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Developing a precautionary approach to financial policy – from climate to biodiversity

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Summary

Climate change and biodiversity loss have primarily been approached by financial authorities (central banks and supervisors) from the perspective of financial risk. The prevailing view is that there is insufficient information and understanding of environment-related financial risks within financial institutions. If such financial risks can be discovered, measured and disclosed, they can be priced into financial markets to support a smooth environmental transition and this market failure can be addressed.

However, environment-related financial risks have particular features that make them less amenable than other types of risk to standard financial risk management approaches. In particular, the 'radical uncertainty' characterising the long time horizons and the endogenous and non-linear dynamics involved with environmental change make quantitative calculations of financial risk challenging, if not impossible.

The authors propose in this paper an alternative, precautionary approach to financial policy, incorporating both prudential and monetary policies. As a framework it draws on the 'precautionary principle' and modern macroprudential policy traditions. A precautionary financial policy mindset acknowledges the importance of measurement practices and price discovery but justifies bolder policy action to shift the allocation of capital to shorter time frames better aligned with the uncertain and potentially catastrophic nature of environment-related threats, including the risks to, and posed by, financial institutions. The paper considers financial authorities' tentative steps and possible tools in such a precautionary policy direction – and how these could be scaled up and mainstreamed.

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This paper is part of a toolbox designed to support central bankers and financial supervisors in calibrating monetary, prudential and other instruments in accordance with sustainability goals, as they address the ramifications of climate change and other environmental challenges. The papers have been written and peer-reviewed by leading experts from academia, think tanks and central banks and are based on cutting-edge research, drawing from best practice in central banking and supervision.

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1. Introduction: why should central banks and financial supervisors adjust and adopt a precautionary financial policy approach?

The threats posed to the financial system by climate change and biodiversity loss are primarily conceived by financial policymakers to result from market failures (Carney, 2015; Schnabel, 2020; Dasgupta, 2021; Brainard, 2021). Financial institutions lack information about the nature and timing of relevant environmental risks and hence are unable to price them into market exchange (Thomä and Chenet, 2017; Chenet et al., 2021; Svartzman, Bolton et al., 2021), despite the scientific consensus around their severity (IPBES and IPCC, 2021; IPCC, 2022). Accordingly, the role of financial policy is 'market-correcting': encouraging financial institutions to measure and disclose their perceived risks to enable price discovery and appropriate shifts in the allocation of capital (Carney, 2015).

In the climate sphere, disclosures, scenario analysis and stress testing can be viewed as extensions of this 'market failure' paradigm, in providing frameworks for how to better understand and measure climate risks. The biodiversity-finance sphere, although significantly less advanced, would appear to be moving in the same direction, for example with the creation of the Taskforce on Nature-based Financial Disclosures (Kedward et al., 2020; TNFD, 2021) and the emphasis on risk measurement in the recently published occasional paper by the Network for Greening the Financial System and INSPIRE research group on biodiversity-related financial risks (NGFS-INSPIRE, 2022).

The implicit logic of this market failure framing is that measuring such risks enables their management via market mechanisms. In this paper, we argue that environment-related financial risks[1] are subject to radical uncertainty: it is unlikely to be possible to measure (i.e. calculate) these risks to a level of relevance, precision and robustness that is useful for decision-making and safeguarding the stability of the financial system.

We propose an alternative, precautionary approach to financial policy, incorporating prudential and monetary policies, that acknowledges the endogenous role of central banks and financial supervisors[2] in determining the severity and scale of environment-related risks. Such a precautionary financial policy framework draws on the precautionary principle and modern macroprudential policy traditions.

Faced with potentially catastrophic outcomes subject to radical uncertainty, our proposed approach advocates the proactive steering of financial markets in a clear direction, away from ecological tipping points and towards building economy-wide resilience. An effective precautionary policy approach will require closer coordination and alignment between central banks, financial supervisors and industrial and fiscal policy spheres to ensure democratic legitimacy and accountability.

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2. How do central banks and financial supervisors currently focus on the financial risk paradigm?

2.1. A reliance on climate risk measurement and disclosure

A fundamental challenge for the financial system, as noted by Mark Carney (2015) when he was Governor of the Bank of England, is that by the time climate-related impacts become financially material for business and political actors, it will be too late to take significant mitigating actions. The key objective for central banks and supervisors is thus to avert this 'tragedy of the horizon' through the timely disclosure of the sources of climate-related financial risks to correct market information. In the years since, financial policymakers – including central banks and financial supervisors – have advocated for increased transparency, better data, and harmonised metrics as part of a 'market-fixing' strategy (Ryan-Collins, 2019) to manage climate risks by improving the efficiency of market mechanisms (Bank of England, 2017; European Commission, 2018; BEIS, 2019; ECB, 2020).

