



Prudential net zero transition plans: the potential of a new regulatory instrument

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Abstract

Net zero transition plans are a promising additional instrument for prudential supervisors to assess, address and bring distant financial risks into the present. To date, transition plans have primarily emerged as non-financial disclosure requirement and as such, their prudential application has been limited. In this article, we discuss the role that transition plans can play as a new regulatory tool in banking supervision. The article outlines steps towards incorporating transition plans into prudential policy, thereby enabling supervisors to effectively use transition plans as a forward-looking instrument to better manage and overcome some of the challenges associated with climate transition risks.

Keywords Sustainability transition · Climate-related risk · Banking supervision · Risk management · Macroprudential policy

Introduction

A transition plan is a detailed multi-year account of targets and actions that sets out how a given firm plans to ensure that its business model and strategy are compatible with a specific environmental objective, such as the goal of limiting global warming to 1.5 °C above pre-industrial levels in line with the Paris Agreement. The primary rationale for the financial sector to align operations with commitments made by governments is to anticipate investment opportunities and mitigate transition risks. In the financial sector, transition plans also serve to make voluntary pledges made by banks more credible. However, policymakers are increasingly recognising the importance of setting expectations or binding requirements to integrate transition plans into firms' strategy and non-financial disclosures (e.g. through the Corporate

Sustainability Reporting Directive (CSRD) in the European Union).

In this article we distinguish three different categories of transition plans (see Table 1). To date, transition plans are primarily as non-financial disclosure documents which do not have prudential purpose; they are not geared towards meeting public regulation to curb excessive financial sector risk-taking. Rather, transition plans emerged as voluntary and market-led initiatives to shore up net zero pledges under the Glasgow Financial Alliance for Net Zero (GFANZ). Generally, transition plans are considered part of the broad climate-related strategy of banks, including as part of Corporate Social Responsibility (CSR) initiatives. This is the case also for the Task Force on Climate-related Financial Disclosures (TCFD) frameworks and its non-binding recommendations that are progressively integrated in regulatory frameworks globally.

More recently, a second category of mandatory requirements for the general corporate sector to produce transition plans has emerged, whereby firms are requested by governments to disclose—as part of their non-financial disclosures—how they intend to ensure that their business model and strategy are compatible with the unfolding global transition to a sustainable economy. In the EU, mandatory corporate transition plans were introduced with the 2022 Corporate Sustainability Reporting Directive (CSRD) and the 2024 Corporate Sustainability Due

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Table 1 Emerging typology of transition plans

	Corporate disclosure-based transition plans		Prudential transition plans
	Type 1: Voluntary disclosure	Type 2: Mandatory disclosure	
<i>Global landscape</i>			
Aim and issue scope	Delivering net zero alignment	Delivering net zero alignment and potentially other sustainability goals (such as biodiversity, human rights)	Managing risk of misalignment to transition to a sustainable economy and climate neutrality. Decarbonisation a priority
Examples	Science Based Targets initiative [SBTi], Task Force on Climate-related Financial Disclosures [TCFD], Glasgow Financial Alliance for Net Zero [GFANZ]	EU's Corporate Sustainability Reporting Directive [CSRD], Corporate Sustainability Due Diligence Directive [CSDDD] and UK Transition Plan Task Force	EU's 2024 Capital Requirements Directive [CRD]
Sector coverage	All firms, including corporates and financial firms	All firms, including corporates and financial firms	Banks, with potential for extension to other regulated financial institutions
Regulatory requirement	No	Yes	Yes
Perspective	Market-led self-regulation	Market conduct-focused regulation	Micro- and macroprudential risk regulation
Standard setters	Private initiatives	Legislators and financial conduct regulators (e.g. European Commission, ESMA)	Legislators and banking regulators (e.g. European Commission, EBA, ECB, BoE)
Transparency	Public	Public	Possible for part of prudential transition plans to remain confidential
Implementation	2022	2024–2026 (EU)	2026 (estimated for EU)
<i>Supervisory playbook: banks</i>			
Supervisory expectations	Non-binding	Non-binding (and linked to cooperation with market conduct authority)	Binding
Supervisory value and assessment	Indirectly relevant for Supervisory Review	Indirectly relevant for Supervisory Review, primary assessment done by market conduct authorities	Directly relevant for Supervisory Review as part of dedicated misalignment risk assessment
Enforcement	Self-regulation, market discipline, civil society scrutiny	Market discipline and private enforcement, civil society scrutiny	Prudential oversight
Supervisory consequences	Indirect	Indirect	Direct
Time horizon	2050 (with intermediate targets)	2050 (with intermediate targets)	2050 (with intermediate targets). Frontloading misalignment risk assessment to the present
<i>Strengths and weaknesses from a prudential perspective</i>			
Strengths	Harnessing market innovation, enabling early adoption and learning	Providing universal reporting with consistent disclosures	Responding directly to prudential dimension of transition planning Clear legal basis for supervisors to assess what they know—risk Effective lever for banks and their counterparts to develop credible transition plans and meet targets



Table 1 (continued)

	Corporate disclosure-based transition plans		Prudential transition plans	
	Type 1: Voluntary disclosure	Type 2: Mandatory disclosure	Type 2: Mandatory disclosure	Type 3: Prudential requirement
Weaknesses	Focused on ambitions rather than financial risks, lack of universal adoption, few consequences when institutions backtrack on their commitments	Focused on investors rather than prudential authorities, lack fine-grained financial risk metrics suitable to prudential policies		Need to develop adequate legal and regulatory frameworks

Source: Compiled by the authors

Diligence Directive (CSDDD). In the UK, the Government launched a Transition Plan Taskforce in 2022 which has since developed its own ‘gold standard’ [56]. The 2024 US Securities and Exchange Commission final rules on Climate-Related Disclosures also cover transition plans where entities already have them [48]. These regulations are meant to incentivise market discipline by providing investors with adequate information regarding the climate risk profile of their investments. As such, they mainly fall within the remit of market conduct supervisors, who have limited tools to address the inadequacy of the plans from the point of view of addressing prudential risks.

