Istituto Affari Internazionali

Paving the Way for Greener Central Banks. Current Trends and Future Developments around the Globe

edited by
Nicola Bilotta and Fabrizio Botti

Edizioni Nuova Cultura

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List of abbreviations

AAIB	Arab African International Bank
ABC	Low Carbon Agriculture
ABS	Asset-Backed Securities
AfDB	African Development Bank
AFI	Alliance for Financial Inclusion
AMMC	Moroccan Capital Market Authority
AP	Asset Purchase
APP	Asset Purchase Programme
BCB	Banco Central do Brasil
BCBS	Basel Committee on Banking Supervision
BCCh	Banco Central de Chile
BCCR	Banco Central de Costa Rica
BCEAO	Banque Centrale des Etats d'Afrique de l'Ouest
BCRA	Banco Central de la República Argentina
BIS	Bank for International Settlements
BKAM	Bank Al-Maghrib
BNDES	National Bank of Economic and Social Development
BNM	Bank Negara Malaysia
BoE	Bank of England
BoJ	Bank of Japan
BoM	Bank of Mauritius
BoT	Bank of Tanzania
BoT	Bank of Thailand
CAR	Rural Environmental Registry
CB	Central Bank
CBE	Central Bank of Egypt
CBI	Climate Bonds Initiative
CBK	Central Bank of Kenya
CBN	Central Bank of Nigeria
CBRC	China Banking Regulatory Commission
CCC	Climate Change Centre
CDP	Carbon Disclosure Project
CDSB	Climate Disclosure Standards Board

CEMLA	Center for Latin American Monetary Studies
CENAPRED	Centro Nacional de Prevención de Desastres
CFA	African Financial Community
CIB	Commercial International Bank
CIC	China Investment Corporation
CISL	Cambridge Institute for Sustainable Leadership
CMA	Capital Markets Authority
CMN	National Monetary Council
CNV	Argentine Securities Commission
COFER	Currency Composition of Official Foreign Exchange Reserves
CRSO	Committee for Organizational Social and Environmental Responsibility
CSR	Comprehensive Surveillance Review
CSR	Corporate Social Responsibility
CTCI	Science, Technology, Knowledge and Innovation
DG	Directorate General
ECAF	Eurosystem Credit Assessment Framework
ECB	European Central Bank
ECLAC	United Nations Economic Commission for Latin America
EFRAG	European Financial Reporting Advisory Group
EMDE	Emerging Market and Developing Economy
EO	Executive Order
ERM	Environmental Risk Management
ESCB	European System of Central Banks
ESG	Environmental, Social, Governance
ESRB	European Systemic Risk Board
FEB	Federation of Egyptian Banks
FRA	Financial Regulatory Authority
FSA	Financial Services Agency
FSB	Financial Stability Board
FSOC	Financial Stability Oversight Council
FSR	Financial Stability Report
FX	Foreign Exchange
GAO	Government Accountability Office
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIZ	German Development Agency
GRI	Global Reporting Initiative
GSIA	Global Sustainable Investment Alliance

GVA	Gross Value Added
HBI	Hot-Briquetted Iron
IBC	International Business Council
ICAAP	Internal Capital Adequacy Assessment Process
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards Foundation
IFSWF	International Forum of Sovereign Wealth Funds
IIED	International Institute for Environment and Development
IIR	International Integrated Reporting
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
IR	Integrated Reporting
IRs	International Reserves
ISDS	Investor-State Dispute Settlement
ISSB	International Sustainability Standards Board
ITAM	Autonomous Technological Institute of Mexico
JFSA	Japan Financial Services Agency
KBA	Kenya Bankers Association
LAJBC	Latin American Journal of Central Banking
LNG	Liquefied Natural Gas
MAS	Monetary Authority of Singapore
MMK	Magnitogorsk Iron and Steel Works
MPA	Macro Prudential Assessment
MPC	Monetary Policy Committee
MSMEs	Micro, Small and Medium-sized Enterprises
MW	Megawatt
NBIM	Norges Bank Investment Management
NDC	Nationally Determined Contribution
NFC	Non-Financial Corporation
NGFS	Network of Central Banks and Supervisors for Greening the Financial System
NGO	Non-governmental Organisation
NLMK	Novolipetsk Steel
NRB	Nepal Rastra Bank
NSBP	Nigeria Sustainable Banking Principles

NWF	National Wellbeing Fund
OJK	Financial Services Authority of Indonesia
OMFIF	Official Monetary and Financial Institutions Forum
OMO	Open Market Operation
OPSWF	One Planet Sovereign Wealth Funds
PA	Prudential Authority
PBoC	People's Bank of China
PNMC	National Plan for Climate Change
PRSA	Social and Environmental Responsibility Policy
PRSAC	Social, Environmental and Climate Responsibility Policy
PSB	Promsvyazbank
PSL	Priority Sector Lending
QE	Quantitative Easing
RDIF	Russian Direct Investment Fund
SARB	South African Reserve Bank
SASB	Sustainability Accounting Standard Board
SBFN	Sustainable Banking and Finance Network
SBS	Superintendencia de Banca, Seguros y AFP
SBV	State Bank of Vietnam
SCC	Supervision Climate Committee
SDG	Sustainable Development Goal
SEBI	Securities and Exchange Board of India
SEC	Securities and Exchange Commission
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales
SFC	Superintendencia Financiera de Colombia
SFI	Sustainable Finance Initiative
SICOR	System of Rural Credit and Proagro Operations
SIFI	Systemically Important Financial Institution
SMEs	Small and Medium-sized Enterprises
SOE	State-owned Enterprise
SSN	National Superintendence of Insurance
SWF	Sovereign Wealth Fund
SWFI	Sovereign Wealth Fund Institute
TCFD	Task Force on Climate-related Financial Disclosures
TFCR	Task Force on Climate-related Financial Risks
TFEU	Treaty on the Functioning of the European Union
TLTRO	Targeted Longer-Term Refinancing Operation
UAB	Union of Arab Banks

UK	United Kingdom
UNEP	United Nations Environment Programme
UNGC	United nations Global Compact
US	United States
VEB	Vnesheconombank
VRF	Value Reporting Foundation
VTB	Vneshtorgbank
WACI	Weighted Average Carbon Intensity
WAMU	West African Monetary Union

Foreword

Climate change is arguably the most severe challenge our world is facing today. Central banks and financial actors might play a key role in mitigating climate-related financial risks. The core mandate of central banks around the globe is to safeguard price stability, financial stability and soundness of financial systems. Climate-related financial risks – being either physical, transition or liability risks – are having a significant impact on financial systems and prices. Mainly for this reason, several central banks have increasingly expanded their tools – monetary policy, microprudential and macroprudential instruments – to better manage and incorporate climate and environmental considerations in their activities. However, whether central banks could play a further and more active role in supporting the transition to a low-carbon economy is more contentious. Depending on their policy remits, central banks could implement a range of proactive policy actions to directly support the transition to a low-carbon economy.

Addressing climate-related financial risks will increasingly appear as a crucial challenge in banking supervision and continuous progress will be made in this direction. To shed some lights on the current trends and future developments on central banks and climate-related financial risks, the Istituto Affari Internazionali (IAI) has promoted, in partnership with Intesa Sanpaolo, a research effort putting together an outstanding group of experts who analysed what central banks are currently doing in different regions of the world. Moreover, to have a comprehensive understanding on how the global financial system could play an additional role to promote greener growth, this research effort also includes an analysis on the International Monetary Fund (IMF) and on national sovereign funds. Finally, it also tackles the crucial issue of Environment, Social and Governance (ESG) investing and its standardisation as a catalyst for "greener" investments. The result is this book which, I believe, provides readers with an extremely useful tool to get interesting and manifold insights on this topic, raising several opened questions to policymakers and regulators.

Lorenzo Kamel
Rome, February 2022

Introduction: Paving the Way for Greener Central Banks. Current Trends and Future Developments around the Globe

Nicola Bilotta and Fabrizio Botti

Climate change has quickly become the most important challenge in our society. Nobody can exactly predict how climate change will affect the economy and the financial system worldwide. What is certain is that financial actors have a key role to play in supporting and fostering a shift towards a low-carbon economy. In this context, central banks could have a primary function in both, tackling climate-related risks and those related to the transition and, potentially, proactively redirecting resources towards green initiatives.

Climate change is affecting (and increasingly will affect) the stability of financial systems. According to a recent economy-wide stress test developed by the European Central Bank (ECB), physical risks from climate change – such as heatwaves or floods – will increase and, as a consequence, it could raise the average default probability of the credit portfolios (up 30 per cent by 2050 for the 10 per cent most vulnerable banks to climate change in the euro area) (Schnabel 2021). Also, private financial institutions perceive this set of risks. *The Bank Risk Management Survey* discloses that over 91 per cent of chief risk officers of 88 financial institutions in 33 countries acknowledge climate change as a top emerging risk (Bellens 2021). Furthermore, research shows that climate change could also have remarkable implications for price stability due to spillover effects on monetary policy transmission and on inflation dynamics of physical risks related to climate change (NGFS 2020).

Central banks have historically conducted monetary policy and oversight over the financial system to guarantee stability and control inflation rates. Climate change could then challenge the core mandate of central

banks. It is no surprise that central banks around the world are increasingly exploring how climate-related risks could affect monetary policy strategies given the potential impact on overall financial stability and banking supervision. Central banks and international supervisors are indeed investigating how different types of climate-related risk and climate considerations could be incorporated in current regulations to foster and achieve greener policies.

However, this effort is proceeding at a different speed and geometry across the globe. This might be driven by a basic concern, which is whether central banks might have a legal mandate to pursue green monetary policies as a policy goal. Internationally, central banks have different core mandates. While some, such as the Federal Reserve in the US, have a dual mandate, meaning to maintain price stability and support economic growth, in others the emphasis is mainly directed to price stability and its role in promoting growth is more contentious. Moreover, central banks have traditionally pursued a policy of market neutrality so as to not alter the normal functioning of financial systems. Even though whether the adherence to this principle produces or exacerbates market failures is still being debated, some scholars argue that market neutrality should be replaced with a market efficiency principle which fully incorporates risks related to climate change (Schnabel 2021).

Available evidence shows that only 12 per cent of the 135 central banks included in the IMF's Central Bank Legislation Database have explicit sustainability mandates while 40 per cent pursue the goal to support the government's policy priorities, which mostly include sustainability goals (Dikau 2021). Amid this scenario, climate-related risks might directly impact central banks' core goals. Therefore, central banks could have the legal mandate to advance an agenda incorporating and considering climate-related risks in their policies to pursue stability and control inflation.