[1] From this point on, we use the abbreviated phrase 'environment-related risks'. The term includes both 'climate-related financial risks' and 'biodiversity-related financial risks'. For a discussion of why treating such risks separately is problematic given their interaction, see Kedward et al. (forthcoming).

[2] From this point on we use the abbreviated phrase 'central banks and supervisors'.

Based on this logic, most of the effort from financial institutions, central banks and supervisors in advanced economies since 2015 has relied on climate-related financial risk measurement and disclosures as the prevailing approach to deal with climate change. A similar trend has emerged, too, for other sources of financial risk from the environment, such as biodiversity loss (Finance for Biodiversity, 2021; TNFD, 2021). This primary focus on risks to the financial system, rather than addressing where finance contributes to threats to the environment more directly, reflects the emphasis on 'prudential' concerns in the primary mandates of advanced economy central banks and supervisors (Baer et al., 2021). Once environment-related risks can be discovered, measured and disclosed, it is thus believed they can be priced into financial markets to support a smooth environmental transition.

Climate scenario analysis and climate stress testing represent efforts by authorities to help financial institutions explore the variety of impacts from climate change, on both the physical and transition sides, and to investigate how risks can play out across time. Such approaches acknowledge the fact that climate change comes with uncertainty and does not translate into a single probable future for the economic and financial system (Svartzman, Bolton et al., 2021). Indeed, switching from a traditional 'forecast' view to a 'scenarios' perspective offers an examination of multiple future realisations of climate change mitigation, impacts and adaptation.

However, such tools are not silver bullets and do not provide the type of precise financial risk measurement that supports shifts in market pricing under the old adage *"that which is measured can be managed"* (Carney, 2015). The question of whether those risks can really be 'measured' to a level that is materially useful enough to inform policymaking decisions has not been sufficiently addressed. Moreover, the scenarios from the Network for Greening the Financial System (NGFS) have been criticised for neglecting the role of the financial sector in the Integrated Assessment Models (IAMs) that underlie the scenarios (Battiston et al., 2021) and for an over-reliance on fossil fuels enabled by assumptions that carbon dioxide can be removed on a vast scale by as-yet unproven technologies (Reclaim Finance, 2021).

"Switching from a traditional 'forecast' view to a 'scenarios' perspective offers an examination of multiple future realisations of climate change mitigation, impacts and adaptation."

2.2. The complex challenge of modelling transmission channels

The transmission from physical and transition risk factors related to climate change and biodiversity loss to ultimate impacts on economic and financial parameters at the level of the financial institution and the financial system is extremely complicated. Modelling these transmission channels necessitates consideration of multiple layers of activity, each of which comes with its own level of uncertainty in terms of understanding, modelling and imagining the many possible realisations. The 'risk measurement' principle in a climate stress test framework consists of first defining a scenario of transition and/or physical risks, and then modelling how these translate at the micro-level to economic transmission channels affecting individual businesses and households. Ultimately, the challenge is to understand how these effects can materialise at the financial market level in the form of the usual risk parameters (market, credit, liquidity and operational risks), and at the micro- and macrofinancial levels, including via the phenomenon of financial contagion, to eventually become systemic. Such processes are genuinely difficult to model, even when focusing on a single risk factor and single firm, to say nothing of the endogeneity, networking effects, multiple feedback loops and working at the financial market scale over long time horizons.

At present, approaching this puzzle, which brings together climate change, policy, technology, micro- and macroeconomics, and micro- and macrofinance, is undertaken by stacking models in cascades feeding into each other. Such models are not fully compatible nor always coherent with one another because they were not conceived to operate together and do not necessarily work under the same

hypotheses. This brings strong limitations that lead to a questioning of the capacity to compute accurate levels of financial risk (Ghersi et al., 2021; Hansen, 2022).

An additional challenge to the modelling of climate-related financial risks comes from the multiplicity of possible events and trajectories that need to be considered. For instance, the Intergovernmental Panel on Climate Change considers a total of 411 global emissions pathways, but these do not include the considerable possibilities at regional and national levels that interact with one another and are inherently dependent on the actions of multiple agents (IPCC, 2018). These multiple scenarios then need to be charted onto complex interconnected financial systems, whose actions have important implications for climate pathways. This translates into yet more possible pathways for the financial system, which policymakers have to consider in order to take informed decisions (Chenet et al., 2021). The number of plausible scenario bifurcations increases with time and it is literally impossible to represent all the possibilities. As a result, the representativity of such modelling exercises comes into question, even if they were proven to be robust for one single scenario.