In this article we focus on a third category, namely mandatory prudential transition plans that focus on the risks of misalignment with net zero targets [44]. These risk-based regulatory instruments would be mandatory and introduced to address micro- and macroprudential concerns related to transition risks. The prudential transition plans could serve as an additional forward-looking assessment tool to safeguard the stability of the financial system thus falling squarely within the remit of prudential supervisory processes, such as the EU’s Supervisory Review and Evaluation Process (SREP). In the EU, policy-makers have introduced prudential transition plans as part of the ‘Single Rulebook’ for banks under the 2024 Capital Requirements Directive reform.

As we argue in the following, prudential transition plans are a promising new instrument that could be used by financial policymakers as an additional dynamic tool to bring distant financial risks into the present, assess and address them. The article explores how they could be used as a forward-looking methodology to better manage and overcome some of the challenges associated with climate risks. It also outlines steps towards designing transition plans and incorporating into them prudential frameworks.

The article is structured as follows. In the Section “[Literature review: the prudential challenge of climate and environmental risk and the promise of transition plans](#)” we review the by now well-established limitation of existing risk-management approach and supervisory techniques regarding climate and environment-related financial risk (C&E risk). In the Section “[Prudential transition plans: the role for supervisors](#)”, we set out the specific contribution that transition plans can make to overcoming these limitation and discusses the potential of prudential transition plans to address specific micro- and macro-prudential concern. In the Section “[Developing the framework for prudential transition plans](#)”, we set out a design for prudential transition plans to fulfil this promise and discuss the integration into supervisory practice. The Section “[Conclusion and outlook](#)” sketches the challenges going forward and open questions for further research.



Literature review: the prudential challenge of climate and environmental risk and the promise of transition plans

Financial institutions are exposed to the physical and transition risks stemming from a misalignment of economies with a low-carbon transition path to net zero emissions. They will also have to play a role in financing the transition of the real economy. This creates a dual challenge for policymakers, summarised by the concept of ‘double materiality’: protecting banks against climate and environment-related (C&E) risk, while lending and investing in ways that do not harm the Earth’s climate and ecosystems [12].

In recent years, financial regulators and supervisors have started to require banks to apply traditional risk management approaches to their climate and environment-related exposures (Section “[Integrating C&E risk into the existing microprudential framework](#)”). However, C&E exposures have turned out to be difficult to effectively manage due to, among other factors, the longer time horizons over which the relevant risks are expected to materialise, the limited effectiveness of the current, conventional, backward-looking risk management approaches, and the lack of comprehensive financial data (Section “[Transition planning as a novel approach to C&E risks](#)”).

Integrating C&E risk into the existing microprudential framework

Banks are exposed to a wide range of risks as a consequence of misalignment of the real economy with climate targets [3, 7, 15]. Accordingly, supervisors have sought to mitigate C&E risks through a variety of high-level approaches ranging from relying on market-led initiatives to mandatory rules. So far, supervisors have faced challenges in assessing financial exposures arising from climate-related risks as well as potential losses and impacts from using forward-looking approaches [7, 11, 43].

Given concerns that banks and the financial sector at large could be misaligned with the transition pathway towards a sustainable and net zero economy, and hence exposed to significant transition risk, there is considerable concern over sudden build-ups of financial risks. This calls for a prudential assessment and mitigation of the risks.

The ‘net zero’ alignment of the banking system also has a crucial role to play in the broader climate transition, given banks’ role as intermediaries and payment system providers [12, 45]. Since the sustainability transformation requires structural changes in the real economy, the financial sector will require non-financial corporates to assess

their activities’ alignment with the former’s trajectory. The transition plans of banks’ customers should be adequately scrutinised by banks and feed into their own transition plans, thereby ensuring a positive contribution of the financial system to the broader sustainable transition.

In the last years, policymakers have started to identify a class of C&E financial risk that banks need to incorporate into their operational and risk management frameworks to ensure the financial stability of the institution. These efforts have taken a somewhat heterogenous shape across the three pillars of the Basel Framework, and policymakers have largely left the task of ensuring that C&E risks are adequately priced to private banks and market participants (Smoleńska and van’t Klooster [53] see Table 2 for an overview):

- Pillar I. There has been very limited concrete regulatory action to incorporate C&E risk into Pillar I to date, except from a narrow single materiality perspective (BIS 2022) [25].
- Pillar II. Due to the broad scope, making it suitable to include climate and environmental risk, some supervisors have issued detailed supervisory guidance based on several regulatory requirements for how banks should deal with C&E risk [27]. The EU has introduced specific requirements into the SREP process as part of the 2024 CRR/CRD reform. However, policymakers and supervisors’ guidance on how risks should be evaluated have as yet been limited.
- Pillar III. Most of the prudential activity has so far focused on the disclosures of prudential risks. In 2022 the European Commission approved detailed ESG disclosure standards drafted by the EBA. These require large institutions to disclose their exposure to physical and transition risks as well as mitigation measures (e.g. share of Green Taxonomy aligned assets), in addition to social and governance aspects [32]. In 2023, the Basel Committee begun consultations on Pillar 3 disclosures of climate-related financial risks only, with dedicated rules forthcoming in 2024 [9].