Central banks can then assume a primary function in incorporating climate and mitigation risks to guarantee stability. Financial regulators could have an array of tools to better achieve this target. First, they could develop climate stress tests of financial institutions' balance sheets to assess their resilience to climate-related risks (Baudino 2021). Several exercises have been done or are underway – such as the those in the Neth-

erlands, France or by the ECB. In this direction, much still needs to be done to improve the scope and efficiency of these exercises. The objective is however clear. Climate stress tests could improve the understanding of future exposures and potential losses related to climate risks, allowing for more informed internal planning and risk management.

Second, they could introduce new disclosures of exposure to climate change, advancing the work pursued by a 2017 report by the Task Force on Climate-related Financial Disclosures (TCFD) of the Financial Stability Board (FSB). An enhanced, consistent and auditable disclosure can help financial institutions to identify and, potentially, address climate-related risks, improving the overall efficiency of their operations. If financial institutions could access standardised taxonomies, they could develop more informed financing and investment decisions as they could more efficiently compare and increase accountability among firms and across industry sectors. Furthermore, sustainability reporting standards could be linked to capital and liquidity requirements, as shown by the recent work of the IFRS Foundation (2021) or by the FSB (TCFD 2021).

Even though, as previously mentioned, the role of central banks in promoting green growth is more contentious in many jurisdictions, it might be a relevant force for change. Several central banks are exploring the possible introduction of the so-called "dirty-penalising factor" to capital and liquidity requirements. Thus, financial institutions would be required to hold more reserves for assets which are vulnerable to climate-related physical and transition risks. The aim would be to encourage financial institutions to finance lower-carbon investments and loans.

A further action that central banks could promote is to re-direct their corporate bond purchases. Asset purchase programmes have been expanded on a massive scale in recent years, resulting in a remarkable growth of central banks' balance sheets. If central banks incorporate climate-related criteria into their corporate bond purchases, they could incentivise companies to take more decisive actions to achieve greener business models. As an indirect consequence, this policy could also speed up the rate at which the corporate sector adopts consistent climate disclosures. If central banks implement new eligibility criteria, private corporations would then be incentivised to adopt those disclosures which could demonstrate their adherence to green standards.

Central banks can do a lot to mitigate climate change and promote, directly and indirectly, greener investments. There is however still much that needs to be better explored and understood, both at a national and international level. This volume aims at contributing to the current policy and academic discussion presenting an analysis of what central banks and national/international financial institutions around the world are doing in this direction and looking at future developments. Sharing and circulating knowledge, experiences and good practice are key to dealing more efficiently with the most pressing challenge the globe is facing.

What is happening worldwide?

In the first chapter, Chiara Colesanti Senni, Andrew McConnell and Boyan Yanovski analyse how the European Central Bank is addressing climate change. The European Union has acknowledged climate change as a policy priority. The ECB is expected to present its assessment on how rating agencies are incorporating climate change risks in their disclosure by mid-2022. Moreover, by the end of 2024, the ECB will introduce requirements into the Eurosystem Credit Assessment Framework (ECAF) targeted at climate change risk. The ECB has also committed to investigating how to better ensure that climate risks are properly reflected in their collateral frameworks. The authors argue that, despite being positive steps, the ECB is proceeding too slowly. The authors suggest that the ECB should shape its actions to support the transition to a low-carbon economy in three main directions: asset purchases; the collateral framework; and targeted refinancing operations.

Christina Skinner, in the second chapter, studies what the Federal Reserve (Fed) in the US is implementing and proposing to tackle climate change. The author claims that, in contrast with a general perception of immobilism, the Fed is acting to deploy a variety of policy tools to foster greener growth. The Fed's actions are however constrained by its own legal mandates. As long as the US Congress does not expand the Fed's statutory responsibilities to include climate change, the Fed has to limit the perimeter of its policy actions.

In the third chapter, Simon Dikau analyses how central banks are acting in Asia. This region is extremely relevant as many countries in Asia

are most vulnerable to climate change. As noted by the author, the role of central banks and supervisors in Asia in addressing environmental issues depends on their mandates which ultimately reflect on the range of policy actions they can promote. Several Asian central banks often have a "development" or "quasi-fiscal" mandate, easing the implementation of more decisive policies. The author argues that some Asian central banks are global pioneers in resorting to innovative and unconventional policy instruments and their policy actions could also be interesting practices for Western countries. However, Asian countries still face remarkable capacity challenges in financial markets and their central banks still need to build up capacities and knowledge to properly address environmental considerations in their strategy.

Africa is a continent in which climate change is already having a devastating impact. In the fourth chapter, Rim Berahab and Afaf Zarkik stress that Africa is highly exposed and vulnerable to both physical risks and transition risks. Nevertheless, African central banks are generally lagging behind in the adoption of policies to address climate change risks. But the good news is that some African central banks have started to explore measures to better incorporate climate risks and, in rarer cases, to support mitigation and adaptation policies, if aligned to their mandate. The authors notice that, despite being in a premature stage, the recent developments demonstrate that African central banks are growing into tackling climate change.

In the fifth chapter, Viviane Helena Torinelli and Serafín Martínez-Jaramillo examine how central banks in Latin America are facing climate change risks. The authors acknowledge that Latin American central banks are acting to better frame climate risks with forward-looking initiatives, within their legal mandate. They mention, for example, as good practices: the Sustainability Agenda of the Central Bank of Brazil, which aims at promoting the allocation of resources towards a more sustainable financial system; and the proposal from the Central Bank of México to create the Sustainable Finance Committee within the Financial System Stability Council.

An important function in fostering greener financial systems will be played by the International Monetary Fund (IMF). In the sixth chapter, Jon Sward and Niranjali Amerasinghe stress that, within its Comprehensive Surveillance Review published in May 2021, the IMF confirmed that

addressing climate risk is part of its mandate. However, the authors argue that the IMF has not been particularly successful, so far, in properly advising its members on facing transition risks. The authors suggest that the IMF should re-orient the underlying approach behind its current policy advice which tends to reinforce many countries' dependence on carbon-intensive sectors and promote fiscal consolidation policies at odds with the need to finance a green transition at scale.

Yaroslav Lissovolik, in the seventh chapter, explores whether sovereign wealth funds could help in fostering investment in greener instruments. The author focuses his analysis on the case of the Russian sovereign wealth fund, the National Wellbeing Fund, but he also investigates prospects and implications of greener sovereign funds based on the existing international experience. The author suggests that, to enable and empower this shift, worldwide sovereign wealth funds should improve their cooperation to promote green development. Multilateral organisations – such as the International Monetary Fund or the World Bank – could play an important role in coordinating and guiding the process of cooperation in sustainable financing across the sovereign wealth funds.

The final chapter addresses the key issue of Environmental, Social and Governance (ESG) investing. As explained by Claude Lopez, investors are increasingly incorporating ESG issues into their investment frameworks. However, ESG factors are currently lacking a proper, formal and structured framework. This fosters terminological and conceptual inconsistencies, making it extremely difficult to assess a firm's ESG performance. The author believes that a standardisation of ESG factors and the establishment of a common framework could empower positive societal and environmental changes.

In the concluding contribution to this volume, Jürgen Braunstein provides a final, well-thought reflection on what has emerged from the analysis and insights developed through the eight chapters of the volume.

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Monetary Policy Operations and Climate Change: The Case of the ECB

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Based on current policies at the end of 2021, the world is estimated to be on track for an average global increase in temperature of 2.7°C.[1] To reduce the risk of tipping points and biospheric, climatic and economic disaster we must constrain the temperature increase to 1.5°C (Masson-Delmotte et al. 2019). An estimated additional 15 trillion US dollars of global energy investment will be required until 2050 to stay below this 1.5°C boundary (IRENA 2019).

Whether and how quickly the transition to a low-carbon economy is achieved will determine the risks to economic stability we face. Climate change, through physical effects such as extreme weather events and long-term shifts in climate patterns, can reduce labour productivity, disrupt supply and food chains, and destroy capital, among other effects. Central banks have highlighted how climate change will impact key macroeconomic variables such as economic growth and price stability (NGFS 2020). Furthermore, the destruction of capital, increases in insurance premiums and lower valuations of collateral due to physical climate change effects – all potentially leading to higher default probabilities – are threats to financial stability (ESRB 2020, FSB 2020).

In order to avoid large-scale physical damages from climate change, a transition to a carbon-neutral economy is required. In the long term, physical risks can be significantly mitigated if an orderly transition to a carbon-neutral economy takes place. However, a disorderly transition can

[1] Climate Action Tracker website: *The CAT Thermometer*, https://climateactiontracker.org/global/cat-thermometer.

itself cause problems for the financial system and create transition risks. Rapid devaluation of stranded fossil fuel assets and carbon-intensive firms could lead to a spiral of collateral shortfalls, liquidity constraints and bank defaults. Both physical and transition risks materialise within traditional risk categories such as credit risk, market risk, liquidity risk, operational risk and underwriting risk (BCBS 2021, NGFS 2020).

Monetary policy operations play an important role in the transition to a low-carbon economy because they influence the funding conditions of firms. Firms whose assets are eligible in monetary policy operations benefit from better conditions than others (Nyborg 2017). The reason behind this asymmetry is that financial institutions value assets that are accepted in central bank operations more than assets that are excluded from them. This increases their price (or reduces their yield). As a consequence, monetary policy operations influence the allocation of resources in the real economy by encouraging financial institutions to invest into or lend to firms whose assets are accepted for monetary policy operations.

Asset eligibility for monetary policy operations depends, amongst other factors, on their risk category. As a result, if climate risks are not priced appropriately by the markets, current policies offer disproportionate support to firms that are highly exposed to climate risks by providing better funding conditions for them than they would get if risks were properly accounted for (Monasterolo and De Angelis 2020). This, together with the principle of market neutrality, results in the indirect support of economic activities that contribute to global warming and in an economy which is too highly exposed to climate risks. Central banks must adjust their monetary policy operations accordingly to avoid reinforcing the current misallocation in the economy and to ensure that climate risks are accounted for (NGFS 2019). In particular, central banks must tighten the conditions under which they accept climate risk exposed assets. Initial steps in this direction have been taken as shown for instance by the introduction of the "market efficiency" principle, which would allow the ECB to deviate from market neutrality in the presence of externalities (like CO_2 emissions) that have not been internalised by the market (Schnabel 2021).

The acknowledgement that climate risks are a source of financial risk has triggered an intense discussion about the role of central banks in dealing with climate-related risks and the measures they need to adopt (NGFS 2020).

The debate has also led to a shift in the perception of the role of central banks, from being purely risk-focused to the broader concept of ensuring coherence with government policies to support the transition to a low-carbon economy. The update of the remit of the Bank of England (BoE) in March of 2021 to reflect the UK government's goal of "strong, sustainable and balanced growth that is also environmentally sustainable and consistent with the transition to a net zero economy" is a case in point (HM Treasury 2021). The BoE has not been the only central bank considering its broader role in addressing the climate crisis. In February 2021, Frank Elderson, Member of the Executive Board of the European Central Bank (ECB), highlighted the ECB's secondary objective to contribute to "the sustainable development of Europe based on […] a high level of protection and improvement of the quality of the environment" and underlined that this secondary objective is "a duty, not an option" (Elderson 2021).

