Environment-schmvironment
Climate change through a finance & liability risk lens

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Overview

1. Climate evolution: from ‘environmental’ to ‘financial’ issue
   a. The three categories of climate-related financial risk
   b. Physical risk impacts: latest science
   c. Connecting the dots: food supply chain industry exposures

2. Economic transition risks
   a. Policy and regulatory responses
   b. Technological developments
   c. Stakeholder expectations: equity investors, debt markets, regulators, insurers & society

3. Opportunities
   a. The sustainable finance revolution

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1. Climate change: the evolution
Climate change: undeniably a foreseeable financial risk issue

<table>
<thead>
<tr>
<th>Three categories of climate-related financial risks</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>ecological impacts: gradual onset + extreme catastrophic</td>
</tr>
<tr>
<td>Economic transition</td>
<td>market impacts driven by policy, technology, social responses to those physical risks</td>
</tr>
<tr>
<td>Liability</td>
<td>failure to mitigate, adapt or disclose</td>
</tr>
</tbody>
</table>

These risks manifest within mainstream investment horizons – including the shorter term.

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What, how, when and why?

- **What?**
  - Climate change – ‘greenhouse effect’

- **How and why?**
  - Primarily emissions of carbon dioxide, methane etc from human activities: combustion of fossil fuels (energy, transport, industry, manufacturing); agriculture (livestock); land use change and clearing

- **When?**
  - Pre-industrial 280ppm vs 415ppm CO2e now – already average planetary temp approx. 1.1°C above pre-industrial average
  - ‘Business as usual’ emissions: 4+°C above pre-industrial average by 2100

- **Who says so?**
  - Scientific consensus – IPCC (2018), NASA, WMO etc etc – as *scientifically certain as gravity*
Changes are already here…
Changes are already here…
Baseline shifts above historical norms

Increase in number of extreme heat days >35C (1940-2015)

Weather records broken as Queensland nears three dozen consecutive days over 40 degrees
Potential climate pathways to 2100

**Physical risk: so what?**

- **+1.1°C (now)**
  - Significant increase in extreme heat days
  - Sea level rise 20cm+ (3.4mm per year)
  - Increased variability in rainfall
  - Increased drought, fire conditions
  - 2,000 species rendered extinct due to climate change in last half century (8% of total 25,000 species extinctions)

- **1.5°C (As early as 2024)**
  - 14% of global population subject to extreme heat
  - 8% plants >50% range
  - 6% insects >50% range
  - 90% decline coral reefs
  - 1.5m tonne decline in fisheries catch

- **2°C (As early as 2036)**
  - 37% global pop’n subject to extreme heat
  - 16% of plants lose >50% range
  - 18% insects lose >50% range
  - 99% decline reefs
  - 3m tonne decline in fisheries catch

- **4+°C (2100 – locked in mid-century)**
  - Highest temperatures in 30 million years
  - Glacial melt compromises fresh water sources
  - Drought over 40% inhabited land
  - Sea level rise 6 feet+
  - Extinction of >50% of all known terrestrial and marine species

Black Rock Investment Institute, Sept 2016
Connecting the dots to the food sector....

- Increase in average temperatures (heat stress – workers and equipment; spoilage)?
- Soil denitrification?
- Changes in crop growth cycles and nutrient densities?
- Pest / disease control?
- Ocean acidification and fresh water / deoxygenation / putrification?
- Infrastructure and community vulnerability, adaptation and resilience?
- Supply chain integrity?
- Water scarcity?
- Inundation (coastal & fresh water)?
- Expanding cyclone/hurricane zones?
Potential climate pathways to 2100

- **Baseline 4.1–4.8°C**
- **Current policies 3.3–3.9°C**
- **Pledges & INDCs 2.4–2.7°C**
- **Below 2°C 1.5–1.7°C**
2. Economic transition impacts
Economic transition risks & opportunities

- Policy & regulatory shifts
- Technological dev’mt
- Shifts in stakeholder preferences
  - Equity investors
  - Debt markets
  - Insurers
  - Prudential & securities regulators (‘soft law’)
  - Social preferences
Policy & regulatory?

Coal-hungry South Africa introduces carbon tax

The tax will be levied from June 1 on greenhouse gases from fuel combustion, and industrial processes and emissions.