This combination of complexity and multiplicity forms situations of radical uncertainty that are not compatible with the traditional approach of 'measuring' financial risk from a probabilistic description of how financial assets can be impacted by exogenous shocks (Chenet et al., 2021). Based on Frank Knight's distinction between risk and uncertainty (Knight, 1921), risk in finance is probabilistic, informed by past events and involving random outcomes with knowable probabilities, while uncertainty (often referred to as 'radical uncertainty' to mark the distinction) characterises situations of 'unknown unknowns', where the future is unknowable and unpredictable. Climate change and the transition towards a net-zero economy, especially when viewed over long time horizons, is characterised by such radical uncertainty and many of the associated risks must be considered as both systemic and endogenous to the macrofinancial system, which prevents the 'price of risk' being calculated as if we knew in which future such a price would form. Such features are even more true for biodiversity-related financial risks, as the underlying phenomena are even more granular, more specific, and less known than for climate change (Kedward et al., 2020; 2021).

"This combination of complexity and multiplicity forms situations of radical uncertainty that are not compatible with the traditional approach of measuring financial risk."

The use of scenario analysis and long-term climate stress tests is a sound approach for testing the relative effects of some policies, consumption patterns or technological disruptions. They can help in anchoring expectations, especially for transition risk, and create a common way to think about environmental change and policies. However, central banks and supervisors have not been clear about the objectives they have when designing scenarios or about how they might inform financial policy interventions, beyond the aforementioned addressing of information asymmetry and market failure. Such scenarios come with no foreseeable capacity to bring the precise quantification that central banks and supervisors expect to be able to implement or calibrate concrete financial policy interventions against climate change. This leaves financial institutions with their subjective perceptions of upcoming changes in the real economy, disconnected from the constraints and imperatives learned from science.

Most entities working on developing these models, both in academia and within other institutions, acknowledge these limitations. The need for action is always put forward very clearly in the preamble of publications and official speeches from central banks and supervisors on the topic. However, strikingly, highlighting the above limitations often precedes conclusions calling for 'more research', better 'measurement practices', and 'building intellectual capacity', which has the natural consequence of delaying action and potentially raising risk levels (NGFS, 2018).

This does not mean that under conditions of radical uncertainty all modelling and attempts to measure environment-related risks are useless. Modelling can shed light on some specific subsets of risk factors, on some specific transmission chains, limited to specific sectoral and regional perimeters, on reasonably short time horizons. But a much better appreciation of the trade-offs between knowledge building and risk materialisation in the nearer term is required. A stronger focus on ecological tipping points (Lenton, 2013; Otto et al., 2020) would make such a trade-off more transparent. This is especially true for nature loss, which can occur in much more abrupt and shorter time frames than climate change, where strong dynamics can be relatively slow to materialise. This trade-off conveys another perspective on the 'tragedy of the horizon', which does not call for measurement as a prerequisite for management, but rather for regulatory action informed by science. In short, modelling environment-related risks offers illustrative and explanatory power but it cannot be the only compass guiding policymakers (Dafermos, 2022 [forthcoming]). As put by L. A. Pereira da Silva (2020): "Green Swans call less for improvements in risk modelling and more for decisive and immediate action and coordination."

3. A precautionary policy framework to address the radical uncertainty underlying environment-related financial risks

In the face of the limitations to measuring risk, which weaken the promise of better price signalling for environment-related risks, central banks and financial supervisors require an alternative to the market fixing paradigm. Central banks and supervisors can indeed respond to the emergent call-for-action, which they have acknowledged, following a rationale of precaution and prevention in the face of potentially catastrophic threats to macrofinancial systems. Two regulatory traditions can serve as a basis for this: the 'precautionary principle' and macroprudential policy (Chenet et al., 2021). Both traditions provide a framework that justifies intervention in the face of uncertainty.

The definition of the precautionary principle in relation to climate change was outlined by the United Nations Framework Convention on Climate Change in 1992:

> *The Parties should take precautionary measures to anticipate, prevent, or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures [...].* (UNFCCC, 1992, Article 3)

"Precautionary policies to address environment-related risks should shift towards a more qualitative risk management approach."

Climate change and biodiversity loss are 'ruin' problems. They may result in exposing the Earth system to irreversible harm that could eventually lead to a risk of total failure, with negative outcomes that may have infinite costs (Weitzman, 2012; Taleb et al., 2014). Following Weitzman (2009), strong mitigation action would represent a collective strategy against catastrophic damage from climate change, and financial policy must contribute to it (Dupuy and Grinbaum, 2005; Aglietta and Espagne, 2016; Svartzman, Bolton et al., 2021).