In the following we review some of the main monetary policy operations of the ECB and discuss their adaptation to account for climate risks. In particular, we look at the need to account for climate risks in the ECB's asset purchases, its collateral framework and its refinancing operations. While our focus is mostly on the ECB, similar considerations apply to other central banks too.

1.1 Asset purchases

Asset purchases (APs) are an unconventional monetary policy instrument that involves the purchasing of assets such as government bonds, corporate bonds and stocks. The ECB has been conducting APs of various kinds of asset since 2009. It currently holds 2.5 trillion euro in public sector bonds, just over 300 billion in corporate bonds, close to 300 billion in covered bonds and close to 29 billion in asset backed securities.[2]

The ECB, like any other central bank, has a fiduciary duty to protect its balance sheet. To that end, appropriate risk management in relation to the assets it buys is critical. External ratings and minimum rating thresholds for the securities the ECB purchases are a core pillar of its risk framework. Yet, as many central banks and other market participants and

[2] ECB website: *Asset Purchase Programmes*, https://www.ecb.europa.eu/mopo/implement/app/html/index.en.html.

observers have highlighted, climate-related financial risks are not sufficiently accounted for in current ratings. As a result, there is a high probability that the ECB is currently buying assets that do not meet its own risk requirements. Addressing this gap in its risk management frameworks by adding further analytics that capture climate-related financial risks is vital and urgent. In its detailed roadmap of climate change-related actions, the ECB has committed to "assess rating agencies" disclosures and understand how they incorporate climate change risk in ratings" by mid-2022, and to "introduce requirements into the Eurosystem Credit Assessment Framework (ECAF) targeted to climate change risk, if warranted" by the end of 2024 (ECB 2021a). The direction is commendable but given that this action plan is the result of an 18-month review and that it was published in July 2021, the speed of travel is not.

Moving beyond a narrow lens on central bank balance sheet risk to the broader objective of financial stability and policy coherence, the ECB also has a duty to explore its options to further support the transition to a low-carbon economy. There is strong evidence that APs have a particular effect on the valuations and bond yields for the direct beneficiaries of the programme (Abidi and Miquel-Flores 2018, Arce et al. 2021), which makes this monetary policy operation a suitable instrument to channel resources towards specific sectors of the economy. For example, in the case of green bonds, the ECB has conducted a study on the effects of its green bond purchases as a part of its overall APs which concludes that the purchasing has reduced the yield on green bonds and supported their issuance by non-financial corporations (NFCs) (De Santis et al. 2018).

An over-weighting of climate-friendly assets in AP programmes is likely to promote the growth of climate-friendly sectors and to lead to the issuance of additional such assets. Conversely, an under-weighting of carbon-intensive assets in AP programmes is likely to result in a shrinkage of the respective sectors.

One potential negative side-effect of such over- and under-weighting is that, if the implementation of the weighting is based on the carbon intensity of the firms, existing carbon-intensive companies would not have access to cheap funds to decarbonise their production processes. Such companies would need to first decarbonise at a higher cost of capital to be able to later take advantage of the lower cost of capital associated with

less-polluting firms. Against this background, central banks should also be taking into account to what extent companies commit themselves to a transition path to rapidly reduce their carbon intensities. The BoE has already taken a step in this direction when it announced in November 2021 that higher-emitting sectors (energy and utilities) will need to have public emissions reduction targets to remain eligible for its Corporate Bond Purchase Scheme.[3]

1.2 Collateral framework

One of the many functions of the ECB is to provide liquidity (credit) to financial institutions with different maturities, including overnight (marginal lending facility), one week (main refinancing operations) and over three months (longer-term refinancing operations). To access ECB liquidity, financial institutions are required to pledge equivalent collateral to that of the liquidity they seek.

The ECB aligns its collateral framework with Article 18.1 of the ESCB/ECB Statute which requires the bank to use "adequate collateral" when undertaking credit operations (TFEU Protocol 4). The current definition of "adequate collateral" is for assets to help fulfil the twin objectives of supporting the smooth conduct of monetary policy and to protect the Eurosystem against losses in the case of counterparty default (Bindseil et al. 2017). After the financial crisis in 2007 the ECB increased the breadth of its collateral framework to allow collaterally constrained financial institutions access to liquidity programmes.[4] The ECB accepts nowadays a broad range

[3] BoE website: *Greening our Corporate Bond Purchase Scheme (CBPS)*, last updated 5 November 2021, https://www.bankofengland.co.uk/markets/greening-the-corporate-bond-purchase-scheme.

[4] Before the crisis the ECB held a credit rating threshold at A– for all eligible collateral (an exception being for ABS, which the credit rating threshold was at AAA). After the crisis in October 2008 the credit rating threshold for all eligible collateral (except ABS) was temporarily lowered to BBB. In April 2008 the drop in ratings threshold was made permanent. In December 2011 the credit rating threshold of ABS based on residential mortgages only or loans to SMEs was relaxed to A–. By July 2014 all ABS and loans to SMEs or credit card receivables had their credit threshold was reduced to BBB – (De Santis et al. 2018). In order to compensate for the contractionary economic and financial environment as a result of the Covid-19 pandemic the ECB further broadened the collateral framework and reduced the credit threshold of collateral eligibility (ECB 2020).

of collateral which includes marketable assets (sovereign bonds, unsecured bank bonds, corporate bonds and asset backed securities) and non-marketable assets (credit claims, including corporate loans and fixed-term deposits).[5]

Moreover, to insulate from adverse balance sheet risk the ECB applies "haircuts" to riskier collateral assets. A "haircut" represents a percentage reduction from the value of an asset to determine the extent to which it can be used as collateral in a liquidity operation and to reflect the risk it poses to the central bank balance sheet.

Dafermos et al. (2021: 3) find that "carbon-intensive companies issue 59% of the corporate bonds that the ECB accepts as collateral while their overall contribution to EU employment and Gross Value Added (GVA) is less than 24% and 29%, respectively". This implies that the ECB is supporting carbon-intensive firms by implicitly generating cheaper financing rates through the collateral premium. Moreover, in the context of climate change, the physical and transition risks of assets are likely to be subject to a high degree of uncertainty given the evident mispricing of climate risks by the markets (Monasterolo and De Angelis 2020). In order to reduce their contribution to the lock-in into a carbon-intensive economy and to insulate themselves against balance sheet losses through climate risks, central banks should adjust their collateral frameworks. Some of them, such as the ECB, have already committed to such adjustments and to ensuring that climate risks are properly reflected in their collateral frameworks (ECB 2021a).

Again, the direction is commendable, the speed of travel is not. Given the propensity for markets to misprice climate risk (Daniel et al. 2016, Kumar et al. 2019, Hong et al. 2019, Monasterolo and De Angelis 2020), central banks face the critical and urgent task of ensuring their exposure to physical and transition risks from climate change through the collateral they accept is accounted for – both in their eligibility criteria as well as in the applied haircuts (McConnell et al. 2021, Monnin 2018). To that end, similar to the need to account for climate-related financial risks in its asset purchases, the ECB must expand its risk assessments to account for an asset's climate risk, which can either be done in-house or through climate risk metrics developed by rating agencies or other dedicated providers. Though the former allows for considerably more control over the

[5] For a detailed overview of the ECB's collateral framework please see Bindseil et al. (2017).

scope and methodology of climate risk assessment, it might fall outside of the current scope and resources of a central bank. As external ratings are already used by most central banks in their collateral risk evaluation, the use of external climate risk analytics can be easily integrated into existing frameworks. Such use would also provide an important signal to market participants, and potentially lead to climate risk re-pricing cascades across international financial markets.

The need to account for climate risks in its collateral framework featured prominently in the ECB's 2021 action plan for integrating climate change into its monetary policy operations (ECB 2021a). In the plan the ECB pledges to account for climate risks in the ECAF that underpins its collateral framework, and to "monitor the adequacy of the collateral valuation and [to] design and implement changes, if warranted" – all this by end-2024 and thus alarmingly misaligned with the urgency that the ECB itself has repeatedly called for in addressing these risks.

1.3 Targeted longer-term refinancing operations

In addition to accounting for climate change considerations in its asset purchases and collateral framework, climate change must also start playing a role in the ECB's targeted longer-term refinancing operations (TLTROs). TLTROs were introduced to the toolkit of the ECB in 2014 to stimulate lending to the real economy with a particular emphasis on those segments of the economy which have no or limited access to financial markets. The ECB's TLTROs are characterised by a significantly longer maturity compared to traditional refinancing operations and by funding conditions which depend on banks' net lending to non-financial corporations and households (excluding mortgages). The goal is to offer long-term funding at attractive conditions to banks in order to ease private-sector credit conditions and stimulate bank lending to the real economy. Despite their wide adoption and the evidence about their support to bank lending conditions (see Barbiero et al. 2021 and references therein, Da Silva et al. 2021), TLTROs have not included climate considerations so far (Colesanti Senni and Monnin 2021).

The ECB has adopted three TLTRO programmes (TLTRO I, TLTRO II and TLTRO III). While the set-up varied for each programme, they all

function along the same lines and share similar characteristics, as well as transmission channels: first, under these programmes, loans to firms become eligible for loans from the ECB, but there is a maximum amount that banks can borrow ("borrowing allowance"), which is a fraction of the stock of loans of banks to non-financial corporations and households, excluding mortgages. Second, all TLTROs condition the interest rate for central bank loans to the volume of loans banks granted to the targeted sectors. In particular, the interest rate is calculated ex-post based on the so-called "lending performance" which is defined based on the growth of the loan portfolio of banks above the "lending target". Third, the transmission channel works through the fact that financial institutions are more likely to grant loans in larger volume to get access to central bank money, which results in larger borrowing on the side of firms whose loans are eligible.

The effects on credit supply of TLTRO I and TLTRO II in Italy are analysed by Benetton and Fantino (2021) and Esposito et al. (2020), using loan-level data from the Italian credit registry. Additional empirical evidence is provided by Andreeva and Garcia-Posada (2021), Leite (2019); Bats and Hudepohl (2019) and Laine (2021). These papers show that TLTROs decreased rates and increased lending amounts, but that the magnitude of these effects is heterogeneous depending on, amongst others, the competitiveness of the banking sector and the size and the financial soundness of firms (captured, for instance, by their risk category). Moreover, heterogeneities in the effectiveness of TLTROs also depend on country characteristics and on the benchmark lending set by the ECB (which can vary from bank to bank). Finally, it is highlighted how the impacts differ between loans to firms and households.

