PRINCIPLES FOR ADDRESSING CLIMATE SYSTEMIC RISKS WITH CAPITAL BUFFERS

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INTRODUCTION

Climate and environmental risks are systemic for our economies and societies. In this context, international supervisory bodies have repeatedly highlighted that climate risks are also potential systemic risks for the financial sector.[1] Any systemic financial risks call for adequate macroprudential policy; climate risks are no exception to this rule.[2] The good news is that supervisors do not need to fully recraft their macroprudential instruments to address them. With some adaptations, the toolkit developed for other systemic risks can be deployed for climate risks.[3]

Against this background, some supervisors have started exploring and assessing the different macroprudential instruments available to address climate systemic risks.[4] Systemic capital buffers emerge as one promising option among the different instruments in their toolkits.

This policy brief focuses on the potential of systemic capital buffers to address climate systemic risks. It argues that systemic capital buffers must simultaneously meet two distinctive but related objectives to address such risks adequately. First, they must ensure the robustness and resilience of the financial system when climate systemic risks materialise. Second, they must contribute to containing the buildup of these risks over time. Without the combination of these two objectives, supervisors would fall into an endless spiral in which a series of macroprudential measures continue failing at containing the buildup of systemic risks, and ever more macroprudential measures to maintain the robustness and resilience of the financial system would be required recurrently. In this context, the mitigation effect on risk buildup embedded in a macroprudential instrument is central to preventing supervisors from being trapped in such a hazardous spiral.

We propose four principles – absorption, prevention, individualisation, and recalibration – for a systemic capital buffer framework contributing to both objectives (resilience and mitigation). The combination of these principles would induce financial institutions to increase their robustness to climate systemic shocks and support their clients' transition and adaptation efforts, thereby addressing the root cause of climate change and mitigating its systemic risks.

This note briefly reviews the links between climate risks, financial stability, and macroprudential instruments before presenting the principles systemic capital buffers should incorporate to address climate systemic risks efficiently.

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[1] This includes the Central Banks and Supervisors Network for Greening the Financial System (NGFS) with its 141 global members and 21 observers (as of May 29, 2024).

[2] The FSB, for example, states that "climate change is likely to represent a systemic risk for the financial sector, potential macroprudential tools or approaches would complement microprudential instruments" (FSB 2022).

[3] See Hiebert and Monnin (2023).

[4] See, for example, ECB-ESRB (2023) and Bank of England (2023).

CLIMATE RISKS AND MACROPRUDENTIAL POLICY

This section highlights the main empirical features of climate systemic risks and the potential macroprudential instruments supervisors can use to address them.

Insights on climate risks and financial stability

Climate risks will materialise through a combination of physical and transition risks. The form they will take depends on the transition path that will be followed globally. Physical risks are at a maximum in a no-transition scenario and decrease in transition scenarios. Transition risks are null in a no-transition scenario and increase with mitigation efforts and emission reduction objectives. They also depend on the duration and the orderliness of the transition. An orderly transition starting now is the scenario that minimises transition risks. In all scenarios, transition risks are frontloaded compared to physical risks.

An orderly transition is the best scenario for financial stability. Empirical estimations by central banks and supervisors generally show that, in terms of physical risk mitigation, the benefits of an effective transition significantly outweigh potential transition risks. They also show that transition risks are lower with an early and orderly transition compared to other scenarios.[5] The flip side of a transition is that it comes with frontloaded risks that could constitute a temporary systemic risk in the shorter term. However, central banks and supervisors' research generally concludes that these frontloaded transition risks are manageable under an orderly transition and can be absorbed by the banking sector.[6] Thus, macroprudential authorities are strongly interested in seeing an orderly transition begin to materialise globally to fulfil their financial stability mandate.