Transition planning as a novel approach to C&E risks

There are significant limitations of applying the existing approach to C&E risks [13, 18, 22]. There are epistemic obstacles to the measurement of financial risk based on historical data gathered over a limited timeframe [2, 14, 37] and supervisors have therefore been reluctant to challenge assumptions concerning specific risk-weightings assigned to transition risk because of questions over how to assign risk-weights to individual assets [54]. There are several



Table 2 C&E risk in the Basel and existing supervisory framework

Basel Pillar	Overview	Actor responsible	Progress
Pillar I—Regulatory capital requirements	Banks and credit rating agencies improve their capacity to assign risk-weights to C&E risk (potentially subject to new regulatory standards). Also includes capital add-ons/buffers, large exposure limits, liquidity/leverage ratios and so on	Basel Committee on Banking Supervision (BCBS), legislatures and regulators	Discussions ongoing at legislative level in the context of microprudential reform
Pillar II—Supervision	Banks set their strategy and risk management for C&E risk subject to supervisory evaluation as well as binding supervisory guidance	BCBS, legislatures, banking regulators and supervisors	Supervisors and regulators making initial steps to incorporate C&E risk into the supervisory processes
Pillar III—Disclosures	Disclosure rules for C&E risk together with metrics developed by banks and supervisors	BCBS, legislatures, banking regulators and supervisors, market conduct authorities	Detailed rules have been introduced across a number of jurisdictions and frameworks (EU Pillar 3 Disclosures; BCBS)

Source: Adapted from Smoleńska and van't Klooster [53]

limitations of existing disclosure and risk management techniques with regard to C&E risks.

First, concerning the *time horizon*, the risks from climate change will occur beyond the usual business, financial and policy cycles [30, 46]. As noted by EBA (2021), supervisors should introduce new C&E risk analysis into supervisory assessment, evaluating whether institutions sufficiently test the long-term resilience of their business models against the time horizon of relevant public policies or broader transition trends, i.e. exceeding commonly used time-frames of three to five years and covering a time horizon of at least 10 years. Therefore, microprudential supervisory frameworks—currently treating three years as the long term—will have to be expanded to a longer time horizon and to cover the entirety of the transition to a net zero economy.

Second, the *backward-looking nature* of certain elements of the existing prudential approach stands in contrast to the climate risk dynamics and the material impacts that are expected manifest in the years to come [13, 43]. To the extent that risks are estimated based on historical data, the current approach is unable to accurately estimate potential losses that will be the consequence of a rapid transition. There are therefore challenges relating to the incorporation of climate risk into prudential frameworks, including its specific characteristics concerning the inherent complexity and interconnectedness of environmental risks, tail-risks and the nonlinear impact of tipping points [36, 52]. The current lack of implementation-ready and well-understood, forward-looking techniques and metrics for financial institutions and supervisors is impeding the ability to assess C&E risk, in particular over a longer time horizon.

Third, C&E risk assessment is plagued by problems relating to *data availability*, for example concerning scope 3 emissions and energy performance certificates [6, 23, 55]. Currently widely used sectoral benchmarks are often not designed for the purpose of assessing transition efforts and related risks. Even if simple metrics become widely available, they may not be adequate for risk assessment. For example, scope 3 emissions and energy performance certificates provide a proxy for alignment, but the compatibility of individual investments with net zero depends essentially on what other actors do. In this regard, it has been noted that sustainability is not a feature of individual investments or firms, but rather of economic systems as a whole [35]. To date, even sophisticated models require hard to evaluate assumptions regarding the pace of transition, policies enacted, consumers lifestyles and the effectiveness of negative emissions technologies [42].

Given these significant challenges in assessing climate risks through traditional risk frameworks, supervisors are not always able to explicitly and fully incorporating climate risks into prudential oversight [1, 13, 16, 47]. For banking supervision, widely discussed proposals focus on stress



testing and scenario analysis [3, 4], capital requirements [20, 40] and supervisory review of bank risk models [28]. On the monetary policy side, the discussion revolves around the design of asset purchase programmes [38], refinancing operations [17] and collateral frameworks [19]. Each approach has been subject to questions about the scope of agency discretion [21, 51] and the exact role of prudential supervisors remains a topic of debate [34].

Prudential transition plans: the role for supervisors

Transition plans can contribute to overcoming the challenges and limitations of existing approaches by bringing distant alignment risks into the operational timeframe of supervisors. We distinguish three contributions that prudential transition plans can make.

Integrating C&E risk into the prudential framework through transition plans

As a novel regulatory instrument, prudential transition plans could be used to assess the alignment, and the transition risks from misalignment, at different points in time along the transition pathway. Transition plans can thereby contribute to enabling supervisors to improve the mitigation of C&E risks by requiring financial institutions to expand their risk management and assessment capabilities and clearly map, monitor and adjust their transition strategy as needed. Within the prudential objective of safeguarding the stability of the banking system, transition plans could be introduced as an additional instrument to achieve several aims.

- First, pertaining to *time horizons*, transition plans can bring distant alignment risks in the financial system into the operational timeframe of supervisors and at the same time support the economic transition through the requirement for detailed milestone adjustment targets for any point between now and 2050. They could identify the short- and medium-term milestones for delivering 2050 targets, comparing them with banks' transition efforts and related exposure to transition risks. They would thereby enable supervisors to bring climate risk into their traditional prudential frameworks by linking the bank's operations today to their practice in the distant future.
- Second, the focus on alignment also offers a *forward-looking alternative* to current ways of estimating risk and associated data requirements. Transition plans can be developed against scenarios and transition pathways representing policy ambition. Supervisors can use the increasingly fine-grained transition targets (e.g. as set out in the Paris Agreement, by the IPCC or IEA) to ask

banks to ensure that their business model and strategies are resilient to C&E risks and challenges from the transition, including changes in policies, technologies and consumer preferences.

