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Are Current Prudential Frameworks Up to the Challenge of Climate Risks?

Climate and environmental issues will likely impact the financial system's stability as they become more pervasive and tangible. As a result, the appropriate financial regulatory and supervisory measures must be in place. This article discusses the challenges faced by financial institutions and the financial system due to the materialisation of climate and environmental risks and the shortcomings in current prudential frameworks. The arguments presented suggest that if the fundamental goal of the Paris Agreement-aligned transition is to phase out coal-fired energy, reduce oil and gas use, and transform carbon-intensive businesses, improving bank governance supervision and/or fostering climate-related disclosure requirements may not be enough. A critical role is instead played by capital requirements that adequately consider climate risks. Moreover, since microprudential tools are typically focused on direct exposures, they may not be sufficient to address the systemic dimension of climate risks. Macroprudential measures should therefore not be overlooked.

There is widespread agreement that central banks, financial supervisors and regulators cannot ignore climate change because of the evidence that it will affect their ability to carry out their mandates and maintain the financial system's stability (Carney, 2015; Couré, 2018; Schnabel, 2020).

As the climate and environmental risks spread and become more significant, banks and the global financial system will unavoidably be exposed to them. Due to supply price shocks and market volatility – related to inflation through credit spreads, saving rates and real interest rates – climate change poses a threat to monetary policy (Lane, 2019; D'Orazio and Popoyan, 2022). These risks can be experienced at the micro and macro levels due to interdependencies and network effects, not to mention the unknowable effects of upcoming catastrophic weather events. Moreover, banks and insurers are currently contributing to causing climate change – because of the intrinsic so-called carbon bias that characterises financial systems worldwide – while also being threatened by it. That will have unfavourable effects on the financial system's stability (D'Orazio, 2022).

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Does the current microprudential framework underestimate climate risks?

Analysing the inclusion of environmental, social and governance (ESG) perspectives in the Pillars of the Basel III framework, it becomes clear that they do not cover crucial aspects of climate risks, namely, the cross-sectorial, global and systemic dimensions. The motivation for this is twofold. First, existing tools consider risks that manifest over a shorter timeframe than climate threats. As a result, climate risks are not fully captured and are only indirectly reflected at best. Second, by focusing on historical losses, the methods employed to evaluate the risks fail to represent the "fundamentally uncertain nature" of climate hazards.

In terms of Pillar 1, existing regulations do not require banks to examine the impact of climate-related risks on their exposures (see D'Orazio, 2022 for a recent review). Consequently, they encourage carbon bias and short-termism in financial markets, making capital mobilisation more difficult for green investment projects. Moreover, current approaches do not allow for appropriate calibration of climate-related hazards (e.g. BoE-PRA, 2021;

Coelho and Restoy, 2022); therefore, a dedicated prudential treatment of such risks would be appropriate (EBA, 2022b). Some proposals have highlighted the possibility of limiting the carbon bias and increasing the share of low-carbon investments by using a Brown Penalizing Factor (BPF) to calculate banks' Capital Adequacy Requirements (2DII, 2018). Others have recommended a Green Supporting Factor (GSF), which proposes lowering the capital requirement for green assets (Dombrovskis, 2017). However, policymakers and academic researchers have heavily criticised these proposals as they could lead to severe market distortions and potential financial instabilities, thus contradicting the original aim of the measure (D'Orazio and Popoyan, 2019). Moreover, adjusting risk weights set by regulators to be used in the standard approach (SA) or in the internal risk-based (IRB) approach to estimate the risk-weighted assets (RWA) and then revising the capital requirements accordingly is still seen as a costly task for supervisors and regulators in terms of research efforts, resources to build new expertise and regulatory adaptation plans.

In the European Union, a recent proposal for reform of the Capital Requirement Regulation (CRR) by the European Banking Authority (EBA, 2020) stated that it would assess "whether a dedicated prudential treatment of exposures related to assets or activities associated substantially with environmental and/or social objectives would be justified." An initial assessment of how the prudential framework interacts with environmental risks and poses questions on whether adaptations are required to effectively address such risks is discussed in EBA (2022b). A report on this matter will be delivered by June 2025, and after that, the EU Commission could decide to submit a legislative proposal to the European Parliament and the Council. However, the timeline for such reform has been delayed, making this option very unlikely in the short term.