Several supervisors highlight that financial institutions must do more to manage climate risks adequately. Most financial institutions still need to implement the institutional processes, compile the data, or develop the necessary tools to manage climate risks. Supervisors expect them to improve substantially in these domains, especially as methodologies and data for managing climate risks are developing rapidly. The current level of preparation in financial institutions raises concerns about the management of climate risks by the financial system as a whole.[7] Such aggregate risk management deficiencies are potential systemic weaknesses for financial stability. They also imply that climate risks are very likely not fully priced in financial markets, posing a risk that asset prices will readjust relatively sharply as market participants start revaluing climate risks.

Financial institutions contribute to climate change and the buildup of climate systemic risks. Financial markets' asset allocation is currently not aligned with transitioning

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[5] NGFS (2023) shows that climate costs in terms of GDP are significantly lower in an early and orderly transition compared to other scenarios. This translates into lower risks for the banking system when measured with traditional risk indicators – e.g., counterparty default rate, loss-given default for banks, etc. (see, for example, ECB 2022a).

[6] For example, Kaldorf and Rottner (2024) find that a trade-off between front-loading climate action and financial stability is doubtful. Jung et al. (2023) assess US banks' credit exposure to transition risk as modest.

[7] In Europe, for example, the ECB found that none of the supervised institutions were close to fully aligning their practices with supervisory expectations (ECB 2022b).

to a sustainable economy. Shifting assets in a way compatible with an orderly transition implies substantial adjustments.[8] This misalignment means that part of finance is directed to economic activities and firms that hold back the transition and, thus, the mitigation of physical risks.[9] This environmental impact results in the buildup of physical risks for the economy and the financial system, which goes against the objective of financial stability.[10]

Addressing the buildup of climate risks requires nuanced, forward-looking responses. The typical response of macroprudential policy to address the buildup of systemic risks is to restrain financial flows to overheating markets. For example, when risks build up in the real estate market, a macroprudential supervisor would restrain the excessive flow of finance toward this market. In the context of climate risks, a natural inclination would be to restrain financial flows toward high-emitting entities or activities. However, this option is not necessarily conducive to an early and orderly transition because it risks cutting funding for high-emitting firms that are decarbonising their activities and need financing for that. The answer should thus be more nuanced. From a systemic risk perspective, and in line with the Paris climate goals, financial flows should be restrained where they maintain the status quo in high-emitting activities and facilitated where they are used to transform businesses to reduce carbon emissions. The ultimate judging criterion is whether the financial flow positively affects the efforts to limit the rise in global temperature, thereby restricting the buildup of physical risks.[11]

Macroprudential instruments to address climate risks

Several macroprudential instruments are available to address climate systemic risk. Supervisors' experience with macroprudential instruments, including capital-based instruments, confirms their effectiveness as a "surgical" tool to tackle specific macro-financial vulnerabilities with relatively modest adverse side effects.[12] Against this background, several propositions have been made to apply existing macroprudential instruments to address climate systemic risks. They cover the entire span of available macroprudential tools, from systemic capital buffers to concentration limits and borrower-based measures.[13]

Systemic capital buffers for climate risks are an emerging, promising option. Some central banks and supervisors have started exploring systemic capital buffers with more

[8] See ECB-ESRB (2020).

[9] For example, in the context of broader environmental risks, Ceglar et al. (2023) show that bank loans to euro-area economic activities significantly contribute to biodiversity loss. They also show that financing economic activities with a high global impact on nature is concentrated, with the ten banks with the highest financing share being responsible for funding around 40% of the total global impact of euro-area firms.

[10] See Boissinot et al. (2022).

[11] To guide this judgement, a transition finance strategy framework, like the one developed by GFANZ – which classifies transition finance activities into finance to climate solutions, finance to Paris-aligned entities or activities, finance to Paris-aligning entities or activities, and finance to managed phase-out of high-emitting activities – can be helpful. Relying on information in firms' transition plans is another option (see Dikau et al. 2022).

[12] See Biljanovska et al. (2023) for a meta-analysis of empirical assessments of macroprudential tools.

