, G., Dimitriadis, G., 2008. Focus groups: strategic articulations of pedagogy, politics, and inquiry. In: Denzin, N.K., Lincoln, Y.S. (Eds.), Collecting and Interpreting Qualitative Materials, third ed. Sage, Thousand Oaks, CA, pp. 375–402.
Keenan, J.M., Bradt, J.T., 2020. Underwaterwriting: from theory to empiricism in regional mortgage markets in the US. Climatic Change 162 (4), 2043–2067.
Kehoe, J., 2020. Bank 'run' risk from ANZ climate lashing. Available at: https://www.afr.com/politics/federal/bank-run-risk-from-anz-climate-lashing-20201029-p569qn. (Accessed 4 December 2020).
Kindon, S., Pain, R., Kesby, M., 2007. Participatory Action Research Approaches and Methods: Connecting People, Participation and Place. Routledge, London.
Klein, J.T., 2012. Research integration: a comparative knowledge base. In: Repko, A.F., Newell, W.H., Szostak, R. (Eds.), Case Studies in Interdisciplinary Research. Sage, London, 2012.
Kompas, T., Pham, V.H., Che, T.N., 2018. The effects of climate change on GDP by country and the global economic gains from complying with the Paris climate accord. Earth's Future 6, 1153–1173.
Lamperti, F., Bosetti, V., Roventini, A., Tavoni, M., 2019. The public costs of climate-induced financial instability. Nat. Clim. Change 9, 829–833.
Langlois-Bertrand, S., Benhaddadi, M., Jegen, M., Pineau, P.O., 2015. Political-institutional barriers to energy efficiency. Energy Strat. Rev. 8, 30–38.
Liamputtong, P., 2015. Focus Group Methodology: Principles and Practice. Sage Publications Ltd., London.
Litterman, R., Anderson, C.E., Bullard, N., Caldecott, B., Cheung, M.L., Colas, J.T., Coviello, R., Davidson, P.W., Dukes, J., Duteil, H.P., Eastwood, A., 2020. Managing Climate Risk in the Us Financial System.
Lucas, C., Eriksen, C., Bowman, D., 2020. A crisis of underinsurance threatens to scar rural Australia permanently. Available at: https://theconversation.com/a-crisis-of-underinsurance-threatens-to-scar-rural-australia-permanently-129343. (Accessed 10 November 2021).
Maier, M.A., 2018. Content analysis: advantages and disadvantages. In: Allen, M. (Ed.), The SAGE Encyclopedia of Communication Research Methods. Sage Publications, London.
May, R.M., Levin, S.A., Sugihara, G., 2008. Ecology for bankers. Nature 451, 893–894.
Mengze, H., Wei, L., 2015. A comparative study on environment credit risk management of commercial banks in the Asia-Pacific region. Bus. Strat. Environ. 24, 159–174.
Muldoon-Smith, K., Greenhalgh, P., 2019. Suspect foundations: developing an understanding of climate-related stranded assets in the global real estate sector. Energy Res. Social Sci. 54, 60–67.
Murfin, J., Spiegel, M., 2020. Is the risk of sea level rise capitalized in residential real estate? Rev. Financ. Stud. 33 (3), 1217–1255.
National Australia Bank, 2021. Sustainability report 2020. Available at: https://www.nab.com.au/content/dam/nabrwd/documents/reports/corporate/2020-sustainability-report-pdf.pdf. (Accessed 1 October 2021).
OECD, 2021. OECD housing sector country snapshot: Australia. Available at: https://www.oecd.org/housing/policy-toolkit/country-snapshots/housing-policy-australia.pdf. (Accessed 1 October 2021).
Okafor, A., Adusei, M., Adeleye, B.N., 2021. Corporate social responsibility and financial performance: evidence from US tech firms. J. Clean. Prod. 126078.
Oppenheimer, M., Lakey, G., 1965. A Manual for Direct Action, vol. 202. Quadrangle Books.
Organisation for Economic Co-Operation and Development (OECD), 2021a. OECD housing policy toolkit – synthesis report. Available at: https://www.oecd.org/mcm/OECD%20Housing%20Policy%20Toolkit%20%E2%80%93%20Synthesis%20Report.pdf. (Accessed 1 October 2021).
Ouazad, A., Kahn, M.E., 2019. Mortgage Finance and Climate Change: Securitization Dynamics in the Aftermath of Natural Disasters (No. W26322). National Bureau of Economic Research.
O'Callaghan, C., McGuirk, P., 2021. Situating financialisation in the geographies of neoliberal housing restructuring: reflections from Ireland and Australia. Environ. Plann.: Econ. Space 53 (4), 809–827.
Paterson, J.M., Bant, E., Howell, N., 2020. It's about to become easier to lend irresponsibly, to help the recovery. Available at: https://theconversation.com/its-about-to-become-easier-to-lend-irresponsibly-to-help-the-recovery-146916. (Accessed 1 October 2021).
Polk, M., 2015. Transdisciplinary co-production: designing and testing a transdisciplinary research framework for societal problem solving. Futures 65, 110–122.
Polk, M., Knutsson, P., 2008. Participation, value rationality and mutual learning in transdisciplinary knowledge production for sustainable development. Environ. Educ. Res. 14, 643–653.
