

Climate Risks in Banking – Transmission Channels

Micro and Macroeconomic Transmission Channels

Transmission channels are the ways in which [physical risk drivers](#) and [transition risk drivers](#) materialise and become sources of losses for banks.

The Basel Committee on Banking Supervision (BCBS) 2021 report on [Climate-related risk drivers and their transmission channels](#) explains how these drivers translate into the traditional financial risk categories of credit, market, liquidity and operational risks. The channels can be either microeconomic or macroeconomic:

Microeconomic Channels

These channels transmit the financial impact arising from climate risk drivers to banks directly or indirectly. Climate risks can directly impact banks' operations or the ability to fund themselves. Banks can also be exposed indirectly through exposures to their counterparties and customers.

Macroeconomic Channels

Climate risk drivers can also affect macroeconomic variables, such as Gross Domestic Product (GDP) or labour productivity, and these in turn can impact banks through the economic environment in which they operate.

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In the following pages, we will look at how physical and transition risks transmit through these channels to manifest themselves in credit, market, liquidity, operational and other risks.

Physical Risk Drivers

Physical risk drivers are changes in weather and climate that cause damage and adverse impacts on economies and banks.

Transition Risk Drivers

These drivers are climate-related changes that could generate, increase or reduce risks arising from the transition towards a low-carbon economy.

Microeconomic Channel – Physical Risk Impact on Credit Risk



Microeconomic Channel

Physical risk drivers can adversely expose a bank to credit risk as they can have a negative impact on its borrowers' ability to repay, which is known as the income effect. A bank's credit risk can also increase through the wealth effect, where it faces difficulties in recouping the value of a defaulted loan because the value of the collateral has declined.

Income and wealth effects arise from damage caused by climate risk drivers to physical assets (for example, housing, inventory, property, equipment or infrastructure) of a bank's counterparties.

Let's take a closer look at a bank's credit risk exposures arising from climate risks in terms of their different counterparties – households, corporates and sovereigns.

Physical Risk Impact on Credit Risks – Households and Corporates



Microeconomic Channel

Physical risks can have a significant impact on the credit risks posed by households and corporates to banks.

Exposures from Households

Banks extending residential mortgage loans are exposed to credit risk if a borrower defaults or the value of the collateral declines. Similar risks arise for commercial property when the real estate is collateralised. Real estate prices can decrease significantly in flooded areas. For instance, prices declined by about 20% in the New York City areas that were flooded by Hurricane Sandy in 2012. Price declines may persist for years or become permanent in areas vulnerable to repeat flooding.

Exposures from Corporates

Severe weather events can reduce corporate sales and profitability. Corporates are also vulnerable to supply shocks through their supply chains, particularly when suppliers are located in countries that are vulnerable to climate change. Higher temperatures and changes in precipitation are increasingly affecting agriculture and could drive harvesting yields down. As a result, the creditworthiness of agricultural loan borrowers could deteriorate.

Physical Risk Impact on Credit Risks – Sovereigns



Microeconomic Channel

For sovereigns, the income effects from physical risk events may arise through lower tax revenues and increased spending needs.

Lower tax revenues may result from impaired or less profitable corporates, lower household income, reduced growth and an overall reduction of output.

At the same time, higher spending may be needed to address the negative climate impacts and cover adaptation costs. This includes investments in infrastructure and implementation of a sovereign's transition strategy, such as subsidies to improve the energy efficiency of homes.

The combination of reduced revenues and increased spending needs can result in budget deficits financed through borrowing.

Increased borrowing may result in higher borrowing costs and, in some cases, reduced access to debt markets and an increasing risk of default. In turn, the deterioration of a sovereign's financial position would increase the credit risk of a bank that has exposures to the sovereign.

Transition Risk – Policy and Technology Impact on Credit Risks



Microeconomic Channel

Corporates can be affected by changes in government policy affecting their production, sales and profitability. Current and future expectations of profitability in turn affect their creditworthiness.