[13] For examples, see Monnin (2021) and Dafermos and Nikolaidi (2022) for systemic capital buffers, Miller and Dikau (2022) for concentration limits and Philipponnat (2023) for borrower-based measures.

depth.[14] One advantage of such tools is that, in some jurisdictions, supervisors have capital buffers in their macroprudential toolkits that have already been implemented to address systemic risks similar to climate risks.[15] Emerging theoretical and empirical research also shows systemic capital buffers can reduce climate systemic risks and support transition policies.[16] Finally, some suggestions have been made to deploy systemic capital buffers in the context of limited and relatively uncertain climate data.[17]

Systemic capital buffers can have unintended but manageable side effects. First, requiring more capital to address climate systemic risks increases aggregate capital costs for financial institutions. This potentially limits the overall volume of loans provided to other activities of high economic value. An aggregate negative effect could be mitigated by lowering the capital buffer for economic activities contributing to the transition.[18] Second, higher capital requirements could also prevent loans from being made to firms with a current unsustainable business model that are engaged in the transition process and need funding for that.[19] As described in the previous section, this potential side effect would be mitigated using forward-looking approaches. Third, setting higher capital requirements on bank loans might push firms to seek funding in other jurisdictions and with non-bank financial institutions. Coordination among jurisdictions and a holistic macroprudential approach to climate risks across the financial sector can mitigate these flows. Finally, capital buffers could inadvertently exacerbate transition risks if implemented too quickly or without proper planning, leading to a sudden revaluation of carbon-intensive assets. A progressive deployment can avoid this.[20]

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[14] See, for example, EBA (2023) and ECB-ESRB (2023) for proposals with varying scope and granularity. ECB staff has started assessing the feasibility of a systemic capital buffer to address transition risks (see Bartsch et al. 2024). They suggest a scheme to implement a climate systemic capital buffer with currently available data and show that its application can mitigate transition risks.

[15] This is the case, for example, in the European Union, where national supervisors can rely on so-called Systemic Risk Buffers (SyRBs) in their macroprudential toolkits (see Monnin 2021).

[16] For example, Grill et al. (2024) show that microprudential regulation alone would not account for the systemic dimension of transition risk, and climate capital buffers are necessary for that. Garcia-Villegas and Martorell (2024) show significant complementarities between capital requirements and carbon taxes in accelerating a green credit transition.

[17] See, for example, Monnin (2022).

[18] Oehmke and Opp (2023) offer a framework that illustrates how the optimal policy might combine additional capital for loans to emitting economic activities and lower capital for economic activities that contribute to the transition.

[19] Higher capital requirements could also limit funding to vulnerable groups often disproportionally exposed to climate risks while playing an essential role in adapting to and mitigating environmental change. Central banks and financial supervisors can combine green finance and financial inclusion policies in an integrated, inclusive green finance approach to alleviate this effect (Volz and Knaack 2023).

[20] Hiebert and Monnin (2023) recommend a progressive deployment of new instruments – starting first with targeting exposures to large firms for which more data are available and to highest-emitting activities at risk of imminent stranding, which carry considerable embedded risk – with some tolerance for potential errors in activation and calibration. Coelho and Restoy (2023) suggest macroprudential measures on new loans first instead of targeting the existing stock of loans to incentivise firms to adjust their practices while allowing authorities more flexibility to calibrate the measures.

PRINCIPLES FOR CLIMATE SYSTEMIC CAPITAL BUFFERS

The objectives of macroprudential policies are to ensure that the financial system has adequate shock absorption capacities – the resilience objective – and that the buildup of financial vulnerabilities is contained – the mitigating objective. These two goals are interrelated and should not be seen as two independent objectives for macroprudential policy.[21] Macroprudential capital buffers should follow four principles to fulfil these two goals in the context of climate systemic risks.

Principle 1 – Absorption

The capital buffer must be calibrated to absorb climate systemic shocks.