Recently, TLTRO III has been one the key measures to mitigate the impact of the coronavirus crisis on the economy. Banks are rewarded with a lower interest rate if they keep lending to businesses and households. This encourages banks to lend more and pass on these attractive terms to companies and households to help them better weather the crisis. The impact of TLTRO III during the pandemic is analysed by Altavilla et al. (2020), using bank-level data. The authors show that in the absence of the funding cost relief associated with the pandemic response measures, banks' ability to supply credit would have been severely affected.

Overall, TLTRO programmes are shown to generally provide substantial support to bank lending conditions (see Barbiero et al. 2021 and references therein, Da Silva et al. 2021). Moreover, they provide an example of central bank intervention aimed at supporting specific segments of the economy. As such, they represent an ideal instrument for central banks to contribute to the transition to a low-carbon economy, and to the reduction of the risks climate change poses to economic and financial instability.

The alignment of TLTROs with climate change considerations can be implemented through both the interest rate the ECB charges as well as the lending volumes that are made available. Van 't Klooster and van Tilburg (2020) propose TLTROs that are linked to the loans that banks provide in alignment with the EU Taxonomy and suggest a pilot programme for TLTROs to refinance "funding for building and renovations in accordance with the Taxonomy requirement for real estate". Batsaikhan and Jourdan (2021) echo this suggestion and propose a TLTRO for loans to housing renovations aimed at improving energy efficiency. Böser and Colesanti Senni (2021) explore the option of linking the interest rate of TLTROs to the exposure to climate risks of banks' loan portfolios and find that such a policy shifts bank lending away from economic activities exposed to climate financial risks. Such a shift would also improve financial stability and raise investments in support of the achievement of climate objectives. Given the convergence across climate risk metrics on which companies are the most exposed to climate risks, an initial focus on these companies to determine exposures would be a good first step in this direction (Bingler et al. 2020, 2021).

In contrast to asset purchases and the collateral framework, targeted refinancing operations do not appear in the ECB action plan to include climate change considerations in its monetary policy strategy. This is surprising given the effectiveness that previous TLTRO programmes have shown in achieving their targets and given the widespread participation of banks in such programmes (more than 87 percent of banks have participated in TLTRO II according to Da Silva et al. 2021).

Conclusion

Climate-related risks, both physical and transition risks, can lead to economic and financial instability. Both kinds of risk can be mitigated through an early transition to a low-carbon economy. Central banks must account for climate-related risks in their activities to protect their own balance sheet, to address the risks of climate change to price and financial stability, and to ensure policy coherence with climate objectives. To that end, there is a critical and urgent need for them to adjust their monetary policy tools accordingly. In this chapter, we describe the key monetary policy operations of the ECB and how they can and should be adjusted to account for climate risks. In particular, we focus on asset purchases, the collateral framework and targeted refinancing operations.

The ECB must adjust its asset purchase programmes to account for the exposure of the assets it purchases to climate risk. This is critical to meet its fiduciary responsibility to protect its own balance sheet. It is also an important step to improve the financing conditions for companies less exposed to climate risk.

The ECB's collateral framework is a second key area that requires adjustments. Climate considerations must be considered through both the eligibility criteria for collateral, as well as through the haircut applied to the assets. In both cases, accounting for climate risks would penalise polluting firms by reducing the collateral utility of their assets within the financial system and shift capital away from polluting and toward cleaner companies.

Finally, and crucially, climate considerations must also be reflected in the ECB TLTROs. TLTROs represent a key tool, in particular, because they allow central banks to also reach companies which are not publicly listed and get their funding mostly through banks. Several criteria can be used to align TLTROs with climate objectives: linking interest rates and volumes to a bank's portfolio exposure to climate risk, its loans in compliance with a green taxonomy, or the funding it provides to energy-efficient housing renovations are examples. Regardless of the criteria considered, accounting for climate considerations in TLTROs is a further critical pillar for central banks to channel resources to the sectors, companies or

projects which can contribute to the transition to a low-carbon economy.

Central banks, including the ECB, have already taken initial steps in this direction. The climate action plan presented by the ECB is an example of a good practice that could be adopted also by other central banks as it provides a clear direction. Similarly, a shift away from the market neutrality principle towards market efficiency as suggested by Isabel Schnabel could become an important precedent for central banks in the conduct of their monetary policy. Given the urgency of the issue, what is lacking is speed.

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2.

The US Federal Reserve: Policy Initiatives and Legal Constraints in Addressing Climate Change

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Governments around the world are considering how, and at what pace, to address climate change and transition to a low-carbon economy. Increasingly over the past several years central banks have become part of that conversation. Many central banks have made significant commitments to deploy a variety of their policy tools in order to assist their governments propel their national economies toward a greener equilibrium.[1] In comparison, the Federal Reserve (the "Fed") has been characterised (or perceived) as slightly more muted in the breadth and pace of its response to the range of popular, political and academic calls upon it to similarly tackle climate change. But the Fed has not been laggard in this regard. To the contrary, the Federal Reserve Board leadership has already taken climate-related action to the full extent of its legal authority, and in some cases may be pushing the boundary of that authority. While there are some initiatives that other central banks – like the Bank of England (BoE) or European Central Bank (ECB) – have pursued which the Fed has not, those actions sit outside the Fed's own legal mandates.

This chapter explains the current and in-progress climate-related policy initiatives at the Federal Reserve Board and the legal authority that supports this policy action.[2] It also sheds light on why certain other policy

[1] See, e.g., Bank of England website: *Climate Change*, https://www.bankofengland.co.uk/climate-change; European Central Bank (ECB) website: *Climate Change and the ECB*, https://www.ecb.europa.eu/ecb/climate; Bank of Japan (2021).

[2] Much of this paper draws on prior work of mine. See, e.g., Skinner (2021).

tools are likely to remain off the table for the Fed, at least absent legislative action by the US Congress to expand the Fed's statutory responsibilities to include climate change. To that end, the first part analyses the evolution of the Fed's position on and response to climate change. The second part discusses why climate-related monetary policy options are not consistent with the Fed's existing legal authority. The third part lingers on the Fed's legal authority in regard to regulation and supervision respectively, and the fourth part briefly highlights the Fed's stance on data and international cooperation. The final part, in conclusion, briefly sheds light on some overarching constitutional law principles that limit the Fed's ability to act in this space and – most importantly – the Executive branch's ability to direct the Fed to do more in regard to climate absent congressional instruction.

2.1 The Fed's evolving response to climate

The Fed's posture toward climate change – and its assessment of whether climate change impacts its various mandates – has evolved considerably over the past two years. Prior to 2020, the Fed did not engage significantly on climate change issues. It did not join the Network for Greening the Financial System (NGFS) or otherwise take steps to consider integrating climate change considerations into its "business as usual" policy decision-making or initiatives. But starting in 2020 – and likely somewhat before – the Fed began facing increasing pressure from certain segments of the public, the press and academia to act in regard to climate change.

Presumably, the Fed felt compelled to respond. At a November press conference, Politico reporter Victoria Guida asked Fed Chairman Jerome Powell (2020: 15), "[D]o you have any plans for joining the network for greening the financial system?" Powell's response indicated the Fed's intention to join the NGFS and, for the first time, publicly recognised that climate change could impact one or more of its statutory mandates. Notably, Powell couched the policy shift in terms of maintaining the Fed's credibility in the eyes of the general public. He replied, "I do think that the public […] will expect and has every right to expect […] that in our oversight of the financial system, we will account for all material risks and try to protect the economy and the public from those risks. Climate change is […]

one of those risks" (Powell 2020: 16). The Fed subsequently applied for membership in the NGFS and officially joined in December 2020 (Federal Reserve Board 2020a).

Another significant moment for the Fed and climate change came in November 2020, with the publication of its annual Financial Stability Report (FSR) (Federal Reserve Board 2020b). There, for the first time, the Fed discussed climate change as a potential financial stability risk. As this paper will discuss, recognising climate change as a financial stability risk triggers a host of potential policy tools, though that conclusion remains contested, likely even among Fed leadership. The 2020 FSR went into some depth around the possible ways in which climate change might pose a risk to the financial stability of the US. In particular, it dissected how climate-related risks might be transmitted to the financial system and create certain financial system vulnerabilities (Federal Reserve Board 2020b: 58-59).

In 2021, the President of the United States began to take significant action on climate change – some of which impacted the Fed. Most significantly, President Biden issued an Executive Order (EO) in May 2021 regarding climate-related financial risk (White House 2021). As relates to the Fed, the key provision in the EO was section 3, which addressed "Climate-Related Financial Risk by Financial Regulators". It directed the Treasury Secretary as Chair of the Financial Stability Oversight Council (FSOC) to (i) assess the financial stability risks of climate change; (ii) facilitate climate-related data-sharing among members of the FSOC and executive departments and agencies; and (iii) issue a report to the President outlining the efforts by FSOC "member agencies to integrate considerations of climate-related financial risk in their policies and programs" (White House 2021).

For context, the FSOC is the macroprudential authority in the United States – it was created by Title I of the Dodd–Frank Act of 2010. The FSOC is a multi-member council; its members include the head of the financial regulators in the US, including the Chairman of the Federal Reserve. Importantly, the FSOC is housed within the Treasury Department and spearheaded by the Treasury Secretary; as such, its agenda reflects the financial regulatory priorities of the Presidential administration in power.[3]

[3] For discussion of the FSOC, see generally, Parajon Skinner (2017).

The FSOC has the power to designate nonbank financial institutions as systemically important nonbank institutions, thereby porting them over into the Fed's jurisdiction. But more relevant for its action on the climate front is the FSOC's power to designate certain activities as financial stability risks in the US, and thus make recommendations to the relevant regulator member as to how best to tackle that risky activity (US Congress 2010: para. 5330).

Now, to be clear, the FSOC did not need much of a push to address climate. Climate change was already the top agenda item for the FSOC and Secretary Janet Yellen. In terms of "emerging risks", Secretary Yellen was clear at the FSOC's first principal meeting under her leadership in March 2021 (US Dept of the Treasury 2021). According to the Secretary, climate change "is an existential threat to our environment, and it poses a tremendous risk to our country's financial stability" (US Dept of the Treasury 2021). Regardless, the FSOC made quick work on the report the President had requested. The FSOC report detailed the work underway at each of the member regulators and had a number of recommended "next steps" for all members, the Fed included. Of particular note for the Fed's role, the FSOC recommended adoption of scenario analysis and supervisory guidance regarding climate change (FSOC 2021: 123-124). Whether the Fed has the legal authority to do either of these things – and whether it is constitutionally proper for the FSOC to recommend as much – will be discussed in further depth below.