A precautionary policy towards environment-related risk can also be seen as a natural extension of macroprudential policy. This emerged in the late 1990s in some East Asian economies following financial and currency crises there and in high-income economies more generally in the aftermath of the 2007–08 global financial crisis. The aim of introducing macroprudential policy was to correct weaknesses caused by microprudential regulation, which was focused on the financial health of individual institutions, and was consequently unable to capture endogenous and systemic risks (Nijskens and Wagner, 2011; Haldane and May, 2011). By focusing on the interaction and propagation effects between individual financial institutions across the financial system, macroprudential policy acts through pre-emptive interventions that aim to mitigate systemic financial risks that cannot be estimated before they materialise and before any self-adjustment by market participants.

This is made possible by central banks and supervisors taking a forward-looking stance focused on financial system resilience, allowing financial authorities to 'lean against the wind'. Macroprudential policy can thus be seen as a precautionary action in the face of radical uncertainty to avoid large losses across scenarios, regardless of their probabilities (Foulis and Bahaj, 2016; Webb et al., 2017).

Notably, macroprudential policy is not always sector- (or market-) neutral. Rather, it has often targeted specific sectors such as real estate and lending to non-bank financial institutions that are known to create systemic risks (Lim et al., 2011; Galati and Moessner, 2013). Given the widely acknowledged systemic financial risk posed by climate change (Aglietta and Espagne, 2016; Gros et al., 2016; Choudhury, 2021), a green macroprudential policy framework would appear justified.

Precautionary policies to address environment-related risks should shift towards a more qualitative risk management approach, where discretion, experience, heuristics, and general direction-setting replace complicated mathematical models in the face of radical uncertainty (Chenet et al., 2021). Decisions over when and how to employ macroprudential policy are not based on sophisticated, quantitative risk modelling but on observing a set of core indicators (e.g. mortgage credit to GDP ratios at the national level; debt-servicing ratios) as well as regulator discretion and judgement (see, for example, Bank of England, 2016). Where there is little doubt over the potential magnitude of a threat or the direction of a harmful trend, fixating on precise quantitative risks does not necessarily improve insights for decision-makers, and at worst can detract from the best course of action (Kay and King, 2020; Saltelli et al., 2020). Rather than delaying policy action until such time that precise measurement is obtainable (i.e. the approach 'you can't manage what you can't measure'), in the face of systemic risks and scientific uncertainty the policymaker should focus on *preventative* action.

"Rather than delaying policy action until precise measurement is obtainable, the policymaker should focus on *preventative* action."

4. Potential applications of a precautionary policy approach

To operationalise a precautionary approach, the focus of policy interventions should be on discouraging the financing of activities that significantly drive climate change and nature loss. This could include the exclusion of unsustainable assets, more aggressive use of capital adequacy rules at both the microprudential and macroprudential levels, and credit guidance policies. We deal with these options in turn below.

4.1. Excluding unsustainable assets

Negative screening of certain financing activities is already commonplace within financial institutions as part of environmental, social and governance (ESG) frameworks (Ma et al., 2020). But in practice, these voluntary exclusion policies are often not ambitious enough to materially shift capital allocation and are applied inconsistently between firms (Thomson, 2020; Crona et al., 2021). Central banks and supervisors, working in collaboration with governments, could potentially improve the efficacy of exclusionary mechanisms by integrating them into financial supervision. This could include prohibiting new financing that enables fossil fuel extraction (including tar sands, Arctic and ultra-deep-water oil, liquefied natural gas for export, coal mining, and coal power) (also proposed by Cullen [2018]), and the clearance of old-growth forests and other highly biodiverse environments where the costs and time involved in replacement (or 'offsetting') are unfeasibly large (Kedward et al., 2020).

4.2. More active use of capital adequacy rules

Penalising existing assets is sensitive in terms of legal feasibility and acceptability. More active use of capital requirements would seem an obvious route forward in this case. The Bank for International Settlements, the European Central Bank and the Bank of England are undertaking reviews of current international and domestic capital requirements frameworks in the light of environment-related risks. Currently,

environment-related risks are neglected, with all non-financial corporate loans receiving the same 100 per cent risk weight by prudential regulators, however they are affected by environment-related risks. A precautionary approach would seek to increase capital requirements for dirty loans in the form of a dirty loan 'penalising factor'.[3] A sufficiently high capital requirement (a higher risk weight) for loans to carbon-intensive sectors, or entities that are severely reliant on fossil fuels, would reflect the growing systemic risk of investing in carbon-intensive activities and could discourage further investment that contributes to climate change. It would also give banks a greater buffer to withstand losses related to climate-related transition risks and potential sudden value losses due to the repricing of assets.