In addition, higher operating costs due to, for example, higher carbon taxes on greenhouse gas (GHG) emissions increase corporates' expenses and reduce their earnings. It may also reduce their creditworthiness and limit their access to funding.

Transition to a lower-carbon economy can also make extracting fossil fuel reserves uneconomical, resulting in [stranded assets](#). These effects can hit the revenues of corporates while also reducing the value of their reserves as collateral.

Efforts to manage transitions may facilitate technological changes, for instance, through subsidies or tax credits for research and development that make renewable energies more competitive.

Carbon taxes and regulations that make carbon-intensive technologies more costly can have a similar impact.

Corporates unable to adopt newer technologies in time would suffer from reduced profitability, with banks exposed to them likely to experience higher credit losses.

Stranded Assets

According to the BCBS's definition, these are assets that, at some time prior to the end of their economic life, are no longer able to earn an economic return as a result of changes associated with the transition to a low-carbon economy.

Transition Risk – Market and Customer Sentiment Impact on Credit Risks



Microeconomic Channel

Transitioning towards a lower-carbon economy may trigger shifts in consumer sentiment and market demand in favour of less carbon-intensive products or investments. The inclusion of [environmental, social and governance \(ESG\) criteria](#) in credit ratings is accelerating such shifts.

For banks, retail and wholesale customers increasingly expect their savings and investments to be managed in projects that have positive environmental impacts.

Further shifts in market preferences come from institutional investors divesting from projects and investments related to fossil fuels (coal mines and oil drilling, in particular), which banks are increasingly reluctant to fund.

Environmental, Social and Governance (ESG) Criteria

ESG criteria refer to the environmental, social and corporate governance factors and intangible assets that are increasingly taken into account by investors. Environmental concerns relate to climate change and sustainability of development. Social concerns include promoting diversity, human rights, customer protection and animal welfare. Corporate governance includes a corporate's management structure, employee relations and compensation.

Physical and Transition Risks – Impact on Market Risk



Microeconomic Channel

Climate risk drivers can have impacts on financial asset valuations, especially when these drivers are not, or not explicitly, priced-in within markets.

Physical Risks

Uncertainty about the location, frequency and intensity of severe weather events may lead to higher volatility in financial markets. Although there is limited analysis of physical risks' impacts on financial markets, there are indications that stock options of firms located on the trajectory or landfall region of a hurricane can increase in implied volatility.

Transition Risks

Changes in policies, technology and investor sentiment can result in an abrupt repricing of financial assets. These changes could lead to significant increases in risk premia, a break down in asset correlations and the reduced effectiveness of hedges that would challenge banks' ability to manage these risks.

Physical Risk – Impact on Liquidity, Operational and Other Risks



Microeconomic Channel

Physical risks should be of concern to banks, as they can strain liquidity, disrupt operations and amplify compliance, liability and reputational risks.

Liquidity Risks

Climate risk drivers can impact banks' liquidity directly by impairing their ability to raise funds or liquidate assets and indirectly through customer demands for liquidity. Physical risks can strain a bank's liquidity in several ways. Following a climate-related disaster, bank liquidity buffers could deplete through a sharp increase in liquidity demand from financial institutions, households and corporates. They may draw on their credit lines and/or withdraw their deposits to finance recovery, putting bank liquidity under pressure. This could oblige the central bank to intervene to preserve financial stability.

Operational Risks

Given that there is little research on banks' operational risks arising from physical risks, parallels can be drawn from their responses to other natural disasters. For example, disruptions in transportation and telecommunications after a severe climate-related disaster are likely to reduce a bank's operational ability.

Other Risks

Banks and the corporates they finance are exposed to increasing compliance, liability and reputational risks due to their investments and lending activities in carbon-intensive sectors. Pressure and campaigns from investors, non-governmental organisations and climate activists can increase these risks and may also increase bank credit risk or even precipitate a corporation's default.

Macroeconomic Channels – Physical Risk Impact on Credit Risks



Macroeconomic Channel

Macroeconomic channels are likely to have the greatest impacts on a bank's credit and market risks. Let's look at how physical risk drivers can transmit through the macroeconomy to affect a bank's credit risk profile.