As we begin 2022, it is fair to say that the Fed remains in assessment mode. It continues to reflect on whether climate change implicates its mandates and, if so, what are the implications for policy action. As Governor Brainard described the Fed's posture in 2021, the Fed is at work "building the requisite institutional capacity and knowledge to deepen [its] understanding of these [climate-related] risks and vulnerabilities" (Brainard 2021). While the Fed has committed to the public, and the President, to study this issue it is also fair to say that Fed leadership – especially Chairman Powell – are also mindful of the rule-of-law. There are equally weighty interests in respecting the boundaries Congress has set for the Fed, and a Powell Fed is very unlikely to flout those constraints. The balance of this paper considers the Fed's authority in respect of each

of its relevant mandates, in light of initiatives currently underway, inconsideration, or decidedly not adopted.

2.2 Climate monetary policy

Perhaps one of the most impactful (potent) things a central bank could do to proactively green the economy is to move credit toward green assets and away from brown ones. Central banks could in theory use their balance sheets to buy "green" bonds – or otherwise construct asset purchase programmes to prefer green bonds in some way or another. Both the ECB and the BoE have done so.[4] Not only does this channel central bank money toward green and away from brown, but it also induces a so-called "greenium" where, observing the imprimatur of the central banks (and likely where the regulatory winds are blowing), the market allocates credit to these "green" companies on terms much more favourable than the "brown" ones. Sometimes this is colloquially referred to as "green QE" – but of course, green bond purchases may be part of a formal QE (quantitative easing) programme.

For the Fed, using its balance sheet to purchase green assets is wholly inconsistent with Fed law. Section 14 of the Federal Reserve Act specifies what kind of assets the Fed can buy in its open-market operations. Private bonds are not one of those enumerated assets – regardless of whether they are green or brown.[5] And indeed the Fed does not buy private bonds in the ordinary course of its open market operations (OMO) or during a crisis-era QE programme. Moreover, it has long been anathema for the Fed to use its balance sheet to favour some sectors over others. Doing so is clearly fiscal in nature and so it would be sure to stoke political controversy.

The Federal Reserve Banks have a bit more discretion to massage their collateral policy to prefer green assets over brown ones in connection with their discount window lending or emergency liquidity facilities (under section 10B of the Federal Reserve Act or section 13(3),

[4] See Bank of England website: *Greening Our Corporate Bond Purchase Scheme (CBPS)*, https://www.bankofengland.co.uk/markets/greening-the-corporate-bond-purchase-scheme; ECB (2021; De Santis et al. (2018).

[5] Federal Reserve Act § 14, 12 USC § 355.

respectively).[6] In that respect, law would not be a formal barrier but politics likely would. Again, were the Fed – in any of its organs – to depart from sector neutrality in the way that it allocates credit, such action would radically alter the heretofore technocratic role of the US central bank and pose legitimacy questions about the preferences of unelected central bankers.

Finally, some may well wonder whether price stability concerns might justify monetary policy action in reaction to climate change. That also seems a practical stretch. While the Federal Reserve Act does not define price stability, never before has the Fed considered price stability in an anticipatory sense. The Federal Open Market Committee uses interest rate policy to respond to real, observed changes in the stability of prices. It would be unworkable to define price stability in the hypothetical.

And this highlights the bigger picture. The Fed certainly has legal authority to respond to climate-related events just as it does to other major events that cause economic turmoil that manifest in the financial system. But it does not have the authority to use its monetary policy tools to proactively make the financial system greener – or to incentivise banks to try and do so.

It bears mention that the Fed is *not* responsible for minding the economic priorities of the government – i.e., neither the President nor the Treasury. There is no formal mechanism for the President or the Treasury Secretary to direct or influence monetary policy decisions. To the contrary, the Fed's history reveals a steady march away from Treasury influence; in some cases, the Fed has gained independence from the Treasury through its own initiative and in several others, by congressional design. This relationship of hyper-independence from the Executive is quite different from the framework in the UK or the European Union. In the case of the BoE, the Bank of England Act 1998 instructs the BoE to pursue price stability as a primary objective but, secondarily to that, to "support" economic policy of the UK government.[7] In practice, this means that HM Treasury can – and has – specified to the Monetary Policy Committee (MPC) that it should "have regard" to environmental sustainability when

[6] Federal Reserve Act § 10B and § 13(3), 12 USC § 347b(a) and § 343.

[7] See Bank of England Act 1998, Ch. 11, § 11, https://www.legislation.gov.uk/ukpga/1998/11/contents.

fashioning monetary policy (UK Treasury 2021). This would not be possible in the US system

2.3 Climate regulation and supervision

Regulation

Central banks have also considered whether to more strictly regulate climate risks through increased capital requirements. The Federal Reserve does have rule-making authority to increase capital requirements in relation to a perceived financial stability risk; and it last did this to implement the Basel III accord relying on authority in section 165 of the Dodd–Frank Act. But it is unclear whether such initiative to, for instance, increase the risk weights for certain brown assets will gain much traction at least in the near term. The Administrative Procedure Act requires that any rule made by any agency – including the Fed – must not be "arbitrary" and "capricious".[8] There are several reasons why a new capital charge could fail under that standard. First and foremost, the US presently lacks uniform, objectively verifiable criteria for what qualifies an asset as "green" versus "brown". Second, it is still unclear whether (and to what degree) a particular brown asset (even if that moniker could be accurately applied) increases risk on a big bank's balance sheet. Accordingly, heightening capital charges for climate-related assets might be somewhat far off.

Supervision

In contrast to monetary policy and supervision, the Fed *is* doing quite a bit on the supervisory front and leaning into the statutory discretion it has on this front. In a March 2021 speech, Governor Lael Brainard made clear her belief that "robust risk management; scenario analysis; consistent, comparable disclosures; and forward plans can help ensure the financial system is resilient to climate-related risks and well positioned to support the transition to a sustainable economy" (Brainard 2021). Governor Brainard is now a Vice Chair on the Fed Board.

At the firm-level – or in regard to "microprudential" supervision – the

[8] 5 USC § 706(2)(A).

Fed operates pursuant to a rather capacious standard set out in the Bank Holding Company Act; that is, the Fed supervises the financial institutions it oversees for "safety and soundness" (US Congress 1956). For better or worse, that statutory phrase is broad enough to support a wide range of firm-level supervisory initiatives. At the very least, Fed supervisors have long worked with banks to monitor asset quality; to the extent that climate risk is (in fact) like any other credit risk, Fed supervisors are on solid footing to address it. To that end, the Fed first signalled to firms in November 2020 (in the 2020 FSR) that it expected firms to be mindful of climate risk. Specifically, the 2020 FSR stated that "Federal Reserve supervisors expect banks to have systems in place that appropriately identify, measure, control, and monitor all of their material risks, which for many banks are likely to extend to climate risks." (Federal Reserve Board 2020b: 59)

More substantively, in January 2021 the Fed announced the creation of a Supervision Climate Committee (SCC) which the New York Federal Reserve Bank (2021) described as a "newly formed System-wide group bringing together senior staff across the Federal Reserve Board and Reserve Banks". Fed leaders have offered a high-level work description of the SCC: "to strengthen our capacity to identify and assess financial risks from climate change and to develop an appropriate program to ensure the resilience of our supervised firms to those risks" (Brainard 2021).

As such, it remains to be seen what will come from the SCC. The 2020 annual Supervision and Regulation Report noted in broad strokes that supervisors "will seek to better understand, measure, and mitigate climate-related financial risks including through analysis of transmission channels of climate change risk to the banking sector, measurement methodologies, and data gaps and challenges" (Federal Reserve Board 2020c: 26). The 2021 report did not mention climate change at all. We can only wait and see what supervisory changes will follow from the SCC in 2022. It would be generally consistent with the Fed's legal authority to use the SCC to fine-tune its dialogue with banks and its methodologies for assessing climate risk *qua* credit risk. But it would not be consistent with overarching due process rights of the supervised institutions for the Fed to use the SCC to exert moral supervisory suasion on supervised institutions to lend or not lend to certain favoured or disfavoured companies

(or industries). Former Vice Chair for Supervision Randal Quarles went to significant lengths to exorcise such manner of opacity and vagueness from Fed supervisory practices (Quarles 2020). Again, much may depend on whether the President's nominee for Vice Chair for Supervision, Sarah Bloom Raskin, is confirmed by the Senate.

On the macro or system-wide level, the Fed has taken similar supervisory strides, though with a bit less legal clarity. Like the SCC, in March 2021 the Fed created a supervisory committee dedicated to studying the financial stability risks of climate change – the Financial Stability Climate Committee. According to the Fed,

> This Federal Reserve System staff committee complements the microprudential focus of the SCC and is undertaking work to identify links between climate change and financial stability, including by investigating how climate change can increase financial-sector vulnerabilities and looking for climate-related amplification channels. (Federal Reserve Board 2021: 62)

This committee's aims to are (i) "to promote the resilience of the financial system to climate-related financial risks"; (ii) "to ensure coordination with the Financial Stability Oversight Council (FSOC) and its member agencies"; and (iii) "to increase the Federal Reserve's international engagement and influence on this issue" (Brainard 2021).

These are all somewhat grey areas. In the first sense – promoting resilience to climate risk – it may well depend what is meant by that phrase. The Fed does not have an explicit financial stability mandate. Its role in regard to financial stability is rather implicit, inferred from Title I of the Dodd–Frank Act which requires the Fed to regulate and supervise those entities that present systemic risks. But, unlike the Bank of England for example, the Fed does not have a formal congressional mandate to pursue policies to safeguard the stability of the financial system overall. So inherently, the Fed's latitude for policy manoeuvre is more constrained than in spaces where it does have explicit responsibility from Congress. This may well put in question some Fed work to implement a new kind of pseudo stress test known as scenario anal-

ysis that is strongly favoured by some, like Governor Brainard (2021).[9]

A Fed scenario analysis would be similar to stress-testing in that it would require banks to respond to hypothetical problems (i.e., climate) but would be over a longer-term horizon and would not necessarily be tied to the capital planning process in the way that the existing, statutory stress tests are. As Governor Brainard describes it,

> For scenario analysis, we would anticipate long time horizons, substantial uncertainty, the use of qualitative elements, and reliance on external data and models. To capture the potential for complex interactions across the financial system, such scenario analysis would consider the effects on bank and nonbank financial intermediaries and financial markets broadly. (Brainard 2021)

But absent an express financial stability mandate, the authority of the Fed to deploy such a new supervisory burden on firms would, absent congressional authorisation, seem to depend on the factual determination that climate change is a financial stability risk. That point remains contested. Some consider it axiomatic that climate change is a financial stability risk; while others point to the relatively small exposure of banks to carbon-intensive producers which is dwarfed by their equity capital holdings and question the risk that these exposures pose to bank solvency (see, e.g., Skinner 2017). It does seem like that factual question is a precondition to the creation and deployment of a new supervisory requirement on firms.