The buffer must be calibrated to absorb unexpected systemic losses from climate shocks. This is a natural corollary of the current capital requirement framework, which requires banks to hold a level of capital that would withstand unexpected losses. Climate change will increase average losses for the banking sector and the span of their distribution. This combination implies potentially higher unexpected losses and calls for increasing capital in the banking system to withstand them.[22] Note that assessing climate risks is subject to large ranges of errors and data limitations. In such cases, adding a margin of conservatism to risk estimates is recommended.[23] Note also that the horizon chosen to assess losses matters in the case of climate risks; unexpected losses are higher for a long horizon. The buffer's recalibration frequency is a parameter to consider in this choice. [24]

The buffer must reflect physical and transition risks. The global geographical dimension of physical risks, whether chronic or acute, is a distinctive characteristic of climate change. Given that greenhouse gas emissions directly affect the planet's climate system and propagate through the interacting planetary sub-systems such as the atmosphere, the hydrosphere and the biosphere, physical risks jeopardise the foundation of the economic and financial systems at the global level. All regions and economies will be affected in one way or the other by physical risks. In this context, a component aimed at absorbing physical risks constitutes a common basis for climate systemic buffers across all jurisdictions. Transition risks are also potentially affecting all economies. However, they might differ substantially from one economy to another, depending on consumption, emissions patterns, and economic dependencies on fossil fuels.[25] Against this background, setting up a specific component for transition risks in a buffer makes sense where such risks stand out as systemic for the banking sector, given the economies in which it operates. A sizeable component to absorb transition risks might only be relevant for some jurisdictions. Note that the inclusion of transition risk into a systemic capital buffer would have an earlier impact on

[21] See Biljanovska et al. (2023) for a review of macroprudential policy objectives and implementations.

[22] See Holscher et al. (2022).

[23] See BCBS (2022).

[24] See Principle 4 below.

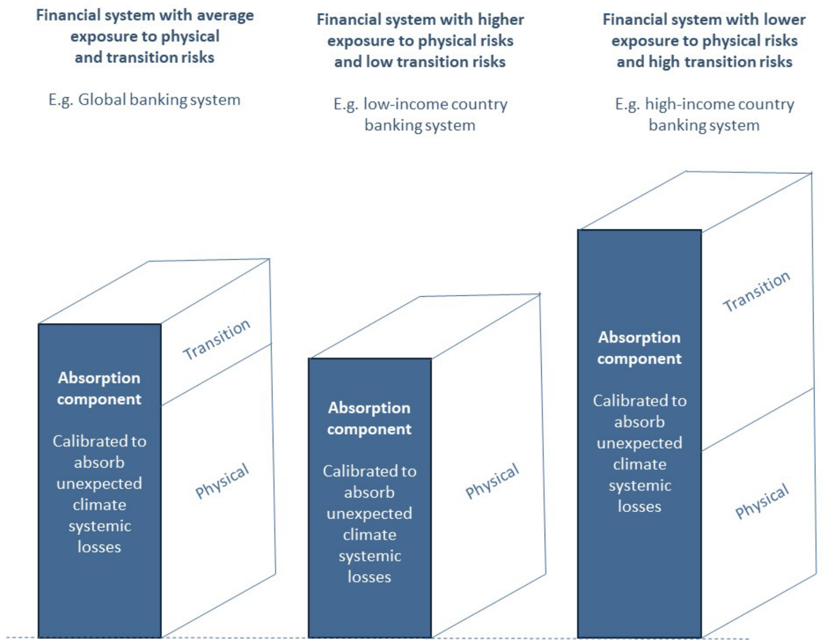
[25] Ferrazzi et al. (2021), for example, find that high-income countries face more significant risks from the green transition than low-income countries.

the behaviour in the financial sector due to the frontloaded nature of transition risks.[26] By contrast, the physical risk absorption component will likely increase with time unless mitigation measures are taken globally.

