

CLIMATE CHANGE: WHAT ROLE FOR CENTRAL BANKS?

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THE POLITICAL CONTEXT

Preserving our planet's resources is the defining issue of our age – and there is no time to waste. That simple yet far-reaching statement encapsulates why transitioning to a carbon-neutral economy is so crucial and has emerged as a cornerstone of international policy efforts. Most countries have committed to carbon neutrality by the middle of this century, yet few have defined clear milestones along the way that stake out a credible path to that objective.

As greenhouse gas emissions still mostly come without a price tag, climate change is a prime example of a negative externality: in their individual choices, economic agents do not sufficiently account for the external damage their choices entail for the environment and others. The intensity of climate change depends on greenhouse gas concentration levels in the atmosphere, a global public good that has been overused, and still is, for the benefit of the individual and to the detriment of society as a whole – a perfect example of the tragedy of the commons (Hardin, 1968). The negative consequences for the climate have been known for decades, and countermeasures are more urgent

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than ever. At the same time, given the intrinsic incentive to free ride, international cooperation and multilateralism is essential. The Paris Agreement was a quantum leap, but needs to be followed by swift collective action. Transitioning to carbon neutrality calls for a global effort by all sectors. That includes the financial industry, whose pivotal role was emphasised for the first time in Article 2.1c of the Paris Agreement, which calls for “finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development” (UNFCCC, 2015). In other words, the financial system needs to be instrumental in supporting the economic transformation.

CLIMATE CHANGE AS A SOURCE OF ECONOMIC AND FINANCIAL RISK

In one way or another, economic agents will all be affected by climate change, its mitigation and the adaptation to it. While some will suffer because their business models are no longer profitable or their land becomes uninhabitable, others will benefit. The increased frequency and severity of extreme weather events poses significant risks to our economies. Consequently, climate change will affect key economic variables that have a bearing on the work of central banks (NGFS, 2019). In addressing these risks, the challenge is to transform our economies without compromising social stability. In this regard, adequate fiscal policies are crucial. Public expenditure is projected to increase considerably in the years ahead, not only to cover adaptation measures and reconstruction activities but also to preserve social equitableness. On top of that, large-scale public and private investment in mitigation action will be needed. In Europe alone, meeting the new 2030 emissions-reduction target will require an estimated €350 billion of additional investment annually (von der Leyen and Hoyer, 2021).

Channelling financing for the necessary transformation is precisely where a stable financial system is key. Yet climate change and climate policies themselves are major sources of financial risk, as has been widely acknowledged by central banks worldwide (NGFS, 2019). Central banks therefore have a duty to ensure that individual financial institutions, and the financial system as a whole, are resilient to these risks. Climate change has some peculiarities distinguishing it from other sources of risk, however, which make this matter more challenging (NGFS, 2018 and 2019):

- climate change affects all economic agents, and the risks it produces are economy-wide, spanning different regions and sectors;
- some form of climate-related risk will materialise in the future, though the exact timing, direction and intensity of the economic fallout of climate change are ex-ante unknown;

– the consequences of climate change are irreversible. As yet, there is no mature technology that could reverse carbon dioxide concentrations in the atmosphere at scale. Furthermore, if we pass certain tipping points of selected elements of the Earth system, this could cause significant impacts on human and ecological systems that might be irreversible (Lenton *et al.*, 2008; Lenton *et al.*, 2019);

– lastly, there is a tragedy of the horizon (Carney, 2015). Long-term thinking coupled with short-term action is essential for an early and orderly transition. This insight is largely based on the fact that “cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond” (IPCC, 2014). Reducing these emissions through unprecedented, “rapid and far-reaching transitions in energy, land, urban, infrastructure [...], and industrial systems” is therefore inevitable to limit global warming to 1.5 °C in the long term (IPCC, 2018).

The literature identifies two main transmission channels for climate-related risks that both have a bearing on the demand and supply side of the economy (NGFS, 2018): physical and transition risks. Physical risks can be either acute or chronic. Climate- or weather-related events, such as floods, storms and droughts, are acute in the sense that they occur at a point in time. Chronic risk, meanwhile, results from permanently changing climate or weather patterns such as temperature increases. Although acute physical risks are limited geographically, they can have a global impact. In a globalised world with closely intertwined markets, seemingly small disruptions to supply chains can have ripple effects on the world economy. The current shortage of microchips – aggravated by a severe drought in Taiwan – is a case in point (BBC, 2021). Alongside physical risks, there are also transition risks, which are the financial risks that result from adapting our economies to a carbon-neutral world. The corresponding climate policies can take different shapes: the introduction of a carbon price, banning certain products or technologies, or abolishing subsidies for “dirty” business activities. The possible phasing out of the combustion engine in vehicles is a recent and prominent example. On top of that, changing consumer preferences or market sentiment as well as shifts in technology are additional transition risk drivers (NGFS, 2019). If the regulatory or technological transition occurs unexpectedly or abruptly, it can lead to a sudden and massive revaluation of assets with potential financial stability implications.