2.4 Data-gathering and international collaboration

Finally, Fed leaders have expressed in various fora a keenness to focus on data-gaps (identifying them in the first instance and then working toward filling them) and ongoing collaboration with international counterparts. The 2021 FSR focused in particular on the Fed's need to "identify[…] additional data, technology, and modeling resources, including those available through other U.S. government agencies" (Federal Reserve Board 2021: 62). Research into data and methodology seems well within the general au-

[9] The Bank of England engages in scenario analysis concerning climate change. See Bank of England (2021).

thority of section 11(l) of the Federal Reserve Act, which provides rather open-ended authority "To employ such attorneys, experts, assistants, clerks, or other employees as may be deemed necessary to conduct the business of the board".[10] It is a sensible (credible, legitimate) place to focus.

On the international level, the Fed has been participating in the Financial Stability Board's work on climate change and it co-chairs the Basel Committee on Banking Supervision's Task Force on Climate-related Financial Risks (TFCR). There is no obvious legal authority for the Fed to collaborate in these international regulatory networking bodies, though the Fed has regularly done so for most of these organisations' existence. That said, when the Fed appears to be importing international standards into domestic law – but outside the ordinary rulemaking process prescribed by the Administrative Procedure Act – it has previously generated substantial controversy (Wallison 2014).

2.5 Limiting principles: The constitutional separation of powers

In summary, the Fed has relatively limited legal authority to proactively address climate change, beyond microprudential supervision and research.

The Fed not only operates within the unique context of US central banking law found in the Federal Reserve Act, the Bank Holding Company Act and the Dodd–Frank Act, it also operates within the unique structure of the US Constitution, which carefully and deliberately separates executive from legislative power. It is for this reason (among others) that it would be deeply problematic for the Fed to stretch its existing mandates to accomplish climate policy goals on the executive branch agenda. Specifically, the Fed must tread cautiously as it responds to the FSOC's request for supervisory guidance and scenario analysis – both policy measures which sit on the border of, and perhaps outside, the Fed's existing congressional mandate.

Ultimately, the Fed's power derives from that which Congress has delegated to it. The Fed is an agency – it is an *agent* of Congress. Accordingly,

[10] Federal Reserve Act § 11(l), 12 USC 248(l).

while the Fed may have instrument independence, it goes not have goal independence (Meyer 2000). That is, it may not elect to deploy its various policy tools to accomplish any goal it deems worthy of pursuit. The Fed only has what power the US Congress has given to it and may not lawfully exceed those boundaries regardless of how important the issue may be to segments of the US or global society.

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3.
Sustainable Central Banking in Asia: Addressing the Environmental Challenges

Simon Dikau

Environmental degradation, and specifically climate change and biodiversity loss are increasingly recognised and assessed by financial policymakers as challenges with far-reaching macroeconomic implications and likely severe negative financial and economic impacts. Most central banks have reached the formal conclusion that addressing environmental issues is part of their core mandate, but substantial differences concerning their role in actively supporting transition efforts remain (NGFS 2019). The international debate on the role of central banks and financial regulators in addressing climate-related financial risks has rapidly expanded in recent years (Carney 2015, Campiglio et al. 2018, Bolton et al. 2020) and there is a growing debate around mandates and alignment questions (Robins et al. 2021). Central banks and supervisors in Asia, some of which have been among the pioneers in addressing climate change, have become increasingly active in incorporating environmental considerations into their frameworks.

In practice, the engagement of Asian central banks and supervisors with environment-related issues can be differentiated into two categories. First, environmental degradation, climate change and biodiversity loss are connected to substantial environmental risks that translate into financial risk with implications for financial stability. This has led central banks and financial supervisors in Asia to become concerned with addressing these risks as part of their core prudential financial stability frameworks. Second, the relevant financial policy institutions in Asia have been particularly active in the area of enhancing efforts to scale up green finance in line with national sustainable transition targets, such as Paris

Agreement-based, national net-zero targets or other environmental protection, pollution reduction or nature conservation goals.

However, the role of central banks and supervisors in Asia and elsewhere in addressing environmental issues depends on their mandates and interpretation thereof, with environmental considerations potentially being framed as part of different objectives due to price stability and financial stability implications, as well as sustainable transition efforts. Some central banks already have a direct sustainability mandate, or a mandate to support the economic priorities of their government (Dikau and Volz 2021a). Furthermore, emerging market and developing economy (EMDE) central banks have often played a more active "developmental" or "quasi-fiscal" role in supporting their governments' economic development objectives. This is relevant in the context of many governments in Asia committing to net-zero transition targets by translating them into national laws, which in turn could have implications for the "supportive role" of central banks and supervisors.

In this context, the leading role of some central banks and supervisors in Asia with regard to their environmental risk and transition awareness can be discussed against the background of several distinctive factors that help explain why some are starting to play a central role in national mitigation and adaptation efforts.

First, a number of economies in Asia are particularly exposed to environmental degradation, climate change and the loss of biodiversity and ecosystem services. The latest evidence on South Asia presented by the Intergovernmental Panel on Climate Change (IPCC) forecasts that the region will see increasing temperatures, longer monsoon seasons and increased droughts as total global warming increases by around 1.5 degrees Celsius over the next two decades (Allan et al. 2021). Furthermore, many South Asian economies are among the most climate-vulnerable nations, with rising sea levels and flooding threatening the coastal states of India, Pakistan, Bangladesh and Sri Lanka, while landlocked countries, including Bhutan, Nepal and Afghanistan, face rising temperatures, drought and melting glaciers. Asian economies, including India, Afghanistan, Bangladesh, Myanmar, Cambodia and Pakistan, are among the bottom 50 of the most vulnerable countries in terms of their exposure, sensitivity and abil-

ity to adapt to the negative impact of climate change.[1]

Second, in EMDEs in Asia, capital markets are often at an earlier stage of development and tend to be bank-dominated, which has implications for financial vulnerabilities and the transmission mechanisms of environmental risks. The dominant role of bank lending also has implications for central banks' policy toolboxes with some relying on direct monetary policy instruments such as refinancing operations, and credit or interest rate ceilings or floors, which can also be used to support national economic development objectives.

Third, some central banks in Asia, and in EMDEs in general, have broader "developmental" mandates that extend beyond primary price and financial stability objectives (Dikau and Ryan-Collins 2017, Dikau and Volz 2021a). These central banks and supervisors are also responsible for achieving secondary objectives that support public policy priorities such as financial inclusion, consumer protection and broader economic development, as well as providing advisory support to their governments. Through supporting wider public policy priorities, some Asian central banks could therefore also feel comfortable and even mandated to address wider sustainability and transition efforts with some already tasked with incentivising the reallocation of financial flows towards sustainable sectors of the economy that enhance mitigation and adaptation efforts.

In terms of current practice in Asia, sustainable finance is emerging as a key issue with a growing number of monetary and financial authorities starting to consider how to integrate environmental considerations into their policy frameworks to address risks and encourage green finance. Durrani et al. (2020) find that the vast majority of Asia and Pacific central banks and supervisors believe they should play a key role in enhancing sustainable finance, whether through providing capacity building, setting the regulatory framework, encouraging green loans and products, or introducing climate change considerations into their operational frameworks. Despite considerable efforts by some, for most central banks and monetary authorities in Asia and the Pacific and beyond, climate risk and sustainable finance represent new areas in which they have little expertise argue Durrani et al. (2020).

[1] University of Notre Dame Global Adaptation Index: https://gain.nd.edu.

This chapter analyses the current role of Asian central banks as well as of financial supervisors in order to take into account the national differences concerning remits and financial policy roles in different jurisdictions between supervisors and central banks. The chapter focuses on South, East and Southeast Asia[2] and is structured as follows. Section 1 sheds light on the financial stability implications of environment-related financial risks, the policy and instrument calibration options, and the related prudential practice by Asian central banks and supervisors. Section 2 turns to the challenges of financing the sustainable transition and scaling up green finance to fund adaptation and mitigation efforts, and discusses policy implications and practice. The final section outlines lessons learned and the global policy implications.

3.1 Addressing financial stability implications of environmental risks

3.1.1 Environmental degradation and related risks in theory

The first and most well-accepted argument for the engagement of central banks and supervisors with environmental issues builds on the acknowledgement of the financial risk and stability implications of environmental risks (NGFS 2020b). Environmental risks are a broad category of risks encompassing different dimensions, such as climate- or biodiversity-loss-related risks.

Environmental risks are generally differentiated as transition and physical risks, which translate into different financial risk categories. Physical risks arise from, for example, the impact of extreme climatic events, the rise in sea levels or the losses of ecosystem services (NGFS 2019). Transition risks arise from the efforts, including policy, technological change, or shifts in investor or public sentiment and disruptive busi-

[2] Specifically, the empirical review focuses on East Asia (China, Hong Kong SAR, Macao, Japan, Mongolia, South Korea, Taiwan Province of China); South Asia (Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, Sri Lanka); and Southeast Asia (Brunei Darussalam, Cambodia, East Timor, Indonesia, Laos. Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam).

ness-model innovations, contributing to mitigating environmental and climate challenges (NGFS 2019).

A classic problem in environmental economics is the tragedy of the commons, which has also been applied to climate change as a "tragedy of the horizon" (Carney 2015). It describes how climate change will be felt beyond the traditional horizons of most actors and will impose a cost on future generations that the current generation has no direct incentive to fix (Carney 2015). Importantly, the costs may occur beyond the business cycle and the horizon of technocratic authorities, like central banks, who are bound by their mandates. There is hence a need for policy to address the lack of incentives by market participants to limit financial risks that will affect future market participants and society. Since the financial system, aided by central banks, plays a key role in providing credit and investment capital for the economy, there could be a role for supervisors in mitigating the adverse effects of environmental degradation and climate change related risks by incorporating sustainability factors into risk management and governance frameworks.

3.1.2 The prudential policy toolbox of central banks in Asia

In order to address environmental risks, central banks and supervisors have a number of options, many of which have been tested in Asia. This section is informed by their practice and focuses on the instruments that are currently used or discussed as particularly relevant in the region.

A first step for central banks and supervisors in Asia often lies in enhancing the "financial architecture" to enable the identification, assessment and classification of relevant environmental risks, as well as impacts and dependencies. On the microprudential level, regulation and supervision can be used to address the relevant risks for individual financial institutions by, for example, requiring banks and other financial institutions to adopt ESG risk management standards, to assess and disclose climate-related risks, or to adjust asset holdings. In the macroprudential dimension, policy is concerned with the systemic risk implications affecting the financial system as a whole by, for example, requiring banks, especially systemically important financial institutions (SIFIs), to build up additional buffers against systemic

risks (e.g., countercyclical and higher capital buffers).