- Third, and while transition plans by themselves will not solve the current *data limitations* and parts of bank transition planning could also be confidential, they would generate information on transition risks in the broader economy. For one, they require banks to develop a detailed account of how their strategy fits with available scenarios and transition pathways, where banks would need to incorporate micro-level, bottom-up information concerning bank counterparties. Furthermore, and given that most of financial institutions' carbon emissions are financed emissions, micro-level information concerning bank counterparties, including counterparties' transition plans, would become available. In fact, banks' client engagement strategy could become not only a key element of the bank risk management aspect, but also serve to provide an important layer of verification for corporate disclosures. Effectively designed bank transition plan requirements would produce significant data on the alignment of individual credit institutions, the financial system and the economic system as a whole, theoretically at every point in time between today and 2050.

The three policy tasks of prudential transition plans

There are three roles for prudential transition plans. First, on the microprudential level, they can support the use of existing risk-based instruments, guiding supervisory attention to weaknesses in the bank's management of C&E risk today. Second, also on the microprudential level, they can provide supervisors with a tool to address risks that an individual bank will likely be exposed to if it continues to operate in line with a misaligned transition plan. Third, on the macroprudential level, they can provide insights into the alignment of the financial sector as a whole.

Microprudential risks—misalignment and short- and medium-term risks

While conventional microprudential supervision focuses on short- and medium-term financial risks over the business or financial cycle [26], transition plans could aid the identification of C&E risk arising from misaligned transition plans on individual balance sheets. These risks will typically materialise in the short and medium term, and from exposures that the bank has already originated or will originate within a typical supervisory timeframe of three to five years. A review of bank transition planning also fits the broader focus



of the supervisory process on strategy and internal systems for risk management.

While supervisors are already developing and using forward-looking tools, including climate-related stress-tests, transition plans offer an important additional forward-looking tool. They allow supervisors to assess the risks stemming from a bank's misalignment with the relevant policy objectives, potentially at any given point in time between now and 2050. This moves the focus beyond exposures of banks as a function of their current exposures to the question of how the C&E-related risks of their portfolios will evolve over time along specific trajectories. Using transition plans in this way can enable supervisors to identify excessive risk-taking and the resilience of the business model of a bank against competition and market developments.

Microprudential risk—misalignment as a proxy for long-term risks

Where C&E risks resist quantification, the efforts that banks make to ensure they anticipate future risk can be a crucial proxy for the material risk that banks are exposed to now and in the future [12, 43].

The timeline for the transition to net zero is often difficult to assess, as different transition pathways imply different levels of risk while the transition pathways are changing. Risks can result from the bank's future lending and investment decisions, while no individual transactions exist today for which supervisors would be overseeing risk. For the future period, banks have ample discretion to downplay risk. They could also make ad hoc assumptions, for example concerning increased regulatory capital that is yet to be acquired. Accordingly, it will not always be possible to test the forward-looking plans of banks against a narrow (single) materiality standard.

Transition plans could help supervisors identify ways in which a bank's transition planning itself is deficient, thereby raising questions about the adequacy of its risk management. In that role, transition plans could become an essential tool for enabling supervisors to assess the microprudential implications of the transition. Here, successful alignment of the bank's lending with likely transition pathways can serve as a proxy for C&E risks that cannot yet be quantified as a material exposure. A bank that operates on the basis of a misaligned transition plan is riskier than one that does not (all other things being equal), and therefore the act of identifying misalignment in itself provides information about bank safety. For the stability of the bank over longer time horizons, alignment with net zero may often be the best proxy available for the materiality of exposures.

In this context, supervisors should identify how banks' transition plans that are insufficient, review their business model and ensure that risks from misalignment are

adequately addressed, while respecting the flexibility of the bank's operations to cater for the uncertainty around the transition. Waiting for C&E risks to constitute clearly identifiable material exposures creates the risk that supervisory intervention comes too late. Misalignment should be first and foremost approached as a source of future financial stability risk, which has implications for how transition plans feature in the supervisory process and ensures that supervisory interventions retain a clear prudential and risk-based rationale.

Macroprudential risks—aggregate alignment and systemic risks

Pervasive misalignment of the banking system with net zero transition pathways is a threat to the stability of the financial system as a whole [39, 49, 50, 58] and therefore a macroprudential risk.

In the short and medium term, transition plans could be aggregated to gauge the fragility of the system as a whole, which could in turn provide a rationale to increase systemic risk buffers, employed as a system-wide buffer, for groups of banks, across subsets of sectoral exposure or to address a sectoral subset of exposures connected to economic activity and/or geographical area [31]. This targeted buffer could increase resilience against the potential materialisation of risks and could also introduce incentives for financial institutions to reduce their exposure to C&E risks. In addition to relying on broad measures for the banking sector as a whole, which can be inadequate for dealing with risk from misalignment by also penalising individual banks that have adequate transition plans, the supervision of transition plans could enable this more targeted use of macroprudential tools tailored to individual institutions.