The buffer must reflect the structure of the economy. Exposure to physical and transition risks can significantly differ across economies. All economies are exposed to physical risks, but their exposure level varies and depends on the type of physical risks that an economy is exposed to and the adaptation measures taken in local areas to mitigate the costs of climate events. In each jurisdiction, the buffer component aimed at absorbing physical risks should reflect the physical risks of the countries, areas and regions where financial institutions have direct and indirect exposure – i.e. the level of buffers depends on the areas in which the national financial system operates. Similarly, the component aimed at absorbing transition risks must reflect the sectors and economic activities to which financial institutions are exposed, as well as the climate policies, technological changes and consumption behaviours that impact transition risks in these segments.[27]

Figure 1 shows examples of absorption components resulting from the elements described above.

FIGURE 1 CLIMATE RISK ABSORPTION COMPONENT



[26] The flip side of this inclusion is that it can create an undesirable short-term incentive for financial institutions to reduce exposures to high-emitting sectors, while these sectors might need transition finance most to transform their business models. Avoiding this side effect requires careful and deliberate design (see Principle 2 below).

[27] Garcia-Villegas and Martorell (2024), for example, show that optimal capital requirements depend on the structural characteristics of an economy's production and energy sectors. Given the heterogeneity in structural features across European economies, they highlight that this result has relevant implications for macroprudential policy in the Euro Area.

Principle 2 – Prevention

The capital buffer must be calibrated to mitigate the buildup of climate systemic risks.

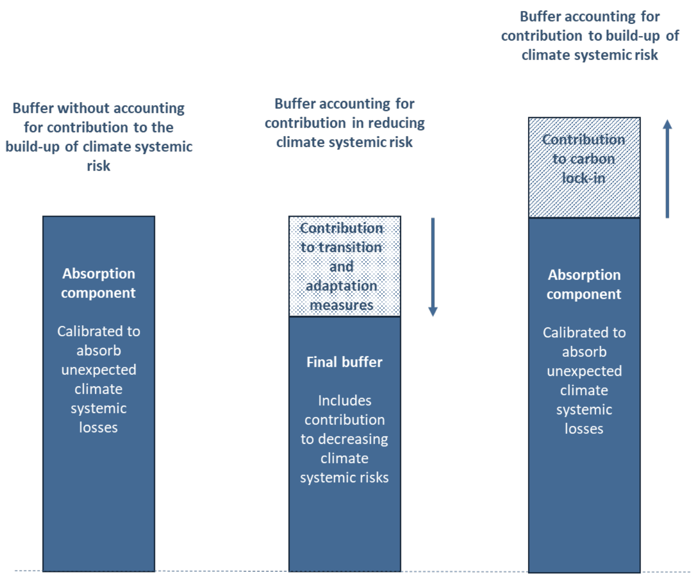
The buffer must include incentives to mitigate the buildup of climate systemic risks. For this, this buffer must induce climate risk-mitigating actions from the financial sector. This includes actions to curb global temperature rise – i.e. the primary source of climate change and the physical risks that derive from it – and actions to support an orderly transition – i.e. the transition path with lower transition risks – as well as adaptation measures – i.e. measures that mitigate the costs of climate change. To achieve this goal, an efficient systemic capital buffer framework must incorporate a feature that reflects, in terms of capital requirements, the financial sector's actions accelerating or slowing down the transition and adaptation of the economy. Theoretically, this element should correspond to the expected reduction (increase) of physical and transition risks attributable to these actions.

The buffer must support actions for climate change mitigation and adaptation. Financial institutions can contribute to mitigating systemic risks from climate change in two ways: first, by contributing to an orderly transition. Such a transition reduces both transition and physical risks for the financial sector and their systemic risks. Second, they can also contribute to mitigating systemic risk by supporting their customers in implementing adaptation measures. Of course, adaptation measures do not address the root cause of climate change, i.e. greenhouse gas emissions, nor do they contribute to reducing transition risks. Still, they contain the costs of physical risks and, thus, their potential systemic risks. Given that accumulated greenhouse gases will stay in the atmosphere and influence climate in the coming years, adaptation measures are central to building resilience to physical risks. Financial institutions' contribution to the transition and the adaptation process can take several forms, from working closely with their customers to implement financially sustainable transition and adaptation strategies to financing capital expenditures to invest in zero-carbon technology or adaptation infrastructure, e.g. through direct loans and other sustainability-related financial instruments.