Based on theoretical considerations, and reflecting the current policy efforts in Asia to address environmental risks (Table 1), a number of policy options emerge as relevant for central banks and supervisors beyond Asia and across developing, emerging and advanced economies:

a) Options for building the enabling financial architecture to mitigate risks

Financial and economic stability assessments. With the aim of creating the empirical evidence base for prudential policy, many central banks and supervisors in Asia are conducting financial stability assessments and are undertaking internal research to investigate environmental risks, initially focusing on climate-related risks, but increasingly expanding their focus to biodiversity-loss-related risks (NGFS and INSPIRE 2021). Financial institutions also conduct environmental impact and risk assessments of their investment, lending and insurance underwriting activities (NGFS 2020c). System-wide and individual assessments can reinforce each other along the way by providing initial empirical findings and helping identify methodologies and metrics to enable the deployment of relevant policy instruments.

Financial sector capacity building and awareness raising. Policymakers in Asia also play a role in strengthening the awareness of the materiality of environmental risks in the financial sector through outreach, communications and financial sector capacity building efforts to elevate the skills and tools needed to identify, monitor and manage the relevant risks.

Policy strategies, remits and missions. Many Asian central banks and supervisors, often together with their governments, have developed and launched green finance policy strategies and agendas to highlight risks and the transition or adaptation implications for the financial system. In the process of clarifying financial sector expectations, central bank remits and mission statements can also be clarified concerning the role of the authorities in addressing environmental issues.

Classifications, standards and taxonomies. The development of classifications, standards and taxonomies to identify sustainable economic activities and related assets has been an increasing focus for financial policymakers. In Asia, this process has often been led by central banks. In

this context, the need for "non-green" taxonomies that identify high-risk and high-polluting sectors that are subject to transition risks can also be discussed. The inclusion of a broader nature dimension, such as biodiversity loss, has also emerged as a central element of efforts to include the assessment of broader environmental factors in addition to climate change impacts.

Disclosure frameworks and supervisory reporting. Some financial supervisors in Asia are beginning to expect financial institutions to disclose information on the environmental risks they are exposed to, often starting with climate change risks. Disclosure guidelines or requirements can also play a key role in gathering sufficient data and creating a basis for a wider impact and risk assessments, such as stress testing and scenario analysis. An emerging debate on disclosures relates to the integration of biodiversity loss and conservation considerations into financial institutions' business decisions for investments, lending and insurance underwriting.

Indicators, metrics and data gaps. Identifying data gaps and developing the relevant indicators and metrics and is a key step for building financial architecture that addresses environmental degradation. Central banks and supervisors in Asia already play a role in assessing the suitability of specified measurement approaches in different contexts. Statistical departments of central banks and supervisory authorities can play a role in collecting data and developing indicators for environmental risk, ultimately informing the creation of dashboards of environmental metrics to assess the state of degradation.

Scenario analysis and stress testing. Because environmental and climate-related risks will manifest in the future, it is important to assess the financial implications of these risks in a forward-looking manner, including via stress testing and scenario analysis (Allen et al. 2020, Battiston et al. 2017). Building on the financial architecture, central banks in Asia are beginning to employ climate stress tests to measure ways in which climate change will affect the financial system, both globally and on a country-by-country level, and to inform the setting of micro- and macroprudential policy.

b) Options for microprudential policy instruments

Financial supervisors in Asia have started to assess the option of using microprudential policy to address environmental risk under the Basel pillars of banking supervision and equivalent standards of insurance supervision. The publication of (voluntary) supervisory guidelines has been the starting point for some Asian central banks and supervisors with the aim of encouraging financial institutions to develop frameworks to monitor and disclose environment-related risks, including the impact of their investments on the environment. Mandatory environmental risk disclosure frameworks for financial institutions are another important potential instrument in the prudential toolbox of central banks and supervisors. Often depending on the mandates and prudential frameworks in different jurisdictions, as well as on empirically establishing an environmental risk differential, environmental risks have been included in relevant microprudential instruments (NGFS 2020b) (e.g., capital or liquidity requirements) by some prudential policymakers in Asia.

c) Options for macroprudential policy instruments

Macroprudential regulation aims to mitigate systemic environmental risks that threaten the stability of the financial system as a whole (Schoenmaker et al., 2015). Environment- and climate-related stress tests can fulfil the task of assessing the potential impact on the economy, the health of individual financial institutions, and the financial system as a whole. Apart from enabling the evaluation of the resilience of the financial system to adverse shocks, climate-related stress tests are also necessary to calibrate macroprudential policy instruments and to allow for the incorporation of the identified vulnerabilities into capital buffers, risk weights and caps. Building on their understanding of the interconnectedness and contagion in the financial system and the systemic environmental risk for financial instability, first central banks and supervisors in Asia have started to consider including environmental risks in relevant macroprudential instruments.

3.1.3 The practice and current initiatives in Asia

In practice, central banks and supervisors in Asia have been active in developing the necessary financial architecture to enable the financial sector to address environmental risks, as well as to create the foundations for the employment of micro- and macroprudential instruments. Examples from practice are summarised in Table 1.

Table 1 | Examples of policies by central banks and supervisors in Asia addressing environmental risks

Examples of building the enabling financial architecture to mitigate risks	
Financial and economic stability assessments	Offering a starting point for the engagement with environmental risks, numerous Asian central banks have engaged in assessment activities.
Policy strategies, remits and missions	Many Asian central banks and supervisors have issued sustainable finance strategies, guidelines or roadmaps, including the State Bank of Vietnam (SBV), the Bank of Thailand (BoT), the Monetary Authority of Singapore (MAS), Central Bank of the Philippines, Central Bank of Sri Lanka, State Bank of Pakistan, Nepal Rastra Bank (NRB), Financial Supervisory Commission of the Republic of China (Taiwan), Mongolian Central Bank, Financial Services Agency (FSA) and the Bank of Japan (BoJ).
Disclosure frameworks and supervisory reporting	SBV issued Guidelines for Information Disclosure on Securities Market to require listed companies to report on their impacts on the environment and society in 2015. Securities and Exchange Commission of Thailand issued a Corporate Governance Code in 2017 to require sustainability reporting. Philippines Securities and Exchange Commission (SEC) issued Sustainability Reporting Guidelines for Publicly-Listed Companies in 2019. Securities and Exchange Board of India (SEBI) issued a circular implementing new sustainability-related reporting requirements for the top 1,000 listed companies in 2021. Japan Financial Services Agency (JFSA) and the Tokyo Stock Exchange require listed top-tier companies to disclose their climate change goals and strategies under a revised Corporate Governance Code.
Indicators, metrics and data gaps	n/a

Scenario analysis and stress testing	Asian central banks and supervisors have started using scenario analysis to conduct their own stress tests, including Bangko Sentral ng Pilipinas (Philippines), Hong Kong Monetary Authority, JFSA/ Bank of Japan, Monetary Authority of Singapore and the People's Bank of China (NGFS 2021).
Examples of microprudential policy	
Microprudential instruments	The PBoC has introduced a "Macro Prudential Assessment" (MPA) scoring system on banks' capital levels and risks with higher MPA score for higher holdings of green assets and to differentiate capital adequacy and liquidity requirements. Bank Bangladesh issued its Environmental Risk Management (ERM) Guidelines for Banks and Financial Institutions in 2011.
Examples of macroprudential policy	
Macroprudential instruments	n/a

Source: Compiled by author.

3.2 SCALING UP SUSTAINABLE MITIGATION AND ADAPTATION FINANCE

3.2.1 Scaling up sustainable finance, adaptation and mitigation in theory

Internationally, there are substantially different views on whether central banks and supervisors should play a role in supporting their countries' transition plans and adaptation or mitigation finance efforts. While many European central banks, as well as monetary institutions with strict inflation-focused mandates are hesitant to explore an explicit role in scaling up sustainable finance through positive incentives or penalties for unsustainable investment, some central banks across Asia are pioneering different, more activist options in practice.

An argument in favour of intervention into the allocation of credit to scale up green finance relates to the understanding of market failure. To achieve sustainable development objectives, investment will have to be directed away from carbon- and resource-intensive and socially harmful

investments, and toward sustainable investment. Environmental degradation, biodiversity loss and climate change can be seen as indicators of an environmentally unsustainable and socially sub-optimal allocation of resources and credit and of a lack of internalisation of negative externalities. In the absence of public intervention, financial institutions may allocate their resources to environmentally and socially undesirable activities, such as carbon-intensive or polluting ventures, in order to maximise their private returns. This discrepancy between environmental or social returns and private returns represents a market failure or imperfection that could theoretically call for efficiency-enhancing government intervention.

Ensuring that financial flows are aligned with transition targets is therefore a potential government and policy objective based on the understanding of the existence of an efficiency-enhancing role of government intervention through financial policy aiming at directing capital away from or restricting lending to some activities, and promoting investment in others. With regard to sustainable growth and green finance, externalities that cause an environmentally suboptimal allocation of capital by financial institutions has been interpreted by some as a call for a more active, market-correcting role of central banks.

However, this role traditionally lies outside of the strict financial and monetary stability mandates of many advanced economy central banks. Interventionist instruments also stand in strong contrast to the widely accepted notion of the "market neutrality" of monetary policy (Colesanti Senni and Monnin 2020). Furthermore, intervention can be associated with negative and distortive side-effects, especially if used in advanced financial markets. Historically, credit allocation policies and various other instruments of "financial repression" were widely used and led in many cases to substantial distortions of financial systems with often unwanted repercussions for savings and prices.

However, in some EMDEs in Asia, financial markets tend to be less prevalent and financial flows are dominated by banks and direct lending. In the absence of advanced financial markets, direct monetary policy instruments play an important role as potentially effective instruments to control credit. In the context of implementing the Paris Agreement and promoting sustainable finance, these controls-based financial policy frameworks that are already in place and used by Asian central banks

have been extended by some to include sustainability objectives. A few central banks in EMDEs in Asia have therefore resorted to these policies as viable, second-best solutions to promote sustainable development and green investment.

3.2.2 The scaling-up toolbox of central banks in Asia

The role that central banks play in Asia in scaling up green finance depends largely on their mandate, relationship with their government and historical "quasi-fiscal" engagement in supporting government development and policy objectives. Many Asian central banks are exploring the alignment of their existing promotional policy frameworks with new sustainability objectives. Historically comparatively widely used in Asia, the promotion of productive as opposed to unproductive investment in the process of economic development serves as an example for a situation in which central banks have often intervened based on a comparable rationale.

The objective of scaling-up policy initiatives thereby substantially differs across central banks. While some explore removing a proven "carbon bias" of an existing policy framework, others aim to support strategic renewable energy industries, mitigation or adaptation sectors, or to generally enhance the national net-zero transition plans (Robins et al. 2021). Central banks in Asia that already employ green credit allocation policies have often added the "green" component as an additional priority to existing and long-standing developmental credit allocation policy schemes.