Because of the costly and potentially long (i.e. time consuming) reform of Pillar 1 to include the climate and environmental risks in the capital requirements (BoE-PRA, 2021; NGFS, 2022), it is often argued that supervisors and regulators could rely on Pillar 2 to implement the required changes (see e.g. Coelho and Restoy, 2022). The argument is that climate-related scenario analysis and stress tests can be used to assess the impact of climate risks on banks' balance sheets. This, in turn, will increase their awareness about exposure to climate risks and possible deficiencies in risk management practices through the implementation of an internal capital adequacy assessment process (ICAAP). The standard Pillar 2 is considered "more flexible" compared to Pillar 1 as it allows supervisors to require financial institutions to change the management approach to risks and create additional loss-absorption capacity (i.e. a capital add-on) when deficiencies (in the management of risks defined under Pillar 1) are found (Coelho and Restoy, 2022). In the same vein, Elderson (2021) proposed that banks be legally required to establish Paris-compatible transition plans.[1]

Climate-related stress testing is a crucial tool within the second pillar of financial regulation. It can be used to assess both micro- and macro-prudential risks by determining how well financial institutions and the broader financial system can withstand the negative effects of climate-related events. Specifically, it involves analysing hypothetical scenarios of climate-related shocks to evaluate the impact on individual financial institutions (microprudential approach) and the entire financial system (macroprudential approach). The testing also provides policymakers with essential information on the financial system's exposure to climate-related risks, and the findings might be used to calibrate and evaluate climate-related macroprudential measures. However, despite their importance, only very few countries, namely Canada, China, France and the UK, have actively considered climate-related financial risks through stress tests.

Regarding Pillar 3, the current debate is focused on enhancing disclosure standards and making them mandatory. The attention is on ESG risk disclosures, which are considered critical to foster market discipline (i.e. the core of Pillar 3). Risk disclosures are relevant to inform market participants about concentrations of carbon-intensive assets at the portfolio level, thus allowing stakeholders to assess banks' ESG-related risks and sustainable financing strategies. However, if they are not considered alongside other prudential policies and made mandatory at the international level, they may not be enough to meet the challenges of climate finance alignment (Ameli et al., 2020). The current debate and action on financial disclosure is quite advanced compared to other areas of regulation and benefits from the research and recommendations of the Task Force on Climate-Related Financial Dis-

1 They "should highlight at any given point in time, from now until 2050, the bank's alignment and potential divergences with the relevant policy objectives through which the EU implements the Paris Agreement. Such a transition plan should be part of a bank's strategy-setting and be closely linked to its business model and business plan. It should contain concrete intermediate milestones from now until 2050 and the associated key and performance indicators so that the bank's management and the competent authorities can at all times understand the risks arising from a possible misalignment with the transition path. If banks fail to meet these milestones, competent authorities – including prudential supervisors – will have to take appropriate measures to ensure that this failure does not result in financial risks" (Elderson, 2021).

closures (TCFD, 2017).[2] Nevertheless, despite the debate being quite advanced on disclosure requirements, in G20 countries, they are mandatory for financial institutions only in China, Indonesia, Mexico and Turkey (see D'Orazio, 2021, 2022 for a recent review of the adoption of climate-related financial policies).

The European Banking Authority has recently issued a report on Pillar 3 disclosures on ESG risks that proposes new standards or modifications to existing measures (EBA, 2022a). Among the new measures, a Green Asset Ratio (GAR) on taxonomy-aligned activities[3] is proposed. Since it is also used in other policy initiatives to understand institutions' exposures to environmentally sustainable activities, it is considered particularly useful in this framework. However, it could be argued that the GAR might not be an adequate tool to measure the alignment of banks' portfolios to low-carbon transition and falls better under Pillar 2.

Addressing the gaps of the microprudential framework

Because of the endogeneity of risk and its related uncertainty, the traditional approach to financial risk, which involves assessing expected values and risk using historical market prices and estimating the probability of defaults, is insufficient for addressing climate risks (Bolton et al., 2020). Indeed, assessing the bank portfolio's exposure to such risks and appropriately assessing the credit risk represented by the assets held (or held in the future) on its balance sheet is the main issue posed by climate hazards to financial stability.

