CLIMATE AND CAPITAL

SOME OUTSTANDING ISSUES

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There is a lively debate about whether and how capital regulations for banks and insurers should be adjusted in response to climate change. The Bank of England will host a **conference** on Wednesday 19 October 2022 to discuss the points in favour of and against adjustments to the regulatory capital framework to take account of climate-related financial risks. More research is needed on appropriate capital tools to address these risks, e.g. whether risks point to microprudential tools which are firm-specific or rather macroprudential system-wide ones. Further research is also needed on appropriate time horizon over which the risks should be considered and how scenarios and forward-looking data should be used. This article will review the existing literature and identify some key gaps. >

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MEASURING CLIMATE-RELATED RISKS IN ASSET PORTFOLIOS

The main rationale for incorporating climate-related risks in capital regulation is to ensure that individual banks and insurers have sufficient capacity to absorb losses which could arise when these risks crystallise. Incorporating climate-related risks into the capital regime will require a reliable methodology to measure these risks.

The existing literature proposes several approaches for estimating banks' exposure to climate transition risks – i.e. risks associated with transitioning to a low-carbon economy. The first approach is to build climate stress testing around technologically plausible scenarios and carbon price paths which are consistent with climate goals (Batten et al (**2016, 2018 - Chapter 10**); **NGFS (2020)**). The second approach is to estimate capital shortfalls for banks arising from the 'stranding' of specific sectors exposed to climate policy (**Battiston et al (2017)**). The third approach consists of building market-based measures of exposures to transition risks based on the sensitivity of banks' equity prices to the excess return of fossil fuel firms (**Jung et al (2021)**).

Physical risks – i.e. risks arising from climate change itself – are harder to quantify than transition risks. While catastrophe models can incorporate the increasing frequency and severity of extreme weather events in the future, they cannot predict which specific region will actually experience an extreme weather event (**Leaton (2020)**). **BCBS (2021a)** acknowledges that limited progress has been made in capturing banks' exposures to physical risks, due to lack of data about the geographical locations of the physical assets underlying their financial exposures, and uncertainty about their ability to insure against prospective losses. Moreover, physical climate risks need to be estimated using non-linear, forward-looking models (**BCBS (2021a**) and **BCBS (2021b)**). But such models can give rise to radically different results and are hard to validate, as past data are unlikely to contain meaningful information about the future trajectory of key climate variables.

Setting capital requirements or buffers based on market-based climate risk measures is problematic for two reasons. First, these measures are likely to be directly influenced by the market reaction to regulators' actions. Second, market-based >

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measures provide reliable signals of transition risks only to the extent that investors price these risks.

By contrast, setting capital requirements or buffers based on climate stress tests is conceptually similar to basing these on other types of stress tests, as long as all major banks and insurers have granular data to map the stress scenarios to losses. But there are practical challenges in mapping climate stress test results to capital requirements. Further research in the following areas could potentially overcome these challenges.

First, more work is needed on how to approach risks that might materialise over a long time horizon and how much capital should be held against these. At the same time, there is a need to develop methodologies to estimate climate risks over relatively short time horizons that are consistent with the current microprudential capital framework (**BIS (2022)**). Second, reliable methodologies need to be developed to help regulators validate firms' data and models. Finally, there is a need to gauge the extent to which climate risks are already reflected in banks' and insurers' capital.

IDEAS FOR NEW POLICY TOOLS AND MACROECONOMIC CONSIDERATIONS

Others have made the case of incorporating climate risks into capital requirements on macroprudential grounds: as climate-related risks can ultimately destabilise the financial system, and regulators should use capital requirements to incentivise an early and orderly low-carbon transition.

One proposal is to introduce lower risk weights for green assets ('green supporting factors' GSF) and higher risk weights for carbon-polluting assets ('carbon penalising factors', CPF, also referred to as 'brown penalizing factor') in calculating capital requirements to incentivise green investment (e.g. **Dombrovskis (2018)**). **Campiglio (2016)** argues in favour of green supporting financial regulations, as a carbon tax might not provide enough incentive to stimulate low-carbon investment when banks face constraints in expanding credit. The implementation of these tools could be partially reconciled with a risk-based approach if green investments were consistently less risky. However, available evidence does not convincingly support this (see e.g. chapter 5 in **EBA (2022)**). >

Batten et al (**2016, 2018 - Chapter 10**) have argued that capital requirements are not the right tool for climate mitigation. Capital requirements for banks and insurers are designed to mitigate prudential risks, and hence adapting these to achieve climate mitigation objectives could undermine their primary purpose, or could give rise to undesirable effects. Moreover, unless those policies are implemented across major jurisdictions, carbon-polluting firms can bypass them by raising funds on international financial markets (**Campiglio et al (2018)**). Others have also questioned the usefulness of capital requirements as a climate mitigation tool using formal models. For example, **Dunz et al (2021)** develop a macroeconomic stock-flow consistent model and find that reducing risk weights for green loans to zero will result only in a small increase in the share of green capital goods in the economy and lead to an increase in the ratio of non-performing loans of carbon-polluting firms.

According to the '**Tinbergen Rule**', policy makers must use multiple policy tools if they want to impact multiple policy targets. Several recent studies use agent-based models to analyse a combination of prudential and government policies. They typically conclude that green prudential policies can give rise to undesirable effects if they are not supported by other policies. **Dafermos and Nikolaidi (2021)** find that GSF and CPF reduce the pace of global warming and thereby decrease physical risks. At the same time, GSF increases bank leverage by boosting green credit and CPF increases loan defaults by reducing economic activity. A mix of green fiscal policies and CPF is potentially synergic, as the former reduce the transition risk brought by the latter. **Lamperti et al (2021)** investigate green capital requirements alongside green credit guarantees and carbon-emission adjustments in credit ratings. They find that a policy mix comprising all three policies allows the economy to enter a virtuous cycle. **Lamperti et al (2019)** find that climate-dependent capital requirements can counterbalance excessively high or low credit provision, as they account for the impact of climate damages on firms' solvency. Such a policy could help address climate physical risks, even though it proves ineffective when damages surge.

In our opinion, an open question is whether capital requirements that are calibrated to imperfect measures of climate risks can achieve the intended aims of ensuring that banks and insurers have sufficient capital to absorb losses without giving rise to unintended side-effects. It is conceivable that imperfectly calibrated capital requirements could at worst interfere with climate mitigation. For example, suppose capital requirements against all oil sector exposure are raised without allowing for the fact that some companies within the sector are actively investing in renewable energy and are thus less exposed to transition risks. By raising the cost of finance for the entire sector it could end up discouraging investment needed for low-carbon transition.

CONCLUSIONS

The literature has proposed ideas of new capital tools but we think that both conceptual and practical challenges remain. For example, as we transition to a greener economy, do climate-related risks increase system-wide or are they simply re-distributed across firms pointing to microprudential requirements **(EBA, 2022)**?

Moreover, the literature shows some progress documenting and sizing firms' exposure to climate risks, e.g. via stress testing. However, further work is needed to explore the appropriate time horizons for capital requirements and how to use forward-looking information in the existing regime. More research is also needed on how to deal with the so-called model uncertainty, and issues around how to validate climate models using available data when certain risks have never materialised in the past.

New research that addresses those challenges can inform policymakers in developing their policy toolkit to tackle climate risks. <