Zero emissions: UK aims to be first of G7 with 'ambitious' target

Germany to stop using coal by end of 2038

A government commission has agreed that Germany should phase out all coal-fired power plants by the end of 2038. The government is already planning to shut down nuclear power plants over the next three years.
Stakeholder shifts

Millennials have a role in the plastics industry, if companies can attract them

“Dirty, Difficult, And Dangerous”: Why Millennials Won’t Work In Oil

Miners urged to tackle image problem among Millennials

Huge reduction in meat-eating ‘essential’ to avoid climate breakdown

To keep global temperature rises to under 2C by 2050, we need to eat much less of these foods ...

UK citizens will need to eat nine times less pork ...

Globally we would need to eat eight times less pork by 2050 ...

... and much more of these legumes

... and five times more legumes

Pork

Legumes

Beef

Nuts and seeds

Lamb

Vegetables

Poultry

Fruits

Sugar

Vegetable oil

Milk

Beyond Meat surges 163% in the best IPO so far in 2019
Equity markets?
Debt markets? Credit ratings

- Physical geography; transition industry/commodity; company-specific (exposure + preparedness)
In commercial lending practice?
<table>
<thead>
<tr>
<th>CLIENT</th>
<th>RATING (S&amp;P)</th>
<th>RISK (R$ MM)</th>
<th>NUMBER OF STATES</th>
<th>NUMBER OF CROP TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client 1</td>
<td>BBB</td>
<td>391.8</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Client 2</td>
<td>BB+</td>
<td>129.3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Client 3</td>
<td>BBB</td>
<td>115.5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Client 4</td>
<td>BB-</td>
<td>112.3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Client 5</td>
<td>BB</td>
<td>108.7</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Client 6</td>
<td>BB-</td>
<td>107.6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Client 7</td>
<td>BB</td>
<td>84.1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Client 8</td>
<td>B</td>
<td>55.7</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Client 9</td>
<td>BB-</td>
<td>55.3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Client 10</td>
<td>B</td>
<td>44.1</td>
<td>3</td>
<td>2</td>
</tr>
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<td>Client 11</td>
<td>BB-</td>
<td>42.0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Client 12</td>
<td>BB-</td>
<td>41.2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Client 13</td>
<td>B</td>
<td>39.5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Client 14</td>
<td>B</td>
<td>17.2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 3.3. Impact of incremental climate change risk on the financial variables of the sample of agricultural sector clients for the 2040s 4°C scenario compared to the present-day (baseline)

<table>
<thead>
<tr>
<th>CLIENT</th>
<th>REVENUE CHANGE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Client 1</td>
<td>-12</td>
</tr>
<tr>
<td>Client 2</td>
<td>-4</td>
</tr>
<tr>
<td>Client 3</td>
<td>22</td>
</tr>
<tr>
<td>Client 4</td>
<td>-16</td>
</tr>
<tr>
<td>Client 5</td>
<td>-14</td>
</tr>
<tr>
<td>Client 6</td>
<td>-13</td>
</tr>
<tr>
<td>Client 7</td>
<td>-3</td>
</tr>
<tr>
<td>Client 8</td>
<td>-2</td>
</tr>
<tr>
<td>Client 9</td>
<td>-4</td>
</tr>
<tr>
<td>Client 10</td>
<td>-2</td>
</tr>
<tr>
<td>Client 11</td>
<td>-10</td>
</tr>
<tr>
<td>Client 12</td>
<td>-8</td>
</tr>
<tr>
<td>Client 13</td>
<td>-11</td>
</tr>
<tr>
<td>Client 14</td>
<td>-8</td>
</tr>
</tbody>
</table>
Estimated annual average losses to customers from physical risks

Impact
Customers facing increasing repair and replacement costs for physical damage to their properties.

Findings
Under the high emissions (RCP 8.5) scenario, if we were to continue to lend in these areas, the estimated annual average losses to customers across our home lending portfolio are expected to increase by 27% by 2050 – this is less than 1% per annum. The largest contributor to these losses currently arises from soil contraction, but the modeling shows that coastal inundation losses could increase by 71% by 2050, primarily due to sea level rises.