This evaluation necessitates the creation of two components: (i) new (forward-looking) risk assessment procedures that consider a longer time horizon than traditional macroeconomic exercises and (ii) methods that allow credit quality to be reflected alongside climate risk exposure.

Regarding the former, new methods may imply adding climate-related risks as well as possible policy and technical shocks and shifts in market and customer attitudes towards banks' normal risk scenarios. Among others, climate value-at-risk (Dietz et al., 2016; Battiston et al., 2019), scenario analyses[4] and stress tests are one example of forward-looking methods that are used to project risks in the future, as they can assist in quantifying tail risks and clarifying the uncertainties inherent to climate-related risks (BCBS, 2021). However, stress testing and scenario analyses are critical instruments for assessing direct exposures to climate risks and therefore should be mandatory to encourage banks' alignment with the Paris Agreement targets.

Regarding the latter, new methodologies are needed to see if any economic sectors or activities (e.g. under the EU taxonomy) have (combined) reduced financial and credit risks. The reasoning is that a risk weight linked with the taxonomy may not be sufficient and may cause significant distortions. Indeed, receiving a green label according to the taxonomy does not imply that the asset is risk-free. Sector and economic activity evaluations might be conducted to acquire evidence that including ESG factors reduces financial and credit risks. This analysis would allow for a more thorough identification of safe assets that may qualify for lower capital requirements (in the spirit of the GSF).

Does the current macroprudential framework underestimate climate risks?

The current financial policy framework is insufficient to assess the system's vulnerability to climate-related financial risks or redirect financial flows to sustainable investments (D'Orazio, 2021, 2022). Additionally, pandemic-related macroprudential financial regulations may have exacerbated existing climate-related vulnerabilities (D'Orazio, 2021). The argument is that failing to consider climate change or green finance could encourage more lending to carbon-intensive industries, reinforcing the (already high) carbon bias. In this environment, countries' overall exposure to climate-related financial risks might further increase, potentially jeopardising the transition to a low-carbon economy.

Given the systemic nature of climate risks, macroprudential measures should not be overlooked and should be given special attention. Microprudential tools, as outlined above, are typically focused on direct exposures and may not be sufficient to address the systemic dimension of climate hazards. As a result, macroprudential instruments must be used in conjunction with microprudential instruments. Sectoral exposures and leverage ratios, among other techniques, should be carefully studied for imple-

2 As the TCFD standards are recognised at the international level, they ensure comparability among institutions and a level playing field with non-EU institutions.

3 According to Regulation (EU) 2020/852 on the establishment of a framework to facilitate sustainable investment.

4 Scenarios implemented by supervisors should be consistent across jurisdictions to the extent possible to facilitate risk measurement and management for internationally active banks.

mentation. Existing measures, such as (systemic) capital requirements, do not address climate and environmental risks. The reasons are consistent with the examination of existing microprudential capital tools described above and usually point to a lack of sufficient evidence to trigger a risk factor adjustment that penalises carbon-intensive assets while promoting low-carbon assets.

The discussion over climate-related macroprudential tools usually focuses on the impact of climate change on credit risks, the revision of capital instruments, and the risk factors that must be addressed. Liquidity risks are instead frequently disregarded, but the potential negative impact of these risks should not be overlooked, and policymakers should explore them further. If we consider the occurrence of a severe weather event, what will be the non-financial agents' (i.e. households and firms) reactions? Following such an occurrence, households may prefer to withdraw funds from their bank accounts (causing a bank run), and companies may decide to rely less on external financial resources (such as bank loans), which may prove extremely expensive. As a result of this climate-induced behavioural response, banks' liabilities are affected because their access to stable funding (deposits) may be reduced. As banks are embedded in a network and interact in the interbank market to replenish their funding sources, interbank exchanges may create two funding-lending cycles. Furthermore, asset stranding may cause a revaluation of those assets, generating substantial funding and market liquidity shortages for the financial institutions holding the assets and other institutions connected to them through the banking network. Finally, the transition to a low-carbon economy may lead to liquidation of some banks' balance sheets, signalling a shift in asset prices (i.e. a price fall) and margin calls, resulting in liquidity issues.