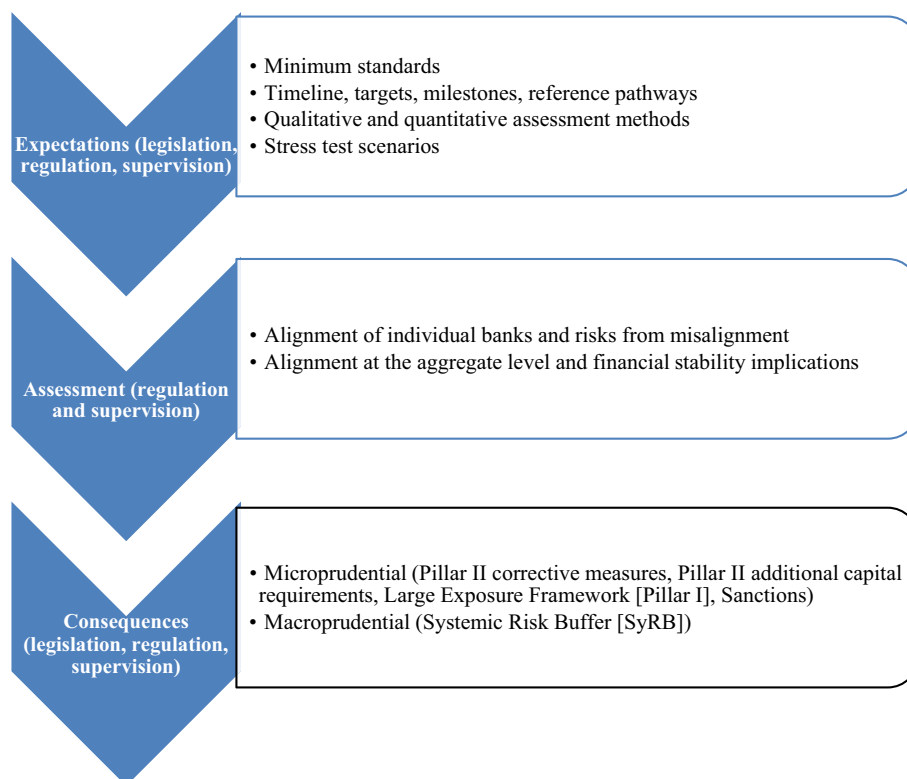
The current discussion around the use of systemic buffers also highlights the challenges in calibrating these (e.g. trade-offs related to a sectoral approach, precision of calibration) and the possible unintended consequences such as fragmentation in the internal market and undesirable interference in the macroprudential policies of other countries (EBA, 2021, [24]).

Developing the framework for prudential transition plans

We now turn to the setting out three steps through which financial policymakers can integrate prudential transition plans into the day-to-day task of supervisors (see Fig. 1). The first step concerns setting expectations regarding the content of the transition plans. In a second step, supervisors need to assess transition plans as part of a standardised process. Third, supervisors should use existing and new supervisory



Fig. 1 Integrating transition plans into the prudential framework—three steps. Source: Compiled by the authors



powers to impose consequences in cases of misalignment. The steps outlined would require formal legislative and regulatory changes in accordance with the existing mandates of supervisors, depending on the jurisdiction.

Setting supervisory expectations for prudential transition plans

The high-level purpose of a prudential transition plan should typically be specified at a legislative level, providing the starting point for the development of adequate supervisory expectations, practices and guidelines by regulators and supervisors. A dedicated prudential transition plan framework does not necessarily require a production of a transition plan distinct from other ‘net zero’ alignment-focused transition plan, but rather specify the intended prudential uses and calibrations of such documents. We distinguish three elements of relevant expectations concerning: transition pathways and scenarios, the bank’s assessment of misalignment and the measures that the bank intends to take to mitigate misalignment.

The selection of scenarios and transition pathways

Science-based transition scenarios and pathways that lead to net zero by 2050, as set out by policymakers in detailed guidance on the relevant methodology and metrics, provide a starting point for transition planning. The transition

scenarios would need to cover climate change, policy developments and expectations related to technological transition, including sectoral pathways against which the bank portfolios could be assessed.

First, banks would need to define net zero targets and transition pathways with regard to how they expect their portfolios to develop. Supervisors would provide detailed guidance on the short- and long-term metrics in relation to the 2030 and 2050 climate change mitigation targets.

Formulating effective expectations requires bringing together the expertise of micro- and macroprudential supervisors as well as economic and environmental policymakers due to the need to translate a government’s expected transition pathway into sectoral guidance that financial institutions should plan for. In some jurisdictions, asking supervisors to play a guiding and advisory role in helping financial institutions to effectively anticipate transition pathways would create significant additional responsibility and may well be considered to be outside the mandate of many. In this case, supervisors would have a strong interest in the creation of an appropriate forum to develop guidance on the required scenarios and alignment measurement methodologies.

Second, baseline and adverse scenarios should set out material C&E-related factors for the bank in the short, medium and long term, across relevant geographical scales and sectors. The scenarios used in transition plans would have to be science-based and fit for prudential purpose and ideally would also refer to national and international targets



and capture all jurisdictions that have material exposures. Building on current practice, the IEA and the NGFS scenario framework can provide a point of reference. Sectoral pathway scenarios used for prudential purposes would also have to incorporate regional considerations, including the entry into force of dedicated sectoral standards and laws implementing climate neutrality goal (e.g. new energy efficiency standards or fuel standards). Given the prevailing uncertainty around future transition pathways, banks could, for example, be asked to select those scenarios and sectors that have the greatest adverse effect on their portfolio to calculate their potential exposure to transition risk. EU is currently working on articulating sectoral transition scenarios in a bottom-up manner through cooperation between public actors, industry and civil society.

In light of advances in technological data analytics, policymakers should set expectations for a high degree of granularity. Supervisors, in collaboration with other public agencies responsible for guiding the industrial transition, would formulate specific expectations regarding the engagement by the bank with counterparties, depending on the respective C&E risks and exposure to transition risk (for example, on the basis of the level of emissions of an entity).