"A precautionary approach would seek to increase capital requirements for dirty loans in the form of a dirty loan 'penalising factor'."

This (our preferred) approach towards implementing a precautionary approach is clearly based on the carbon intensiveness of companies and/or their activities (whereby a carbon-intensive company would still be able to issue green assets to acquire funding). At its simplest level, this approach would require identifying either clearly green and/or dirty activities or asset classes. Alternatively, it could include the establishment of a fully-fledged green and dirty taxonomy. While there are challenges and limitations to developing a taxonomy, considerable progress has been made in designing a green taxonomy in the European Union. Less progress has been made on dirty taxonomies, although these have been grounded in an identification of NACE four-digit sectors, emission intensities and decarbonisation targets.[4] The reason dirty taxonomies have been developed less may well rest with the power of vested interests to resist them (Schreiber et al., 2020). Independent central banks should be well placed to lead on their development in this case.

If policymakers still favoured a purely 'financial risk-based approach', a precautionary approach would entail designing a set of heuristics to help make environmental capital risk regulations operational. The first step is the development of a well-defined set of financial risk indicators, as well as thresholds for them, to define how and when capital requirements need to be adapted. Examples of climate risk metrics include the share of climate-risky loans in total assets, banks' holdings of high-climate-risk securities as a percentage of capital, and climate-risk exposure metrics provided by external rating agencies (Bingler and Colesanti Senni, 2020).

Regulators should first focus on the financial exposures that face the clearest transition-related risks: fossil fuel assets and infrastructure. Bonds, loans and derivative transactions for companies that derive more than, for example, 20 per cent of their revenue from the extraction, exploration, transportation, storage, exporting, or refining of oil, natural gas or coal should face higher capital risk weightings. These could be calibrated according to the type of fossil fuel (e.g. coal would attract a higher risk weighting), the maturity of the loan, and the extent to which the borrowing firm is dependent on fossil fuel-related activities for its revenue (Gelzinis, 2021). One recent proposal is for 'one-for-one' capital requirements for new dirty financing, meaning banks and insurers would have to hold an equivalent unit of currency of their own funds liable for potential losses (Philipponnat et al., 2020), in effect rendering such investment more equity-like. This basic risk management principle is already applied to other high-risk exposures. For example, the Basel Committee just recommended the one-for-one rule be applied to some cryptocurrencies' exposures (BCBS, 2021).

From a macroprudential perspective, banks that are exposed to systemic climate risks could also be forced to hold an additional capital buffer or surcharge to increase their resilience to future shocks and internalise the cost their activities are placing on the rest of the financial system, in much the same way as post-crisis regulation has seen surcharges placed on globally systemically important banks (G-SIBs) (BCBS, 2013). In the EU, for example, 'systemic risk buffers' (SyRBs) have been implemented at a national level for over a decade and are currently in use in 15 countries to

[3]The EU has been considering the idea of a 'green supporting factor' capital framework whereby capital requirements could be reduced on activities defined as green in accordance with the EU's newly developed green finance taxonomy (EU TEG SF, 2020). There is currently no evidence of lower risk for green loans (Boot and Schoenmaker, 2018; Dankert et al., 2018). In addition, the evidence suggests such 'supporting factors' make little difference to the issuance of loans (Dankert et al., 2018; Van Lerven and Ryan-Collins, 2018).

[4]NACE is the industry classification standard used in the European Union. For a more detailed explanation and full list of references on dirty taxonomies, see Dafermos (2021).

address several sector- and location-specific sources of systemic risk. Norway's exposure to petroleum is one example (Monnin, 2021). The European Systemic Risk Board could work with individual member states to set standards around a green/dirty taxonomy or it could develop common principles and metrics to assess environmental systemic risks. Supervisory limits could also be applied on the basis of greenness and/or dirtiness of activities or asset classes (Dafermos et al., 2021), or of large exposures to transition-sensitive companies and sectors (Schoenmaker and Van Tilburg, 2016; Miller and Dikau, 2022).

4.3. Credit guidance policies

Given the urgency of the climate and biodiversity crises, central banks and supervisors should also be considering how they can more directly support the massive capital reallocation towards sustainable activities that is required to meet the transition to a net-zero carbon economy, beyond purely financial stability considerations. 'Credit guidance' – policy tools aimed at steering credit flows either away from or towards particular sectors of the economy – has fallen somewhat out of fashion in advanced economies since the 1980s. However, this was commonly used in the post-war period and in East Asia during the 1980s to support rapid economic growth and ambitious industrial transition (Monnet, 2016; Bezemer et al., 2021), and is currently used in many emerging market economies to support green finance, including in China, India and Bangladesh (Dikau and Ryan-Collins, 2017; Dikau and Volz, 2018; D'Orazio and Popoyan, 2019). Use of such tools may require greater coordination between central banks and governments, in particular ministries of finance and industrial policy. This is certainly a field where further research is needed to examine what types of policies will be effective in a world where market-based finance (or 'shadow-banking') also plays an important role and is often not within the purview of central bank regulators.