Labour and Growth

Physical risk drivers are expected to reduce GDP growth. In turn, this economic contraction can increase a bank's credit risk exposure, for example, through lower corporate profitability, reduced household incomes or defaults. In particular, increases in temperature adversely affect mortality, morbidity (illness, impairment or degradation of health), agricultural yields, labour supply and labour productivity. Work capacity could be reduced significantly in certain regions during daylight hours as it becomes too hot to work.

Cost of Recovery from Natural Disasters

These can be significant, especially for developing countries and poorer regions or municipalities. They may negatively impact banks' credit assessment of the affected public entities. The disaster and the need to borrow to fund the recovery can significantly increase borrowing costs, possibly leading to higher taxes, reduced government spending, reduced economic activity and higher credit risk for banks.

Socioeconomic Changes

There is evidence that climate change could amplify negative socioeconomic changes. Changes in climate, including extreme weather, sea level rise, drought and desertification, can deplete resources, cause violent conflicts, increase relocations out of affected areas or increase mass migration. All of these changes translate into reduced GDP growth, a less favourable macroeconomic environment and reduced creditworthiness of borrowers.

Reference - Higher Recovery Costs for Developing Economies

When looking at the 10 largest disasters between 1970 and 2018, the International Monetary Fund (IMF) estimated that emerging markets incurred damages between 3% and 10% of their GDP, whereas losses were between 1% and 3% of GDP for mature economies. Select [here](#) and read Chapter 5 of the IMF's Global Financial Stability Report if you'd like to learn more about this.

Transition Risk Impact on Credit Risks



Macroeconomic Channel

The shift towards a non-carbon environment will have huge implications on sovereigns that rely heavily on fossil fuels for income, while also restricting the income of those living in countries where stricter measures are being implemented.

Stranded Resources

A global transition away from fossil fuels will likely result in most fossil fuel reserves becoming stranded (that is, not being extracted because it becomes uneconomical to do so). This could lead to considerable losses, especially in emerging economies that rely heavily on fossil fuel revenues. Such effects would reduce government revenues, reduce their ability to service their debt, increase borrowing costs, reduce their credit ratings and ultimately increase the credit risks that banks would face from these counterparties.

Aggregate Impact of Reduced Incomes

Aggregate household income and wealth may contract through the combined effects of carbon taxation, increased production costs in carbon-intensive activities and structural changes in consumer preferences and in the economy. Reduced corporate profitability and reductions in household income would slow GDP growth and lead to higher unemployment. Combined wealth and income contractions would increase credit risk from both households and corporates.

Physical Risk Impact on Market Risk



Macroeconomic Channel

Sovereigns exposed to physical risk drivers – such as some Caribbean countries frequently hit by hurricanes – may also experience higher borrowing costs, reduced debt market access and deteriorating fiscal positions.

A sovereign's reduced creditworthiness would affect banks through losses on holdings of government debt, reduced value of collateral that banks can use to secure funding and an increase in the banks' funding costs due to rating downgrades.

Review Question

Which of the following are transmission channels through which physical risk drivers can increase a bank's credit risk?

- Direct damage reducing the borrower's income and therefore its ability to repay (Yes/No)
- Direct damage reducing the value of the borrower's collateralised assets (Yes/No)
- Damage to infrastructures that have knock-on effects on all agents that use them (Yes/No)
- Carbon taxes and regulations that make carbon-intensive technologies more costly (Yes/No)

Direct damage that has an impact on a borrower's income or on the value of its collateralised assets will affect its ability to borrow and repay. This is also the case when commonly used infrastructures are damaged, except that in such instances, the damage will have knock-on effects on all users. All three are cases where various physical risk drivers may be transmitted to banks' exposures and become a source of climate-related financial losses.

However, carbon taxes and regulations that make carbon-intensive technologies more costly are examples of transition risk drivers and of their transmission channels since increasing the cost of carbon-intensive technologies will make them less competitive when compared to renewable sources of energy.