Addressing the gaps of the macroprudential framework

The literature shows that the substantial reforms to the risk weighting approach and capital requirements estimation (i.e. capital adequacy ratios) are hampered by practical and political barriers, making them difficult to implement in the short term (BoE-PRA, 2021; Coelho and Restoy, 2022). Evidence suggests, however, that banks and regulators have changed exposure risk weights to accommodate new data or pursue political goals (e.g. EBA, 2016).

Among Pillar 1 measures, sectoral capital requirements[5] can be considered an alternative to standard capital requirements. They can be calibrated by taking into account the results of systemic stress tests and scenario analyses or the outcomes of other analyses aimed at measuring the carbon intensity of loans by sector of economic activity[6] (Faiella and Lavecchia, 2020) or by geographical location.[7] Sectoral capital requirements could also imply that risk weights for low-carbon vs. carbon-intensive sectors or technology within sectors should be differentiated. Increased risk weights or higher capital buffers could limit a bank's exposure to carbon-intensive sectors. Limiting over-leverage in carbon-intensive sectors strengthens the system and indirectly reorients loans to non-polluting sectors. However, they assume that bank capital costs will rise to penalise polluting companies, which could generate market distortions in the short term. Furthermore, data suggests that evaluating exposures at a sectoral level may underestimate the total CO_2 emissions across a company's whole value chain, making implementation more difficult (FSB, 2020). As a result, further research is required before policymakers can effectively employ this tool. Therefore, additional research in the field of input-output analysis might be useful in this respect (Ghadge et al., 2020).

A sectoral leverage ratio may be more transparent and simpler than the instruments listed above. It would be based on determining the bank's capital exposure to assets associated with carbon-intensive sectors, which should be limited to a particular percentage of total assets, with the exact percentage defined by the regulator (D'Orazio and Popoyan, 2019). Like sectoral capital restrictions, this strategy could be especially successful in controlling financial market instabilities because it indirectly inhibits over-leveraging in polluting industries and reorients financial flows towards green ones. However, the implementation feasibility of these instruments is related to granular loan and climate data availability.

Lately, a group of European financial institutions has reacted to the European Commission's most recent update to banking rules and a broader request for advice on the state of the macroprudential framework (ECB, 2022). They advocate the use of the EU's existing systemic risk buffer (SyRB) to address climate risks. The SyRB is a capi-

5 By providing higher capital buffers, sectoral capital requirements improve bank fund ratios.

6 Existing empirical literature highlights that financial institutions' exposure to energy transition risks could be significant in several countries, including the Netherlands, Germany and Mexico (see, for example, Schotten et al., 2016; DNB, 2017; Roncoroni et al., 2021; D'Orazio et al., 2022). These findings show that the financial risks posed by the energy sector should be given special attention and possibly considered when determining sectoral requirements or leverage ratios.

7 This aspect might be particularly relevant to the design of sectoral requirements at the financial system level as the exposure to physical and transition risks also depends on the geographical location of economic activities (see e.g. Pagliari, 2021).

tal mechanism that allows EU member states to impose additional capital buffers[8] on all or part of their supervised institutions. Financial authorities concerned about stranded asset risks could apply a SyRB to banks' fossil fuel exposures at the sector or sub-sector level. However, this decision could distort the market as authorities have complete discretion on the rate of a SyRB. The result is that some carbon-intensive sectors (or banks) could benefit from a sectoral climate SyRB. Countries with a low incidence of oil in their energy mix, for example, may have no reservations about imposing a SyRB on theirs banks' oil exposure, while more oil-dependent countries may be more hesitant to introduce such restrictions. Moreover, any increase in the SyRB and the buffer rates of other systemically important institutions (O-SIIs) or global systemically important institutions (G-SIIs) should be authorised by the European Commission, thereby possibly further delaying implementation.

Liquidity risks should be constantly monitored – and addressed – alongside credit risks. Because of the issues highlighted in the previous sections, existing liquidity measures like the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) should be adjusted to account for potential maturity mismatches from low-carbon long-term investments and to steer low-carbon long-term investments.