The buffer must rely on forward-looking indicators to assess systemic risk mitigation by financial institutions. The financial sector's contribution to containing climate systemic risks through their participation in and support of mitigation and adaptation measures by their customers can be assessed in several ways. For that, supervisors can rely on qualitative indicators – e.g. assessing how financial institutions work with their clients to achieve sustainability objectives – on quantitative metrics – e.g., the loans provided to sustainable solutions and the emissions avoided with their funding – or a mix of both – e.g., the alignment of banks' customers' investment plans with the transition to a low carbon economy. Financial supervisors must also select the relevant indicators depending on the structure of the economy in which domestic financial institutions are evolving and the specific transition and adaptation measures that these economies require. However, supervisors must also ensure that the metrics they use reflect financial institutions' contributions in decreasing future climate risks, not their past contribution to increasing them – i.e. they must use forward-looking indicators. Failing this criterion risks penalising high-emitting customers who need funding to transform into a low-carbon business model. Failing to do so might consolidate the lock-in into a non-sustainable economy and would go against the intended goal of containing the build-up of systemic risks to improve financial stability.[28]

Figure 2 illustrates how a prevention component can be integrated into a systemic risk buffer for climate risks.

FIGURE 2 CLIMATE RISK PREVENTION COMPONENT



Principle 3 – Individualisation

The capital buffer level must be institution-specific with a common, non-divestible and systemic base.

The buffer must have an institution-specific component that reflects individual exposure to climate risks. Supervisors should allocate part of the systemic buffer across financial institutions in proportion to their exposure to climate risks for two main reasons. First, the alternative – a system-wide buffer equally distributed across financial institutions – would dilute the measure's effectiveness by not addressing risks directly where they are.[29] This potentially increases the costs and side effects of higher capital requirements for the financial sector. Second, a proportional scheme incentivises financial institutions to reduce their exposure to climate risks to limit capital costs. Several schemes can be envisaged to

[28] As mentioned above, supervisors can avoid this trap by using a transition finance strategy framework, like the one developed by GFANZ, or by referring to information in firms' transition plans (see footnote 11).

[29] Garcia-Villegas and Martorell (2024) show, for example, that it is optimal for macroprudential authorities to increase capital requirements asymmetrically in proportion to the risk borne by each sectoral exposure for transition risks.

reflect individual exposure to climate risk in a systemic buffer, from a very granular institutions-specific component to a system with a few buckets for different levels of risk.[30]