Demanding disclosure of bank practices and portfolio projections

Taking into account the relevant scenarios and corporate disclosures (in particular, Type-II transition plans), policymakers should indicate how banks intend to align their business practice and evolving portfolio against the relevant scenario's. The relevant expectations should ask banks to anticipate how they intend to align their business with the transition pathway, including long-term strategy, operational roles and client engagement. The principles of materiality and proportionality will be relevant in the context where individually assessing the plans for all corporates is burdensome. Supervisors should consider differentiating such requirements relative to the institution's size, the scale, nature and complexity of the C&E risks, and the scope of the institution's activities.

Policymakers should set out how bank prudential transition plans would require varying levels of granularity depending on the time horizon, to cover both short- and long-term risks, including based on multi-year milestones for transition-relevant economic sectors, companies and economic activities. A gradual approach would also enable supervisors to assess whether banks and non-financial corporates are backloading their climate mitigation action, and therefore increasing their exposure to short-term transition risks. For cross-border banks, the assessment could be done at both the individual and consolidated level.

Finally, since portfolio alignment and assessment of misalignment risk hinges on banks' governance practices, expectations should focus attention on forward-looking strategy and business model analysis, and specify *inter alia* management and client processes related to transition. Expectations would also extend to management and board membership (where transition plans should be treated as a matter of risk strategy), to ensure adequate capacity. Nevertheless, procedure for formulating transition plans would have to engage various parts of the bank (operational, accounting, legal) to ensure adequate mainstreaming and integration of transition-thinking throughout the firm. Transition plans would also outline the processes of engagement with bank clients (e.g. specifying a requirement for client transition plans for large or environmentally-impactful corporates).

Given the forward-looking ('double-materiality') perspective of transition plans as a prudential tool, the former would not only be concerned with the assessment of risk to the bank from C&E risks, including transition risks, but would also look at the impact that bank lending has on increasing environmental risks.

Setting out measures to mitigate misalignment risk

Policymakers should formulate expectations for how banks should adapt their operations in light of their annual transition plans to ensure that banks' evolving efforts toward the ability of strategy and risk management to mitigate future risk of misalignment. This process would likely take the form of an iterative dialogue, where banks discuss measures taken in light of previous transition plans and to be taken to improve future alignment, allowing for an assessment of the progress made and drawing lessons regarding the credibility of the bank's net zero transition as a matter of strategy. This entails elaborating how the financial institution expects to mitigate future climate-related transition risks (e.g., [41]). Banks would have to build capacity and develop long-term strategies for exposed sectors, financed activities and product offerings. In addition, an estimate of their future exposure to risks at various time intervals in reference to important milestones and yearly targets for economic sectors would be provided, as well as for different scenarios, including baseline and adverse scenarios.

Conducting a supervisory assessment of transition plans

As a second step, a comprehensive review process by supervisors would enable the identification of risk from misalignment and a disorderly transition, thereby building on the supervisory expectations and details set out in the previous step. The identification of risk exposure would help to



overcome the current mismatch in time horizons between climate risks and prudential supervision and could become an integral part of the supervisory review process (and fit under Pillar II of the Basel regime). This kind of supervisory assessment remains the appropriate tool given that it enables the supervisor to develop an idiosyncratic assessment of banks' risk exposures and leaves space for extending the time horizon of the supervisory process [8, 23, 43].

The assessment would have the aim of determining whether financial institutions have formulated adequate plans, which set out sufficient action in the face of changing sectoral compositions, policy changes, innovation and changing production techniques, and changes in consumer preferences.

First, supervisors would assess the alignment against climate policy targets with the aim of establishing a quantitative basis for examining individual banks' exposure to transition risk. From the transition plan, banks would disclose their portfolio [mis]alignment based on current and expected carbon intensity performance (or another suitable metric) against climate policy targets.

Second, the assessment would focus on the development of risk management and governance processes at financial institutions, enabling supervisors to understand banks' evolving development of capacity to assess climate risk and integrate the longer-term transition plan objectives into operational decision-making, thereby introducing a qualitative aspect to examining banks' transition risk. This would enable supervisors to assess the latter without establishing a quantitative measure of risk for banks' individual exposures.

Where banks' portfolio exposures are not aligned to climate and policy pathway targets, banks could be asked to disclose how they assess and mitigate these risks, as well as their future strategy in managing transition risks. Consequently, the supervisory assessment of transition plans is inherently linked to banks' long-term strategy and business model. While such a supervisory assessment should be limited by deference to business judgement and property rights, adequate corrective measures and exercise of appropriate supervisory powers would be necessary to ensure adequate mitigation of transition risks (see Section "[Literature review: the prudential challenge of climate and environmental risk and the promise of transition plans](#)" above).

Important caveats in the assessment process include that there may be less clear-cut cases where the supervisor cannot determine if there is a misalignment or how much misalignment exists, as well as cases where there is more than one transition pathway, implying supervisory discretion. Here, cooperation between different financial supervisors and other government agencies will be desirable, but needs to be tailored to the organisation of tasks within specific jurisdictions. Banking supervisors should also use information from non-financial disclosures of banks' net zero

plans and other climate pledges in their assessments. The non-prudential disclosures also have a bearing on banks' risk profiles, and in particular operational and reputational risk. Bank supervisors would have to work towards developing joint and coordinated approaches with market conduct supervisors. While the microprudential supervisor would lead the transition plan assessment, there should be an efficient flow of information and the input of specific agencies (e.g. environmental agencies) should be decisive in matters regarding science-based assessments [29].