"Central banks and supervisors should also be considering how they can support the massive capital reallocation towards sustainable activities required to meet the transition to net-zero."

Limitations on implementing an exclusionary policy approach concern the political acceptability of such financial policy interventions within current institutional paradigms, which emphasise the strict operational independence of central banks and supervisors from government. Indeed, the suitability of central banks incorporating environmental criteria into their policy toolkits has been the subject of fierce debate over recent years, with detractors claiming that green financial policy is an example of 'mission creep' beyond central banks and supervisors' mandates to focus only on maintaining price and financial stability (e.g. Gros, 2020).

However, recent developments indicate that the tide is turning on this traditional view. Firstly, most major central banks are in agreement that climate change and broader environmental degradation pose grave threats to both price and financial stability, making climate risk policy highly relevant to the maintenance of existing primary mandates (NGFS, 2019; 2021). Moreover, the conventional approach is increasingly recognised to be insufficient to deal with the scale of the environmental challenge, with some arguing that alignment with emerging government policy on the net-zero transition is likely to be the most effective way for central banks and supervisors to effectively meet their primary mandates, over a pure risk-based approach (Barkawi and Zadek, 2021; Robins et al., 2021; Dikau et al., 2021). Secondly, regardless of the interpretation of the primary mandate, a systematic analysis of 135 central banks revealed that over 50 per cent already have a mandate related to sustainability objectives, 12 per cent explicitly so, and 40 per cent through the (often secondary) requirement to support government policy goals (Dikau and Volz, 2021). Finally, while it is certainly true that the establishment and deployment of an exclusion list for financial policy will likely require more active coordination with broader government departments to ensure democratic legitimacy, such collaboration is hardly novel – especially in the aftermath of the 2008 financial crisis. In the fallout of the COVID-19 pandemic especially, central banks have increasingly worked in direct

collaboration with treasury departments to deliver liquidity stimulus to targeted parts of the economy and financial markets (Cavallino and De Fiore, 2020).

5. Shifting towards a precautionary mindset: emerging policies

In this section we consider recent developments in environment-related risk policies in more detail.

Emerging environmental-financial policies indicate that a mindset shift is underway in some jurisdictions regarding the role monetary and financial policy should play in mitigating environment-related risks. While no environmental-financial policies have yet been deployed explicitly under the justifications of the precautionary approach, elements of emerging policy approaches are opening the door to increased institutional awareness and acceptance of the active and pre-emptive role central banks and supervisors should play in resolving environmental risks and impacts.

"Emerging environmental-financial policies indicate that a mindset shift is underway."

5.1. Recognising the limitations of 'market neutrality'

In advanced economy central banks, a major development over the 2020–2021 period has been recognition of the limitations of 'market neutrality' as a guiding principle for implementing monetary policy operations such as quantitative easing. This operational principle, which ostensibly aims to mirror relative market shares in order to avoid privileging any particular companies or sectors,[5] is now widely accepted by central bankers to replicate market failures in the mispricing of climate and other environmental risks (Schnabel, 2020; Bailey, 2020; Arnold, 2020; Bank of England, 2021b; Weidmann, 2021). By recognising its limitations, this development effectively opens the door to using monetary policy tools more explicitly to support or discourage certain sectors, with the allocative criteria based on policymaker discretion rather than aiming to merely replicate the market. The Bank of Japan has led the way in this regard, becoming in 2021 the first major central bank to launch a green targeted long-term refinancing operation, allowing banks to access long-term zero-interest funding for green lending until at least 2031.[6] The European Central Bank (ECB) has also engaged with proposals for greening targeted refinancing operations (Cox, 2020), and has committed in its monetary policy review to account for climate risks in its asset purchases (ECB, 2021).

5.2. Greening monetary policy portfolios

It is the Bank of England's framework for greening its Corporate Bond Purchase Scheme (CBPS) that is most interesting to consider from a precautionary perspective. The Bank's updated 2021 mandate gave it an expanded remit to account for the Government's green transition objectives in the design and implementation of monetary policy. This mandate change has enabled the Bank to take a more discretionary, rather than purely risk-based, approach to greening its CBPS. The criteria for determining eligibility for the programme commit to excluding certain activities that scientific evidence suggests are incompatible with reaching net-zero emissions by 2050 (Bank of England, 2021a). This is – in both design and proposed implementation – an exclusionary approach to managing some elements of climate risk in the CBPS.