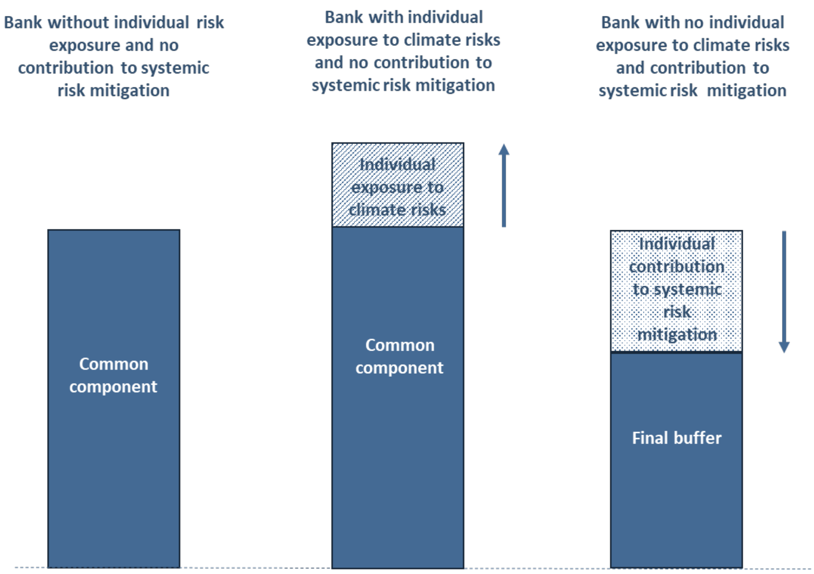
The buffer must have an institution-specific component that reflects individual contributions to mitigation and adaptation measures. Supervisors should also differentiate the decreases in capital requirements that reflect contributions to mitigation and adaptation measures across financial institutions. This is necessary to incentivise individual institutions to increase their support for such measures by limiting their capital costs. Unless such an institution-specific reward is set at the system level, no individual institution is incentivised to contribute more than its peers to reduce climate systemic risks – i.e., there is a free rider problem. Thus, supervisors should lower the individual component of the buffer when a financial institution implements strategies to fund and support transition and adaptation measures by its clients. Conversely, supervisors should increase it when financial institutions pursue practices hindering transition and adaptation.

The buffer must have a significant common, non-divestible, and systemic basis. It is important to note that a financial institution can only partially avoid indirect climate shocks even if it reduces its direct exposures. A common systemic absorption component must thus remain for all financial institutions, even if some are not directly exposed to climate risks. Given that microprudential capital requirements should cover individual exposures to climate risks, the additional institution-specific component for climate risk exposure should only address systemic risks where they are the most likely to hit first, providing a first line of defence to avoid the second-round effects and amplification loops they may trigger. Regarding the prevention component, the overall reduction in systemic risk that actions from individual financial institutions can provide is also likely to be relatively small compared to its exposure to climate systemic risk. Accordingly, the individual component of the systemic buffer should remain relatively small compared to its common component, which reflects the macro-financial risks to which financial institutions are exposed.

Figure 3 presents possible common and individual component combinations for a systemic buffer.

[30] Bartsch et al. (2024), for example, map their continuous estimation of transition risk losses into different buckets. The bank-specific capital requirement depends on the bucket to which a financial institution is allocated, and its level matches the losses projected in the middle of the bucket.

FIGURE 3 CLIMATE RISK COMMON AND INDIVIDUAL COMPONENTS



Principle 4 – Recalibration

The capital buffer level must be periodically recalibrated to reflect the observed transition path and institution-specific risk profiles.

The common component must be dynamically adjusted to reflect the economy's transition path. As explained above, the level of systemic risk that the financial sector faces ultimately depends on the transition path that the economy will take.[31] If a transition does not materialise globally, heftier physical risks will increase systemic risks; on the reverse, an orderly transition will minimise them. This evolution should be reflected in the absorption component of the systemic buffer. Thus, a dynamic adjustment to the observed transition path is integral to the systemic capital buffer design. If climate transition progresses, the buffer can be decreased and released to reflect that physical and transition risks are contained. If the transition is delayed, the buffer should increase to reflect the prospect of higher transition or physical risks. The periodicity of these recalibrations should reflect that changes in transition paths can only be observed over a few years.