Given their interdependent nature, physical and transition risks need to be considered and addressed simultaneously. The Network of Central Banks and Supervisors for Greening the Financial System (NGFS) has therefore identified two main dimensions that determine

the potential impact of physical and transition risks on the economy and financial system: the strength of the response, i.e. how ambitious and far-reaching mitigation measures are, and the transition being orderly or disorderly (NGFS, 2019). Transition risks to the economy and financial system are greatest in a scenario where mitigation measures occur in an unexpected or disorderly fashion, while combined physical and transition risks will be minimised in an early and orderly scenario. This fits in with the results of the ECB's economy-wide climate stress test (ECB, 2021a), which found that both non-financial corporations and banks benefit from early climate policy measures. The upside of an orderly and efficient transition to a carbon-neutral economy outweighs its short-term costs in the medium to long term.

Although climate-related financial risks have their own unique features, as set out above, they are treated as part of the traditional risk categories, like market, credit, business or operational risk. All these standard risk categories can include a climate risk dimension (BaFin, 2020). For example, an extreme weather event destroying a borrower's production facilities might lead to higher credit risk for lending banks.

CLIMATE CHANGE AND CENTRAL BANKS' MANDATES

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Just like any other economic agent, central banks have to grapple with climate-related risks. They regard climate-related risks as a threat not only to the economy, but also to the functioning of their own operational frameworks, though they do see scope to integrate climate-related risk into the latter (NGFS, 2020b). The main arguments put forward in favour of applying a protective, risk-oriented approach are (1) to mitigate climate-related financial risks, and (2) to safeguard financial stability. Those in favour of proactively supporting climate policy to ensure an orderly transition emphasise its importance as a prerequisite for the functioning of the monetary policy transmission channels, i.e. they establish a direct link to the primary mandate. A similar logic can apply to financial stability matters. Overall, the latter approach is more contentious and arguably blurs the line between climate and monetary policy.

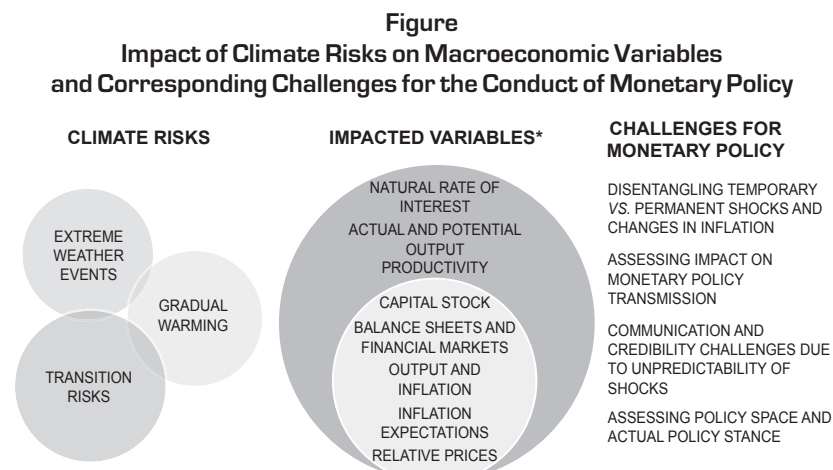
Ultimately, it is a central bank's legal mandate that determines its scope for action. Thus, a second way to approach the question of why central banks should care about climate change is to screen their mandates for explicit references to terms such as "sustainability", support of "economic development" or "government economic policy". If central banks' mandates mention terms like these, this could, in principle, justify climate-related action by central banks and provide some room for manoeuvre, even more so if their governments are already committed to climate action. An NGFS review of 107 central banks'

mandates has found that almost half of them have price stability as their sole primary objective, with the remainder having references to several primary objectives of equal rank (NGFS, 2020b). Roughly one-quarter of the central banks reviewed have a reference to sustainability matters within their mandate, but just 5% of them as part of their primary objective. By contrast, more than half of the central banks surveyed in the NGFS exercise are supposed to explicitly support economic development or government economic policy within their mandate, but only in 22% of the cases as part of their primary objective. These results are broadly in line with the findings of Dikau and Volz (2021), who base their own empirical analysis on the IMF's Central Bank Legislation Database and conclude that central banks have leeway to, and ought to, incorporate climate-related risks into their operational frameworks in their own best interest. Just as the mandates and traditions of central banks differ, so, too, will their policy actions in practice.