A prudential framework that is in line with the Paris Agreement

Financial markets worldwide are mostly misaligned with the objectives of the Paris Agreement and characterised by a so-called carbon bias, which results in carbon lock-in and path dependence and implies the possibility of financial instability threats. Only a few nations, including Australia, Brazil, China, France, Indonesia, the Netherlands and South Korea, have greatly engaged in climate-related financial policymaking (CRFP; D'Orazio and Thole, 2022). Central banks and financial regulators have promoted 38% of climate-related financial policies adopted internationally, with Indonesia showing the highest level of commitment, followed by Brazil, China and the UK (D'Orazio and Thole, 2022).

Moreover, as discussed in this article, evidence suggests that existing Basel III regulations do not adequately address climate risks nor their cross-sectoral, global and systemic dimensions. This is due to two factors. First, current tools consider risks that materialise on a shorter time horizon than climate risks. As a result, risks related to climate change are only partially and indirectly reflected. Second, by concentrating on past losses, the methods used to assess the risks do not adequately capture the fundamentally uncertain nature of climate risks. Moreover, pandemic-related macroprudential financial regulations may have exacerbated existing climate-related vulnerabilities. The carbon bias could have been reinforced by failing to consider climate change or green finance and encouraging greater lending to carbon-intensive companies in financial responses to the COVID-19 pandemic spread (D'Orazio, 2021). Hence, countries' overall exposure to financial risks associated with climate change may rise even further, perhaps compromising the transition to a low-carbon economy.

Considering the gaps in existing micro- and macroprudential frameworks, more research is needed to address climate-related risks and align the financial sector to the Paris Agreement goals. Among Basel III Pillar 1 measures, sectoral capital requirements can be considered an alternative to standard capital requirements by assessing the results of systemic stress tests and scenario analyses or the outcomes of other analyses aimed at measuring the carbon intensity of loans by sector of economic activity or geographical location. They could also imply that low-carbon vs. carbon-intensive sectors' risk weights or technology within sectors should be differentiated. Measures under Pillar II have been recently called into the discussion, arguing that its flexibility (compared to Pillar I) should be better exploited to respond to the financial threats of climate risks and could allow for a timelier and smoother adoption as implementation is left to each jurisdiction's discretion and does not necessitate a potentially time-consuming rewriting of the Basel Agreement. Nevertheless, if disclosure requirements are not considered alongside other prudential policies and made mandatory and consistent at the international level, they may not be enough. Against this backdrop, improving bank governance supervision or how financial institutions detect risks may be potentially insufficient if the main purpose of the transition is to phase out coal-fired energy, reduce oil and gas use, and transform carbon-intensive production processes. Rather, how banks choose which assets to finance is crucial in preventing excessive risk-taking in carbon-sensitive industries and limiting the spread of carbon bias throughout the financial system. Capital requirements considering climate risks are thus critical for aligning credit policies with the Paris Agreement and climate neutrality goals.

Addressing climate-related risks and aligning the financial sector to the Paris Agreement goals is particularly urgent as, in the upcoming years, there will be less time

8 These buffers could be applied to entire portfolios or specific subsets of portfolios that pose a particular danger to financial stability.

to prevent significant, irreversible climate change and its impact on the financial sector. Macroprudential measures should not be overlooked, considering that microprudential tools are typically focused on direct exposures and may not be sufficient to address the systemic dimension of climate risks.

References

2DII (2018), The green supporting factor, Quantifying the impact on European banks and green finance, 2 Degrees Investing Initiative.

Ameli, N., P. Drummond, A. Bisaro, M. Grubb and H. Chenet (2020), Climate finance and disclosure for institutional investors: Why transparency is not enough, *Climatic Chang*e, 160(4), 565-589.

Battiston, S., A. Mandel and I. Monasterolo (2019), CLIMAFIN Handbook: Pricing forward-looking climate risks under uncertainty.

BCBS (2021), Climate-related financial risks – measurement methodologies, Basel Committee on Banking Supervision – Bank for International Settlements.

BoE-PRA (2021), Climate-related financial risk management and the role of capital requirements, Climate Change Adaptation Report 2021, Bank of England – Prudential Regulation Authority.

Carney, M. (2015, 29 September), Breaking the tragedy of the horizon – climate change and financial stability, Speech at Lloyd's of London, Bank of England.