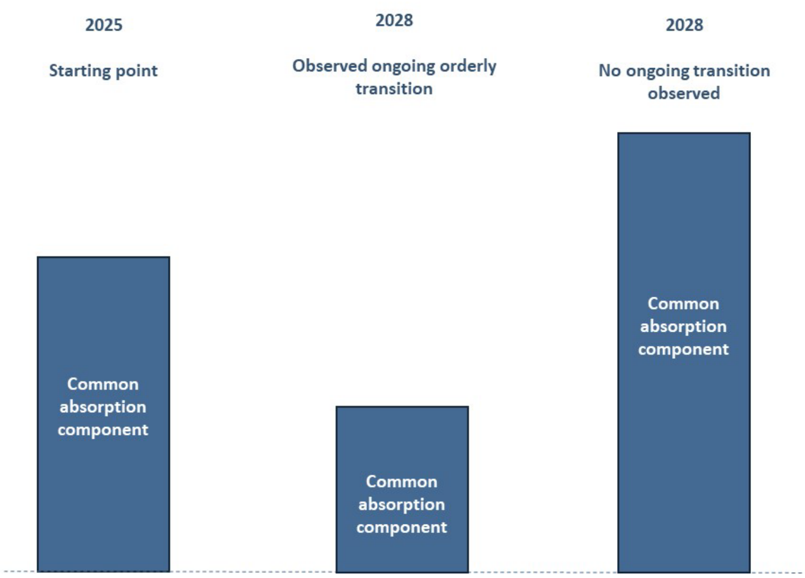
The institution-specific component must be frequently adjusted to reflect the institution's practices. As for the common component, supervisors must regularly recalibrate the specific buffers that they require from each financial institution. However, this recalibration should not reflect the evolution of the transition path taken by the economy but how individual institutions change their exposure to climate systemic risks and their actions to support their clients in implementing mitigation and adaptation measures. A frequent and adequate recalibration of these two dimensions is critical for setting efficient incentives for financial institutions to reduce their climate risk exposure and support their

[31] See Section Insights on climate risks and financial stability.

actions to avoid the build-up of climate systemic risks.[32] Keeping miscalibrated individual components for too long could put financial institutions off their efforts to reduce risk exposure and support transition and adaptation measures. Supervisors should thus recalibrate the individual components of a systemic buffer much more frequently than its common component.

Figure 4 illustrates the evolution of the systemic buffer's common component for different transition paths.

FIGURE 4 TRANSITION PATH AND SYSTEMIC BUFFER'S COMMON COMPONENT



[32] This recalibration could be based on the quarterly frequency used for Pillar 1 capital requirements in the Basel Framework.

CONCLUSION

Systemic capital buffers. Like any systemic risk, climate risks must be addressed with macroprudential policy. Several macroprudential instruments are available to central banks and financial supervisors for that. This policy brief calls for implementing systemic capital buffers in the suite of instruments central banks and financial supervisors use to address climate systemic risks. It highlights four principles – absorption, prevention, individualisation, and recalibration – that systemic capital buffers must follow to address these risks efficiently.

Dual objectives. An efficient and dynamic macroprudential approach is critical to avoiding disproportionally burdening financial institutions by asking for more capital when they need to finance the transition. At the same time, a systemic risk buffer is considered one of the macroprudential policy options to address climate risks.[33] In this paper, we have attempted to lay out a basic design concept for such a climate-related systemic risk buffer and a set of principles to design and operationalise the buffer framework. Our design concept aims to achieve a buffer framework which fulfils the dual objectives of a) ensuring that the financial system has adequate shock absorption capacities against climate risks (resilience objective) and b) making sure that the build-up of financial vulnerabilities through climate risks is contained (mitigation objective). In this context, we have also argued that the buffer level should be adjusted downward where a financial institution provides transition finance or adaptation finance to address macro-financial transition risk and physical risk.

Immediate action. In this context, one should remember the NGFS's description of climate change's distinctive characteristics: the magnitude and nature of the future impacts of climate change will be determined by actions taken today – the so-called "dependency on short-term action."[34] Failing to take necessary short-term action will give rise to the build-up of risks that pose a significant threat to the whole economic system. If such a prospect becomes actual and imminent, the amount of capital required to maintain the robustness and resilience of the financial system could be impossibly enormous. In this sense, actions taken today to address climate risks would prevent financial institutions' future required level of capital from becoming too prohibitive. The proposed buffer framework design contributes to moving in this direction and thus recognises the dependency on short-term action. We hope our idea will stimulate discussions in policy debates and support policy actions in designing macroprudential approaches to climate change on national and international levels.

[33] See ECB-ESRB (2023).

[34] See NGFS (2019).

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