CENTRAL BANKS' ACTION ON CLIMATE CHANGE

Having established that climate change has potentially far-reaching economic and financial consequences, it goes without saying that these will also – temporarily or permanently – impact core economic indicators that drive central bank policy, such as output, productivity or inflation expectations (see Figure below). As a result, central banks' mandates typically require them to address these consequences and thus climate change itself; however, it is an open question what actions

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* For impacted variables, the darber, the longer the time horizon.

Source: NGFS (2020a).

central banks can take. Furthermore, does action on climate change really call for a new doctrine for central banks, or is it just a refinement of their traditional doctrine but still strongly rooted within it?

To deliver on its price stability mandate, a central bank first needs to better understand the consequences of climate change for the drivers and transmission channels of monetary policy as well as its policy toolkit. For central banks to uphold their reputation as authorities on economic modelling and forecasting, they need to revise and amend their models and analyses in the light of climate change. As they adapt their modelling approaches, they need to be transparent about the shortcomings of the economic models of climate change they use, which typically rely on a number of crucial and simplifying assumptions (Hansen, 2021). By doing so, central banks will add credibility to their analyses and forward guidance and heft to their communications. In a second step – translating their insights into actions –, central banks could adjust their operational frameworks, i.e. their credit operations, collateral frameworks or asset purchases. In this context, it is important to provide for the effectiveness of their toolkit while weighing up operational feasibility, the degree of risk protection provided, and the potential contribution to climate change mitigation (NGFS, 2021a). By communicating clearly and credibly on the economic impacts that climate change may cause and taking effective action to ensure price stability regardless, central banks enable economic agents to plan and make the long-term investment needed to adjust to these impacts (NGFS, 2020a).

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Incentivising the necessary investment furthermore requires trust in the stability of the financial system (Buch and Weigert, 2021). To safeguard the soundness and resilience of the financial system, macroprudential analyses and policies need to consider climate-related risks (Bolton *et al.*, 2020). Scenario analysis is one key tool to explore uncertain medium- to long-term developments, and central banks have joined forces and been crucial in designing scenarios commensurate with the requirements of assessing climate-related financial risks (NGFS, 2020d). Numerous central banks are working on adapting these scenarios to various economic contexts and their analytical objectives (NGFS, 2021b), and some have already run macroprudential stress tests on the basis of them (e.g. ECB, 2021a). Importantly, through the development of these scenarios, central banks also allow private market participants to examine climate-related risks based on a common set of assumptions, which is conducive to improving the overall quality of climate-related financial risk assessment (Bingler and Colesanti Senni, 2020). The fact that the scenarios are becoming

increasingly integrated into private sector-driven analyses and tools (e.g. MathWorks, 2021; S&P Global, 2021) thus represents an important step forward.

Raising awareness of climate-related risks in the financial sector and developing tools to gauge these risks for the benefit not just of central banks but also of market participants is crucial for addressing them. Hence, their mandate permitting, central banks, in their capacity as supervisors, have also adjusted their supervisory strategies, practices and expectations. Supervision of financial institutions is typically strictly risk-based and as such, it has to account for all material risks, including those induced by climate change. Central banks and supervisors have identified best practices and communicated supervisory expectations (NGFS, 2021c). In addition, central banks have, to an increasing extent of late, also been defining criteria for microprudential, bottom-up stress tests, thereby raising awareness and forcing supervised institutions to analyse their exposure to the specified climate-related risks (e.g. Baudino and Svoronos, 2021; ECB, 2021c).

The degree to which protective, risk-based measures can be successful depends on central banks' ability to analyse risks appropriately and, therefore, on the quality of the data and indicators used to measure climate-related risks and opportunities. Reinforcing a protective approach by taking proactive measures as outlined below allows central banks to support the availability, accessibility and quality of data and indicators, improve transparency more generally, and lend (indirect) support to certain market segments or foster the adoption of technology to scale up sustainable investment.