Estimated annual average loss by peril

Index (2018 = 100)

2016 2020 2025 2030 2035 2040 2045 2050 2055 2060

- Soil contraction
- Flood
- Bushfire
- Wind
- Inundation

High risk properties
To better understand our potential credit risk, we have estimated the part of our current portfolio which may be high risk, where there is located and how it could change over time. We have considered high risk to be properties where the increase in insurance costs from 2018 as a
Insurance?

Climate change on track to make world 'uninsurable': IAG

**FINANCIAL REVIEW**

**COMPOUND COSTS:**
HOW CLIMATE CHANGE IS DAMAGING AUSTRALIA'S ECONOMY

If we don't rapidly reduce greenhouse gas emissions, by 2030 about 1 in every 19 properties could have effectively unaffordable insurance premiums.

Climate change and extreme weather are projected to reduce property values by $571 billion by 2030, $611 billion by 2050 and $770 billion by 2100.
‘...climate change...appears to be regarded by the MDBA as a factor to be dealt with by the same mundane operational flexibility as the system always has displayed in order to cope with ‘normal’ variability.’

...Science, as that term should be understood, was not used. The MDBA has failed to disclose key matters, such as its modelling. Science is open, available, and can be critiqued and checked. It can be validated or invalidated.

[The MDBA’s failure to conduct] any review of climate change risks to the Basin...demonstrates ongoing negligence by the MDBA. It is a dereliction of its duties. It is not just indefensible, but incomprehensible...’
A few more choice words

- ‘Politics rather than science ultimately drove the setting of the Basin-wide SDL and the recovery figure of 2750 GL. The recovery amount had to start with a ‘2’. This was not a scientific determination, but one made by senior management and the Board of the MDBA. It is an unlawful approach. It is maladministration.

- In 2011, management of the MDBA improperly pressured the CSIRO to alter parts of the CSIRO’s ‘Multiple Benefits’ report. This rendered parts of that report misleading, as they no longer reflected the views of, at the very least, Dr Matthew Colloff, who was one of the authors. The CSIRO should not have agreed to the changes that were made. This conduct too represents maladministration.

- Regrettably…the MDBA has shown itself to be unwilling or incapable of acting lawfully. …there are serious doubts whether the current senior management and Board are capable of fulfilling their statutory obligations and functions.

- The assertion by the MDBA that climate change projections could not be incorporated into the modelling because they were too uncertain is rejected.

- [The MDBA’s failure to conduct] any review of climate change risks to the Basin… demonstrates ongoing negligence. It is a dereliction of its duties. It is not just indefensible, but incomprehensible.

- Any assertion by the MDBA that climate change can be incorporated into the Basin Plan modelling at its 10-yearly review, or at some later date, is misplaced. Climate change is happening now, and can occur quickly. Deferral to a later date…is nonsensical in a policy sense as well as unlawful.
The ratchet: heightened expectations in FY19?

Climate-related and other emerging risks disclosures: assessing financial statement materiality using AASB Practice Statement 2
3. The good news: finance opportunities for the food sector
Opportunities - the sustainable finance (r)evolution

GREEN BONDS
GREEN LOANS
SDG BONDS/LOANS
CLIMATE - LINKED MORTGAGES
SUSTAINABILITY-LINKED LOANS
Margin adjustment triggers

General ESG
Tied to 3P ESG rating

Specific metrics, stretch targets
Eg. emissions intensity reductions, percentage supply chain audits

- Pennon
- Gecina
- abertis
- Olam
- Adecco
- ACCOR HOTELS
- wilmar

- IBERDROLA
- renewi
- storaenso
- DSM
- GRUPPO
- UNIBAIL-RODAMCO-WESTFIELD
Agri sector examples

- **Dairy + plant-based products**: €2b, ESG score Sustainalytics + Vigeo Eiris
- **Cocoa & chocolate**: €750m, ESG score Sustainalytics
- **Pulp & Paper**: €600m, Science-Based Targets per tonne pulp, paper board
- **Dairy**: €520m
  - Reduce carbon footprint, Foster healthier consumption habits and lifestyles, & Accelerate the sustainable transformation of dairy upstream. Penalty to a NGO or for internal investments allowing to achieve the objective.
- **Food processor / manufacturer**: US$500m, ESG score Sustainalytics
- **Tropical Oils, Oilseeds, Grains, Sugar**:
  - US$150m
  - US$200m
  - US$100m
  - Tiered adjustments based on Sustainalytics assessment of biodiversity and greenhouse gas reduction programmes, renewable energy use, freedom of association policy
- **Rubber & palm oil**: €15m, Sustainability improvements
4. So...what does this mean?  