So far, the criteria only explicitly exclude activities related to thermal coal, but the Bank has also committed to tightening this framework:

> *Over time, we will look to keep CBPS eligibility criteria aligned with the balance of scientific opinion and UK Government policy regarding activities which are considered incompatible with transition to net-zero. This is likely to entail imposing additional restrictions on a wider range of fossil fuel related activities, beyond thermal coal.* (Bank of England, 2021a)

[5] Of course, in practice true market neutrality is not achieved. To take the example of asset purchases, central banks impose minimum eligibility criteria which, among other things, exclude the financial sector and bonds of certain maturities and credit ratings.

[6] The refinancing scheme offers zero interest loans of one year duration that can be rolled over an unlimited number of times until at least 2031, effectively making it a long-term refinancing operation. The scheme also offers preferential green reserve requirements by exempting reserves linked to green lending from the negative interest rate. See Fujioka and Takeo (2021).

Additionally, the Bank of England's policy approach places emphasis on the need to directly engage with bond issuers to encourage their transition to net-zero. This development is interesting in that it marks a shift in the perceived role of the central bank from 'passive' to 'active' investor – a decisive step away from 'market neutrality' and towards monetary policy deployed in alignment with broader government policy objectives. While these developments are positive, the Bank's green quantitative easing plans have been criticised elsewhere for not going far enough, with its core approach of tilting the portfolio within but not across sectors perversely at risk of providing better treatment to carbon-intensive than green companies (Dafermos et al., 2022).[7]

5.3. Greening macroprudential policy

The emerging consensus on the deployment of macroprudential policies, however, has been less aligned with a precautionary approach. While the Bank of England and the European Central Bank have launched climate stress tests, the results will not be used directly to inform capital requirements (Bailey, 2020; ECB, 2022) – with both institutions arguing that more evidence of an established risk differential between green and dirty activities is required to justify the use of such policies (Baranovic et al., 2021; PRA, 2021). Similarly, the Bank for International Settlements has proposed that the current Pillar 2 framework, which calculates capital add-ons on a firm-by-firm basis, should be sufficient to safeguard the financial system from climate risks. Researchers at the BIS have even claimed that "there is no clear case for macroprudential regulation aimed at containing systemic climate-related financial risks" (Coelho and Restoy, 2022). This perspective has been criticised for basing capital adjustments on a microprudential assessment of firm vulnerability rather than also accounting for causality (i.e. firm responsibility) (CLSN, 2022). In other words, it neglects the fact that part of the systemic threat of climate risks stems from their endogeneity: they emerge from the financing practices of the financial system itself.

Yet, as central banks and supervisors move from risk assessment to supervisory decision-making in practice, cracks are beginning to appear in the traditional 'measure-in-order-to-manage' mindset. In highlighting the slow progress made by European banks in incorporating climate risk information into lending and decision-making processes, ECB Board Member Frank Elderson has emphasised that "patchy data is a good start" and that the ECB expects banks to use proxies, including qualitative approaches, rather than striving for ever more perfect data before taking action: "There are risks to acting on the basis of partial data, but in the case of climate change and environmental degradation, the risks of inaction are far greater" (Elderson, 2021).

This trade-off between data gathering and taking meaningful actions has also been acknowledged by central banks in the context of biodiversity loss. Emphasising the complexity of ecosystems, and the incommensurability and limited substitutability of natural capital, some central bank researchers have suggested that "addressing BRFR [biodiversity-related financial risks] will require much more than finding the 'right' biodiversity-economy model or bridging specific data gaps" (Svartzman, Espagne et al., 2021). Furthermore, as the NGFS-INSPIRE Joint Study Group on biodiversity loss and financial stability has acknowledged, "given the urgency of the challenge there could also be a rationale to act on the available biodiversity data even if incomplete and imperfect to avoid the potentially large and irreversible economic and financial costs of biodiversity loss" (NGFS-INSPIRE, 2022).

5.4. The emergence of more interventionist green financial policies

While these developments within advanced economy central banks reflect their institutional focus on 'prudential' concerns, other central banks around the world have aimed to use their policy toolkits more explicitly to influence the allocation of

"The trade-off between data gathering and taking meaningful actions has also been acknowledged by central banks in the context of biodiversity loss."