Currently, the market still lacks comparable, consistent and decision-useful climate-related information, and consequently, financial markets seem to be underestimating material climate-related financial risks (CDP, 2020). While it is up to policymakers and standard setters to implement mandatory reporting, central banks can act as catalysts. They could, for example, link the eligibility of assets to certain climate-related reporting requirements and only purchase securities or accept them as collateral if their issuers disclose key climate-related indicators. A similar logic can be applied to the use of external credit ratings by central banks, confining their use to credit rating agencies that adequately consider climate-related financial risks as part of their risk assessments (Mauderer, 2020; Weidmann, 2021). Both approaches would increase market transparency and facilitate the uptake of similar measures in the financial industry. Consequently, markets would be more efficient in pricing climate-related financial risks and better placed to allocate funds efficiently.

To overcome certain market barriers, central banks can also incentivise the use of technology. One recent initiative saw the Banca d'Italia join forces with the BIS Innovation Hub to launch the G20 TechSprint 2021 on green and sustainable finance during Italy's G20 presidency in 2021. The idea behind this worldwide competition was to seek innovative solutions to better connect projects and investors, reduce information asymmetries, and better assess physical and transition risks with the help of state-of-the-art technology. Another way in which central banks can foster financial innovation and lend support to new sustainable finance market segments is to adjust their collateral policies accordingly. For example, the ECB decided to accept sustainability-linked bonds as collateral for its credit operations and to make them eligible for outright purchases, provided they comply with all other eligibility criteria (ECB, 2020).

In addition, numerous central banks around the world have used part of their portfolios to support climate change mitigation by developing and implementing sustainable and responsible investment (SRI) strategies. According to an NGFS survey among forty central banks, their main reasons for adopting SRI practices are reputational risk and setting a good example (NGFS, 2020c). Alongside typical financial objectives that aim at increasing risk-adjusted returns, there are extra-financial considerations that central banks mention in this regard as well. The underlying rationale here is to achieve a positive real world impact, for instance by financing the carbon-neutral transformation. The BIS is facilitating similar steps thanks to the launch of two green bond funds: one denominated in euro, the other in U.S. dollars (BIS, 2021a). By investing in these open-ended funds, central banks and official institutions around the globe can allocate capital to green projects, follow up on their own environmental targets, and further stimulate the growth of the green bond market. The success of this initiative is underlined by the fact that the BIS recently announced the launch of a complementary Asian green bond fund in early 2022 (BIS, 2021b).

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CONCLUSION

There can be no doubt that climate change affects central banks' core tasks and operations and that this impact may increase considerably in the future. As a result, the need for central banks to account for climate change and the risks it entails is self-explanatory. What is also evident, though, is that while the topic of climate change may be relatively new to central banks, it is nonetheless a concept that is deeply entrenched in their traditional mandates and hence does not constitute or require a new doctrine. On the contrary: it is more about a modern and

timely interpretation of central banks' long-standing objectives, which mainly require them to preserve price stability and sometimes also to facilitate sustained growth, promote employment or safeguard financial stability.

Counting on new doctrines or assumed mandates to explicitly address climate change would lead to demands and expectations that central banks would not be able to meet. Climate policy should lie first and foremost in the hands of elected governments and there is no doubt that fiscal policies are the most efficient way to incentivise the transition to a carbon-neutral economy. As a result, as central banks address climate change, they need to be careful to frame it in the context of the traditional doctrine and in that context alone.

While climate-related risks have only been on central banks' agenda for a few years now and many challenges remain, there is no denying that central banks have also made great strides in terms of facing up to the impact of climate change. The Eurosystem is a case in point: in its recent strategy review, it acknowledged the impact climate change and the transition to a carbon-neutral economy may have on its ability to fulfil its mandate and, thus, committed to revising and expanding its analytical and modelling capacities in this area considerably. This will entail specifying technical assumptions on climate-related (fiscal) policies, such as carbon pricing, as well as assessing the importance of these policies or weather and climate data for the quality of economic forecasting. The Eurosystem published a multi-year action plan outlining the ways in which to address and account for climate-related risks (ECB, 2021b), including adapting its monetary policy operations with respect to disclosures, risk assessment, the collateral framework as well as purchases of corporate sector assets. In addition, climate stress testing will become a staple tool, while new statistical indicators and collections are to be developed to improve transparency and the quality of data used to examine financial risks from monetary policy transactions. All these measures should, however, be considered in the context of the Eurosystem's core mandate, which is to preserve price stability, as well as its supervisory duties.

Putting this plan into action will not be easy – not for the Eurosystem and not for other central banks aiming to take similar measures. As they face much the same challenges, cooperating and coordinating internationally will allow them to learn from each other, and frontrunners will lower the barriers for others to follow suit. This is the very spirit of the NGFS and the reason for its success. Central banks' role in addressing climate change is a supporting one, but one that they have assumed in earnest.

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