Coelho, R. and F. Restoy (2022), The regulatory response to climate risks: some challenges, *FSI Brief*, 16, Bank for International Settlements.

Coeuré, B. (2018, 8 November), Monetary policy and climate change, Speech at a conference on "Scaling up Green Finance: The Role of Central Banks", European Central Bank.

D'Orazio, P. and L. Popoyan (2022), Realising Central Banks' Climate Ambitions Through Financial Stability Mandates, *Intereconomics*, 57(2), 103-111, https://www.intereconomics.eu/contents/year/2022/number/2/article/realising-central-banks-climate-ambitions-through-financial-stability-mandates.html (17 February 2023).

D'Orazio, P. and L. Popoyan (2019), Fostering green investments and tackling climate-related financial risks: Which role for macroprudential policies?, *Ecological Economics*, 160, 25-37.

D'Orazio, P. (2022), Mapping the emergence and diffusion of climate-related financial policies: Evidence from a cluster analysis on G20 countries, *International Economics*, 169, 135-147.

D'Orazio, P. (2021), Towards a post-pandemic policy framework to manage climate-related financial risks and resilience, *Climate Policy*, 21(10), 1368-1382.

D'Orazio, P., T. Hertel and F. Kasbrink (2022), No need to worry? Estimating the exposure of the German banking sector to climate-related transition risks, *Ruhr Economic Papers,* 946, RWI-Leibniz-Institut für Wirtschaftsforschung, Ruhr-University Bochum, TU Dortmund University, University of Duisburg-Essen.

D'Orazio, P. and S. Thole (2022), Climate-related financial policy index: a composite index to compare the engagement in green financial policymaking at the global level, *Ecological Indicators*, 141, 109065.

Dietz, S., A. Bowen, C. Dixon and P. Gradwell, (2016), 'Climate value at risk' of global financial assets, *Nature Climate Change*, 6(7), 676-679.

Dombrovskis, V. (2017, 12 December), Greening finance for sustainable business, Speech at the One Planet Summit in Paris.

EBA (2022a), Final Report – Final draft implementing technical standards on prudential disclosures on ESG risks in accordance with Article 449a CRR, EBA/ITS/2022/01, European Banking Authority.

EBA (2022b), The role of environmental risks in the prudential framework, *Discussion paper*, EBA/DP/2022/02, European Banking Authority.

EBA (2020), Capital Requirements Regulation (CRR), PART TEN, TITLE II, Article 501c; *EBA Single Rulebook*.

EBA (2016), EBA Report on SMES and SME supporting factor, EBA/OP/2016/04, European Banking Authority.

ECB (2022), Opinion of the European Central Bank of 27 April 2022 on the Proposal for a Directive of the European Parliament and of the Council amending Directive 2013/36/EU as regards supervisory powers, sanctions, third-country branches, environmental, social and governance risk, CON/2022/16.

Elderson, F. (2021, 20 October), Overcoming the tragedy of the horizon: requiring banks to translate 2050 targets into milestones, Keynote speech at the Financial Market Authority's Supervisory Conference in Vienna, European Central Bank.

Faiella, I. and L. Lavecchia (2020), The carbon content of Italian loans, *Journal of Sustainable Finance & Investment*, 12(3), 939-957.

FSB (2022), Supervisory and Regulatory Approaches to Climate-related risks – Interim Report, Financial Stability Board.

Ghadge, A., H. Wurtmann and S. Seuring (2020), Managing climate change risks in global supply chains: a review and research agenda, *International Journal of Production Research*, 58(1), 44-64.

Lane, P. R. (2019), Climate Change and the Irish Financial System, Economic Letter, 1, Central Bank of Ireland.

NGFS (2022), Capturing risk differentials from climate-related risks – A Progress Report: Lessons learned from the existing analyses and practices of financial institutions, credit rating agencies and supervisors, Network for Greening the Financial Sector.

Pagliari, M. S. (2021), LSIs' exposures to climate change related risks: an approach to assess physical risks, ECB Working Paper, 2517, European Central Bank.

Schnabel, I. (2020, 28 September), When markets fail – the need for collective action in tackling climate change, Speech at the European Sustainable Finance Summit, European Central Bank.