[7]For example, at present the Bank commits to buying the 'best-in-class' fossil fuel bonds (as measured by various climate metrics) rather than to excluding these sectors altogether – despite widespread consensus on the incompatibility of new oil and gas production with net-zero (IEA, 2021). Apart from kicking the can down the road in terms of meaningful exclusions that could send decisive signals to markets, this tilting approach also does not address the specific financing challenges posed by emerging green industries – many of which are not at the scale required to access capital market financing and the implicit financing subsidy delivered by eligibility to the CBPS.

capital for 'promotional' purposes (Baer et al., 2021) – and have led the way in the deployment of some of the more interventionist climate policies discussed in section 4 above. The People's Bank of China has launched a green targeted refinancing scheme that mandates banks to lend to green activities at close to benchmark rates (PBOC, 2021), while the central banks of Bangladesh and South Korea have also explicitly set reduced interest rates for green activities. Both Bangladesh and the Reserve Bank of India have also made use of quantitative credit guidance tools, specifying minimum bank lending ratios for priority sectors, which include sustainable purposes (Dikau and Ryan-Collins, 2017).

These approaches have mostly been deployed to support green sectors, rather than to discourage financing to unsustainable sectors, but what is notable is that the allocative criteria are determined at policymakers' discretion rather than reflecting quantitative estimates of climate risk. That such discretionary allocation in practice tends to align with broader government objectives reflects the historical 'developmental role' of these central banks as macroeconomic policymakers (Epstein, 2006). One limitation of this discretionary approach is that the efficacy of policies is only as robust as policymaker designations of what is green or not green.[8] The Bank of Japan's green refinancing programme, for example, has been criticised for its inclusion of fossil gas as a 'transition-compatible' fuel eligible for green liquidity provision. However, similar problems have plagued the ostensibly science-backed EU Sustainable Taxonomy, which has been accused of bowing to powerful lobby groups in its inclusion of gas and nuclear power, suggesting that 'greenwashing' is related to a lack of true democratic engagement rather than discretionary powers given to policymakers (Varoufakis and Adler, 2020).

"One limitation of the discretionary approach is that the efficacy of policies is only as robust as policymaker designations of what is green or not green."

In its *Guide for Supervisors*, the NGFS has opened the door to central banks and supervisors using discretionary exclusion-type interventions, suggesting that measures such as stringent limits on risk concentration, limits or prohibitions on the financing of certain categories of activities or sectors, and mandatory deleveraging of certain risks could be deployed to manage environment-related risks where levels of exposure are deemed excessively high (NGFS, 2020). The Brazilian central bank gives one example of such a policy in practice, imposing outright portfolio restrictions on certain forms of financing, such as crop expansion in ecologically important zones (Resolution No. 3814/2009) and to borrowers who fail to comply with environmental regulations (Resolution No. 3545/2008). While progress with Brazilian deforestation has been complicated in recent years by the policies of the Bolsonaro regime, econometric analysis for the period 2003 to 2011 has shown that these regulatory restrictions resulted in a material reduction in deforestation (Assunção et al., 2020). Investigating the environmental outcomes of other quantity-based central bank interventions – (see e.g. Dikau and Ryan-Collins [2017]) – would be a worthy avenue for future research.

6. Conclusion

The threats posed to the financial system and wider macroeconomy from the climate and biodiversity emergencies are increasingly recognised by financial policymakers, yet actual policy interventions to mitigate such threats have been scarce. This is due to the employment of a 'to measure is to manage' policy paradigm that makes heroic assumptions about the ability of financial institutions to identify and quantify financial risks given the conditions of radical uncertainty they are subject to. We identify an alternative approach, drawing on key insights from the precautionary principle and macroprudential policy. A precautionary policy approach to environment-related financial risks focuses less on quantifying the impacts on individual financial institutions and more on proactively avoiding the catastrophic macrofinancial and macroeconomic risks associated with ecological tipping points due to the ongoing

[8] All in all, in the face of the multiple pathways compatible with climate targets (IPCC, 2018) and the preservation of the biosphere, it is important to keep in mind that transition risks emerge essentially from socioeconomic decisions, and that there is no universal scientific truth about those risks, which are heavily scenario dependent. For example, a technology usually considered as not financially risky could become risky if penalised by governments or not adopted by consumers.

degradation of the biosphere. Excluding the financing of those activities most closely associated with such tipping points or making them subject to punitive capital requirements would be obvious first steps under such a regime.

Some central banks and financial supervisors have already taken steps down this path, moving away from a purely microprudential risk-based framework towards more strongly aligning monetary policy in particular with broader net-zero transition objectives. In the sphere of (macro-)prudential regulation, there has been less progress in high-income economies compared with emerging and developing countries that have a strong tradition of policy coordination between financial authorities, economic development, and industrial policy.

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