Prattico, E., 2018. Sharing the burden of climate change via climate finance and business models. In: Jafry, T. (Ed.), Routledge Handbook of Climate Justice. Routledge, 2018.
Repko, A.F., 2008. Interdisciplinary Research: Process and Theory. Sage, Thousand Oaks, CA.
Rhodes, C., 2016. Democratic business ethics: volkswagen's emissions scandal and the disruption of corporate sovereignty. Org. Studies 37, 1501–1518.
Roncoroni, A., Battiston, S., Escobar-Farfán, L.O., Martinez-Jaramillo, S., 2021. Climate risk and financial stability in the network of banks and investment funds. J. Financ. Stabil. 54, 100870.
Saumure, K., Given, L., 2008. Data saturation. In: Given, L.M. (Ed.), The SAGE Encyclopedia of Qualitative Research Methods. Sage, London.
Savills, 2013. Around the World in Dollars and Cents–How Private Money Moves Around the Real Estate World.
Schmulow, A., 2021. ASIC, now less a corporate watchdog, more a lapdog. Available at: https://theconversation.com/asic-now-less-a-corporate-watchdog-more-a-lapdog-167532. (Accessed 1 October 2021).
Scholz, R.W., Steiner, G., 2015. The real type and ideal type of transdisciplinary processes: part I—theoretical foundations. Sustain. Sci. 10, 527–544.
Schreier, M., 2014. Qualitative content analysis. In: Flick, U. (Ed.), The SAGE Handbook of Qualitative Data Analysis. SAGE Publications Ltd, London.
Schütze, F., 2020. Transition Risks and Opportunities in Residential Mortgages (No. 1910). DIW Discussion Papers.
Scott, M., van Huizen, J., Jung, C., 2017. The Bank of England's Response to Climate Change. Bank of England Quarterly Bulletin 2017 Q2. Bank of England, London.
Shapiro, J., 2018. Major banks' $1.3 trillion mortgage books stress tested by Fitch. Available at: https://www.afr.com/companies/financial-services/major-banks-13-trillion-mortgage-books-stress-tested-by-fitch-20180430-h0zfjn. (Accessed 18 February 2020).
Shue, H., Kanbur, R., 2018. Climate Justice: Integrating Economics and Philosophy. Oxford University Press, pp. 1–24.
Sorrell, S., O'Malley, E., Schleich, J., Scott, S., 2004. The Economics of Energy Efficiency — Barriers to Cost-Effective Investment. Edward Elgar, Cheltenham.

Steffen, W., Mallon, K., Kompas, T., Dean, A., Rice, M., 2019. Compound Costs: How Climate Change Is Damaging Australia's Economy. Climate Council of Australia, Australia.
Stern, N., 2008. American economic association the economics of climate change. Am. Econ. Rev. 98, 1–37.
Task force on Climate-related Financial Disclosures (TCFD), 2017. Recommendations of the Task Force on Climate-Related Financial Disclosures.
Task force on Climate-related Financial Disclosures, 2019. Task Force on Climate-Related Financial Disclosures: Status Report.
The Australia Institute, 2016. Australia's banks most profitable in the world. Available at: https://www.tai.org.au/content/australias-banks-most-profitable-world. (Accessed 7 October 2019).
Tura, N., Hanski, J., Ahola, T., Ståhle, M., Piiparinen, S., Valkokari, P., 2019. Unlocking circular business: a framework of barriers and drivers. J. Clean. Prod. 212, 90–98.
UNEPFI, 2019. Principles for responsible banking. Available at: https://www.unepfi.org/banking/bankingprinciples/. (Accessed 18 February 2020).
UNEPFI, 23 December 2021. Principles for responsible banking signatories. Available at: https://www.unepfi.org/banking/bankingprinciples/prbsignatories/. (Accessed 1 October 2021).
Vermunt, D.A., Negro, S.O., Verweij, P.A., Kuppens, D.V., Hekkert, M.P., 2019. Exploring barriers to implementing different circular business models. J. Clean. Prod. 222, 891–902.
Weber, O., Scholz, R.W., Michalik, G., 2010. Incorporating sustainability criteria into credit risk management. Bus. Strat. Environ. 19 (1), 39–50.
Westpac Banking Group, 2021. Presentation and investor discussion pack. Available at: https://www.westpac.com.au/content/dam/public/wbc/documents/pdf/aw/ic/1H21_WBC_Presentation_and_IDP.pdf. (Accessed 1 October 2021).
Wiek, A., Weber, O., 2014. Sustainability challenges and the ambivalent role of the financial sector. J. Sustain. Fin. Invest. 4 (1), 9–20.
Wright, D., Meadows, D.H., 2008. Thinking in Systems: A Primer. Chelsea Green, White River, Vermont.
Wright, C., Nyberg, D., 2015. Climate Change, Capitalism, and Corporations. Cambridge University Press.
Yin, R.K., 2015. Qualitative Research from Start to Finish. Guilford publications, New York.
Zenghelis, D., 2012. A Strategy for Restoring Confidence and Economic Growth through Green Investment and Innovation. Policy Brief, Grantham Institute on Climate Change and the Environment, London School of Economics, London.