Prudential transition plans could also feed into macroprudential policy by, at an aggregate level, enabling the assessment of banks' exposure to certain sectors and activities under scenarios that present the greatest systemic risk. Aggregating transition plans would enable monitoring the aggregate exposure of banks to individual corporates, which may pose material risks to the financial stability of the banking sector.

For banks operating across borders, supervisory colleges should play an important role. Dedicated cooperation between home and host supervisors around the transition plan process would have to be established, bearing in mind local financial stability concerns. Such cooperation would ensure appropriate information exchange and coordination of assessment at the level of the entity and at the consolidated level [11, 33].

Mitigating risks from misalignment by introducing supervisory consequences

As a third step in integrating transition plans in the prudential framework supervisors should be able act when institutions are misaligned. Accordingly, legislators and regulators should be empowered to not only scrutinise bank transition plans but also take action in light of identified risks.

Within the microprudential toolbox, transition plans could be used as a Basel Pillar II instrument to help diagnose the risk that the bank is exposed to as a consequence of misalignment. Where banks are misaligned, supervisors would need to make a careful assessment concerning the appropriateness of corrective measures and, for example, the possible need to hold additional capital. In the context of Pillar I and II, supervisory requirements and guidance on risk mitigation would apply. Under Pillar III, banks could be required to disclose their methodology and metrics for calculating their quantitative exposure to transition risk, encourage best practice and providing supervisors with additional insight.

Although few regulatory frameworks, such as the EU, currently contain dedicated provisions for C&E risk and prudential transition plans, there is certainly scope for doing this [8]. Going forward, expectations for transition plans and consequences for misalignment could be incorporated into Pillar I on a 'double materiality' basis. However, as already



noted in the literature review, a purely legislative approach would be rigid, lacking the flexibility to adapt to changing circumstances. For this reason, Pillar II corrective measures seems to be the most practical way address identified misalignment risks. Where supervisors identify inadequate management of transition-related financial risk, they already have a range of corrective measures at their disposal. Within existing prudential frameworks, supervisors can *inter alia* require banks to strengthen risk management, apply internal limits, strengthen the level of provisions and reserves, and improve internal controls [5].

Transition plans provide insights not only into a bank's management of risk but also into whether the board as a whole has sufficient to fulfil their functions in the face of a rapidly changing economic transition. In this context, response measures could include requiring senior members of the bank to attend additional training and climate awareness courses [41]. In case of serious concerns, supervisors could request a change in the composition of senior management or the board to ensure representation of adequate climate and sustainability transition expertise.

Specific supervisory sanctions could be extended to the remit of transition plans, such as banning dividend payments,¹ or publicly naming banks that have inadequate plans to enable the market to price-in misalignment risks. An assessment linking banks' transition plan performance over time with additional and deferred release of bankers' bonuses could provide an additional incentive for consistent implementation of the transition plans over an extended period.

Complementing these measures, and with misalignment as a prudential concern, Pillar II, which already covers banks' forward-looking risk horizon using stress tests and additional disclosure, could incorporate transition plans and extend the supervisory risk assessment timeframe to allow for the inclusion of climate transition risks. Moreover, Pillar II focuses on the risk management practices of banks, which aligns with the supervisory assessment outlined under Step 2 of the proposed prudential transition plan framework. Consequently, in cases where transition plans are assessed to be inadequate, supervisors could introduce a capital surcharge within the bank's Pillar II requirements or guidance (either through concentration risk or the risk management and governance scalars). This would require or strongly incentivise banks to increase the regulatory capital to mitigate the risks from their portfolio exposure.

For similar reason, the large exposure limit could be introduced for the aggregate large exposures to relevant climate transition-sensitive sectors, activities and geographical locations, which if exceeded would require firms to submit a transition strategy [41]. Specific sectoral lending limits could be foreseen on this basis. Credit ceilings, similarly, could be applicable across all bank exposures in accordance with perceived misalignment.

Finally, a range of measures from the macroprudential toolbox, including Systemic Risk Buffers (SyRB), can help prevent and mitigate long-term, non-cyclical systemic or macroprudential risks arising from C&E risks and transition misalignment risk. SyRB could be applied across certain sets or subsets of exposures, for instance those subject to transition risks related to climate change [31, 32]. Moving beyond this narrow focus on individual exposures, supervisors could potentially also be granted macroprudential powers to intervene more directly when banks are misaligned and are contributing to financial stability risks. However, more work is needed to calibrate these metrics and address the risk of market fragmentation and spill over effects.

Conclusion and outlook

We have shown that net zero transition plans can play an important role in addressing the risks associated with the economic transition, potentially providing supervisors with an additional dynamic and forward-looking prudential instrument. The emerging practice and discussion signals that the requirements placed on banks by the three identified types of transition plan could be met by a single document and plan. Already, in some jurisdictions Type 2 (mandatory corporate) disclosures are replacing Type 1 (voluntary) transition plans. A well-designed Type 3 (mandatory prudential) transition plan framework could draw on the existing Type 2 disclosures. Alternatively, some jurisdictions may prefer a separate Type 3 disclosure process that only complements the corporate Type 2 regime. Even if corporate and supervisory plans cover similar terrain, the discussed prudential Type 3 transition plans are assessed with the distinct purpose of identifying prudential risks related to alignment as well as ways to address risks from misalignment. Accordingly, it may be the case that the same metrics and other information disclosed may be assessed differently from a sustainability disclosure and prudential perspective.

This article outlined how prudential transition plans can offer a useful tool for supervisors to evaluate whether individual banks and the banking system at large are on a transition pathway that is in line with a jurisdiction's legally binding climate goals. They provide insights into banks' exposure and risk management over long time horizons and in a forward-looking manner. They thereby offer an

¹ E.g. under the CRD IV's concept of Maximum Distributable Amounts, which requires financial supervisors to restrict earnings distribution if a bank's total capital falls below the sum of its Pillar I, Pillar II and CRD buffer requirements.



additional risk assessment tool for the prudential supervision of individual banks and the banking system at large to help overcome some of the limitations of traditional risk management tools and supervisory practices.