Practical tips
Leading global guidance on climate-related financial risk assessment & disclosure: G20 FSB TCFD Report

- What makes these voluntary standards so significant?
- Governance, strategy, risk management, metrics & targets
- Specific additional ‘supplemental guidance’ for financial services + 12 non-financial sectors
- Stress-testing and scenario planning are central themes
- Investors from BlackRock, ACSI and Climate Action 100+ seeking disclosure by investees consistent with TCFD Recommendations
- Refer to Annex for sector-specific risk/opportunities guidance
Leading global guidance on climate-related financial risk assessment & disclosure: G20 FSB TCFD Report

<table>
<thead>
<tr>
<th>Financial Category</th>
<th>Climate-Related Category</th>
<th>Example Metric</th>
<th>Unit of Measure</th>
<th>Alignment</th>
<th>Rationale for Inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>Risk Adaptation &amp; Mitigation</td>
<td>Revenues/Savings from investments in low-carbon alternatives (e.g., R&amp;D, equipment, products or services)</td>
<td>Local currency CDP: CC3.2, 3.3, 3.1</td>
<td>New products and revenue streams from climate-related products and services and the return on investments of Capex projects that create operational efficiencies.</td>
<td></td>
</tr>
<tr>
<td>Expenditures</td>
<td>Risk Adaptation &amp; Mitigation</td>
<td>Expenditures (OpEx) for low-carbon/water alternatives (e.g., R&amp;D, equipment, products, or services)</td>
<td>Local currency GRI: G4-11/2 CDP: EU3.3</td>
<td>Expenditures for new technologies are needed to manage transition risk. The level of expenditures provides an indication of the level to which future earning capacity of core business might be affected.</td>
<td></td>
</tr>
<tr>
<td>Expenditures</td>
<td>Water</td>
<td>Total water withdrawn and total water consumed</td>
<td>Cubic meters SASB: CN1010-06</td>
<td>Water stress can result in increased cost of supply, factual inability to produce, and/or legislation to regulate water withdrawal for production. The quantity of water consumed and percent withdrawn in high water-stress areas inform the risk of significant costs or limitations to production capacity.</td>
<td></td>
</tr>
<tr>
<td>Expenditures</td>
<td>Water</td>
<td>Percent of water withdrawn and consumed in regions with high or extremely high baseline water stress</td>
<td>Percentage SASB: CN1010-06</td>
<td>Water stress can result in limitations to production capacity or enforced demolition of assets. The level of assets in high water-stress areas informs the potential implications on asset valuation.</td>
<td></td>
</tr>
<tr>
<td>Assets</td>
<td>Water</td>
<td>Amount of assets committed in regions with high or extremely high baseline water stress</td>
<td>Number of assets, value, percentage of total assets SASB: IF0101-06</td>
<td></td>
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</tr>
</tbody>
</table>

Figure 13: Agriculture, Food, and Forest Products Group

The Agriculture, Food, and Forest Products Group includes, but is not limited to, industries listed in Figure 13.

Climate-related risks and opportunities in this group largely emanate from GHG emissions, and water and waste management driven by land use, production practices, and changing land-use patterns. The absolutely and relative impacts of climate-related transition and physical risks will vary between producers and processors of food and fiber. Producers, such as agriculture and forestry enterprises, will likely be impacted financially to somewhat greater degree by GHG and water risks including extreme weather.
Physical risk: stress-testing & scenario planning over a plausible range of climate futures (not just base case or ‘mediums’) is key
What does this mean for the business of food?

- The legal and financial imperatives for robust consideration is clear…but there are risks *and opportunities*

- Minimising risks and capturing opportunities requires contemporary understanding, proactive inquiry and critical evaluation – forward-looking basis

- *How robust are scenarios and assumptions used in strategy and planning? How will the decisions we make now position us to continue to produce in this disruption?*

- A change from historical norms is inevitable (and has already happened). The variable will be 1.5°C vs 4°C+.

- *Planning based on historical norms instead of future scenario planning is a red flag.*
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