As an initial step to introduce utilise net zero transition plans, it would be necessary to implement the mandatory climate-related disclosure for financial and non-financial corporates in line with the IFRS Foundation's International Sustainability Standards Board (ISSB) and the EU's CSRD/CSDDD regime. This would improve the availability and granularity of the underlying data that, in turn, enables the assessment of transition risks. In addition, capacity-building efforts will be necessary to enable banks to assess their future risk exposures, and prudential supervisors to assess and address relevant risks. In the EU, where discussion around all three types of transition plan have advanced and led to regulatory efforts, supervisors can already rely on standards and instruments to set supervisory expectations (e.g. the EU Taxonomy, guidance on climate risk scenarios, supervisory expectations for banks, risk management expectations and Pillar III requirements).

Strategically, in this first phase of the elaboration of net zero transition plans, the related applications, expectations and potential prudential as well as alignment aims will have to be explored further. This is the case both for market-led corporate disclosures and on the prudential supervision side, highlighting the importance for the prudential supervisors to be involved in the design of transition plans of all types. Financial supervisors should also coordinate their activities to develop international standards for prudential transition plans, as already ongoing within the BCBS, the FSB, and the NGFS.

In developing their prudential expectations for transition plans, supervisors would also have to be mindful of several possible challenges and unintended consequences.

First, the effective implementation of transition plans for financial institutions depends on the availability, wide coverage and granularity of climate-related data on non-financial corporates, which is subject to significant gaps. Prudential transition plans will have to be based on comprehensive datasets. Granular climate-related disclosure from the underlying non-financial corporates that includes scenario analysis and information on the alignment with climate policy targets and sectoral pathways are necessary prerequisites. Additionally, mandatory non-financial corporate climate disclosure frameworks, such as the UK's announcement of mandatory TCFD disclosure for all large corporates [57] or the EU's CSRD/CSDDD regime are slowly beginning to be implemented. The substantial gaps in available data for banks to identify, assess and report their climate transition risk exposure hinder their ability to conduct scenario analysis or examine current and future climate policy targets. To mitigate this limitation, the necessary data collection

should be incorporated into expectations for transition plans, thereby ultimately also leaving it up to banks to gather the data required to properly manage exposures, while taking the uncertainty on the transition pathways at national and international levels into account.

Within corporates' climate disclosure, specific metrics for current and expected carbon intensity by sector are required for the assessment of alignment to climate pathway targets (with intensity measured as CO₂ per revenue ton kilometre or CO₂-equivalent per ton, etc.). Beyond this, additional metrics and disclosure from non-financial corporates could be introduced to assess the credibility of stated future mitigation efforts.

Second, sector- and activity-specific expertise will be required to comprehensively understand the origin, size and materiality of transition risks, which will originate within transition-sensitive sectors of the real economy from where they may spill over into the financial sector. While financial supervisors have in-depth expertise on financial institutions, markets and instruments, they might lack similarly detailed expertise on the real economy, as well as an explicit mandate to exercise such expertise. A detailed understanding of the changing interconnections and interdependencies between sectors in the real economy is necessary for the effective supervision of transition risks, which may be outside of current expertise and capacities.

Given the complexity of the task and the relevance of non-financial knowledge (e.g. environmental science), new supervisory powers would require a simultaneous increase in the internal capacities of supervisors, new forms of inter-agency cooperation and engagement with relevant stakeholders to identify an appropriate approach. Technical assistance from multilateral institutions can facilitate the development of capacity in less developed markets.

Furthermore, there could be unintended consequences and risks, as incorporating transition planning into the heart of the supervisory process would constitute a significant step in the evolution of current supervisory practice. It could, therefore, also lead to far-reaching changes in how the financial system operates. By supporting the transition to net zero by 2050, the regulatory scrutiny of banks' transition plans would also have pervasive effects on the real economy.

First, the introduction of mandatory transition plans, and the supervisory consequences that could follow from an assessment that identifies misalignment, could have adverse impacts on specific 'strategic sectors' due to reduced access to funding from banks and a higher cost of capital that may hinder the efforts to transition to low-carbon activities. In this context, a bottom-up (as opposed to sector-level) approach to assessing transition risk could help address this limitation.

Second, the required collection and provision of climate-related data in exchange for access to finance could have



negative implications for small- and medium-sized enterprises (SMEs). This could undermine efforts to achieve a transition that takes distributional effects into account if the cost of disclosing climate-related data proves to be too costly for SMEs, which may face higher costs of capital and being ‘left behind’ in the transition (‘just transition’). The developing regulatory frameworks should therefore be designed and implemented in a proportionate and inclusive manner.

Third, the increased scrutiny of banks could lead to a migration of risk to other parts of the financial system. For example, it has been shown that, rather than taking C&E risks on board, banks seek to arbitrage around climate policies in cross-border lending [10]. Similarly, activities most exposed to transition risks could be moved to non-bank sectors of the economy, thereby dispersing risk but not necessarily improving macro-level stability. Likewise, a narrow focus on early alignment may lead to rapid sell-offs of certain assets, which may induce instability in the financial sector. Transition plans could therefore be used to promote client engagement and meaningful C&E risk transition advice, which could also present a new and attractive business opportunity for banks. Such risks strengthen the case for a macroprudential approach to transition plan supervision, involving oversight over the financial system as a whole.

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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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