In practice, scaling-up policy can take different shapes and forms in Asia, and prudential, as well as monetary policy frameworks can play a role in enhancing green finance and supporting transition finance. This can also lead to potential conflicts with the financial and monetary stability-focused primary aims of the policy frameworks.

First, the primary function of prudential frameworks is the identification and mitigation of financial risks. However, addressing environment-related financial risks by encouraging the financial sector to assess and disclose these risks with the aim of enabling the market to price them in could already lead to disinvestment and a scaling-down of financial flows to unsustainable, and therefore high-risk sectors. The risk-based

deployment of prudential instruments, such as capital requirements could, in addition to mitigating risks, therefore also aid the "greening" of financial flows. Nonetheless, some central banks and supervisors in Asia are also employing prudential instruments outside of a risk-based approach to penalise unsustainable or support sustainable investments through prudential instruments.

Second, the primary function of monetary policy is the stabilisation of the macroeconomy and inflationary pressures, which can be affected by the environment and climate change (Boneva et al. 2021). The response of monetary policy to inflation caused by, for example, climate change-related droughts, is not directly related to the incorporation of relevant factors in the calibration of the instruments themselves and relates instead to the augmentation of macro models to take environmental factors into account. In the context of safeguarding price stability, central banks are therefore primarily concerned with correctly analysing and predicting price changes and responding accordingly (NGFS 2020a, Schoenmaker 2021).

However, monetary policy instruments can also be used to more directly support sustainable finance. The following section focuses on how monetary policy frameworks and instruments are employed in Asia to not only remove a potential carbon bias from existing frameworks, but also to actively encourage, incentivise or force the financial sector to scale up sustainable finance.

Reflecting the efforts to scale up green finance in Asia (Table 2), a number of potential policy options emerge as relevant for central banks beyond Asia and across developing, emerging and advanced economies:

a) Options for instruments for scaling up sustainable finance

Collateral frameworks. By pricing-in environmental risks and applying the appropriate haircuts to account for these risks, or by strictly excluding asset classes that are not aligned with transition plans, collateral frameworks could theoretically be used by central banks to scale up sustainable finance (Oustry et al. 2020).

Refinancing operations. Prominently used by many Asian central banks, differential or preferential green-targeted refinancing lines offer refinancing for commercial banks at preferential terms for specified

green asset classes, thereby compensating or overcompensating financial institutions for lending at lower-than-market interest rates to low-carbon or otherwise sustainable projects. The instrument can be particularly effective in economies with bank-dominated economies in which the central banks' refinancing operations are a powerful tool.

Informal and credit or "window guidance". "Window guidance", also known as "moral suasion" or "jawboning", is a relatively informal policy instrument that uses benevolent compulsion to guide financial institutions to extend credit and allocate lending in line with official (government) targets (Geiger 2008). While window guidance originated in Japan, the instrument is in use today in Asia to promote green lending while discouraging investment in environmentally harmful activities (Dikau and Volz 2021a). Again, the instrument is particularly effective in bank-based financial systems.

Credit quotas and interest rate ceilings. Employed by a few central banks in Asia, mandatory minimum/maximum credit quotas/floors are fixed lending requirements that are set by the central bank to require commercial banks to allocate a fixed percentage of their loan portfolio to specified asset classes, sectors, industries, or geographical areas. Through green minimum credit quotas, for example, a central bank can require banks to lend at least a specified quota to fund green investments. Maximum credit ceilings could be utilised to restrict lending to carbon-intensive industries. In contrast to most policy instruments in use by central banks, the operating channel of credit quotas is not the creation of incentives for financial institutions to allocate their resources to preferred causes, but a mandatory and binding quota, which may potentially create severe market distortions. The administrative setting of interest rates by the central bank of commercial banks' lending rates with the aim of promoting green investment and curbing unsustainable lending is another heavy interventionist central banking tool that is not aimed at creating incentives, but instead targets the setting of lower rates for preferred sectors or higher rates for less preferred ones in order to reduce funding.

Asset purchase programmes and quantitative easing. A few central banks globally, among them the Bank of Japan (BoJ) as the only one in Asia, have engaged in large-scale asset purchase programmes (APPs) as part of quantitative easing efforts. Research has shown that the introduc-

tion of QE failed to take the environmental quality of asset purchases into account, resulting in an unintentional carbon bias and skewedness towards carbon-intensive industries in the corporate APPs of some central banks (Matikainen et al. 2017, Dafermos et al. 2020a, 2020b) or a high exposure to environmental risks (Asuka et al. 2022). While only relevant for the BoJ in Asia, the greening of APPs along with central bank balance sheets and monetary policy operations offer an option to not only reduce their own exposure to environmental risks, but to also aid the scaling up of green finance.

3.2.3 The practice and current initiatives in Asia

In practice, many central banks in Asia have played an active role in scaling up green finance, often playing a pioneering role in employing unconventional instruments to incentivise or guide financial flows to sustainable economic sectors and away from harmful activities.
Examples from practice are summarised in Table 2.

Table 2 | Examples of policies by central banks and supervisors in Asia to scale up sustainable finance

Examples of instruments for scaling up sustainable finance	
Collateral frameworks	The PBoC included green bonds in the pool of assets eligible as collateral for its Medium-Term Lending Facility, and given green financial bonds a "first-among-equals" status in 2018 (Macaire and Naef 2022).
Refinancing operations	Bangladesh Bank has compensated commercial banks at reduced interest rates for loans extended for sustainable investment projects from 2009 onwards (Bangladesh Bank 2017). The PBoC has offered green refinancing from 2016, allowing commercial banks to use green loans or bonds as collateral for borrowing at discounted rates (PBoC et al. 2016). The BoJ announced the "Climate Response Financing Operations" in 2021 as its preferential refinancing programme to provide long-term funds at a low interest rate to private financial institutions that are making efforts in terms of lending and investment to address climate change (BoJ 2021).

Informal and credit or "window guidance"	The China Banking Regulatory Commission, from at least 2006, and the PBoC from 2007 have included "green" targets in their window guidance policy to discourage lending to carbon-intensive and polluting industries and/or to increase support to sustainable activities (Dikau and Volz 2021b). The Royal Monetary Authority of Bhutan has introduced priority sector lending (PSL) guidelines towards the promotion of sustainable micro, small and medium enterprises (MSMEs) to support the window services of the government.
Credit quotas and interest rate ceilings	The Reserve Bank of India extended its PSL programme in 2015, under which it requires banks to allocate 40 per cent of their lending according to government priorities, to include lending for social infrastructure and renewable energy projects (Reserve Bank of India 2015). Bangladesh Bank requires banks and financial institutions to set at least 2 per cent and 15 per cent annual targets for eco-friendly financing and sustainable financing respectively.
Asset purchase programme and quantitative easing	n/a

Source: Compiled by author.

Conclusions and policy implications

Central banks and supervisors in Asia have been increasingly active in acknowledging and addressing environmental, climate change and biodiversity loss-related implications for financial policy. A number of institutions have emerged as exceptionally active in the context of addressing environmental risks, and as global pioneers concerning the scaling up of green finance.

First, through engagement, central banks and supervisors in Asia have begun to build the enabling financial architecture through financial and economic stability assessments, awareness raising, sustainable finance strategies, taxonomies, disclosure frameworks, metrics and scenario analysis. While these first steps propel some Asian central banks and supervisors far beyond the "acknowledgement and assessment" stage that many international central banks are at, it also provides them with the foundation for employing microprudential and macroprudential policy instruments to address relevant environmental risks.

Second, some financial policy institutions in Asia have been particularly active in scaling up green finance, at times resorting to innovative and unconventional policy instruments, which would be considered outside of the mandates and remits of many Western monetary and prudential institutions. Instruments for scaling up sustainable finance in line with national sustainability or transition targets in Asia include the greening of collateral frameworks, preferential refinancing operations, "window guidance", credit quotas and interest rate ceilings.

In terms of lessons and good practice, this active engagement by some Asian central banks in addressing environmental implications can be interpreted as indicative of an increasing acknowledgement in the region of the rationale for urgent policy adjustments in the face of significant vulnerabilities and the necessity to mitigate the worst impacts. Going beyond a purely risk-based approach, the assessments of adaptation finance requirements to reduce vulnerabilities and the translation of national transition commitments into financial mitigation policy highlights the crucial role of central banks in Asia as national policy institutions. A central lesson for other central banks in Asia and beyond is that monetary and prudential authorities in economies that are particularly vulnerable to climate change, environmental degradation or are highly dependent on disappearing ecosystems and biodiversity have to urgently act to assess and mitigate the threat to macroeconomic stability.

Through the dominant role that central banks play in Asia under sometimes significantly broader, and "developmental" or "quasi-fiscal" mandates, some financial policymakers have found themselves positioned at an ideal gateway to implement far-reaching policies to scale up sustainable financial flows in their economies. A broader lesson on good practice for other central banks is that existing mandates and policy instruments often provide ample room to address and mitigate environmental implications. For examples, some central banks in Asia have established instruments to support specific economic growth or development policies of their governments. These instruments can be reassessed and calibrated to take environmental adaptation and mitigation objectives into account, as practiced by some central banks already.

However, significant capacity issues in financial markets as well as in EMDEs in Asian economies remain, and for most central banks and mone-

tary authorities in Asia, environmental considerations remain a relatively new area in which they need to build up capacities and knowledge.

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4.

How Are Central Banks in Africa Addressing Climate-related Risks and Supporting Mitigation and Adaptation Policies?

Rim Berahab and Afaf Zarkik

Beyond its multiple environmental, health and economic impacts, climate change is increasingly regarded as a source of financial risk (Elderson 2021). As the scope of analysis of climate risks for finance is broad, this chapter focuses specifically on the case of central banks (CBs). Admittedly, CBs are not the main actors in climate change prevention, since climate policy remains a government prerogative. Yet, at the joint 2019 annual meeting of the World Bank and the International Monetary Fund (IMF), climate change and the role of monetary policy featured prominently, reflecting the growing attention paid by CBs to this issue. In essence, CBs play a crucial role in ensuring economic and financial stability. They perform their traditional roles of setting monetary policy and in most cases of banking supervision, financial inclusion and oversight of payment systems. Since the global economic and financial crisis of 2008, CBs have expanded their toolkit to address risks to financial stability as well. More recently, in the wake of the Covid-19 pandemic, CBs have used a range of conventional and unconventional tools to ease monetary policy, support liquidity in key financial markets and maintain credit flows (IMF 2021).

Nevertheless, experience has shown that the mandates of CBs tend to be rigid over time. But today, change is impending given the increased risks posed by climate change and its unpredictability. In this respect, the European Central Bank (ECB) is taking the lead by incorporating climate

change considerations into its monetary policy strategy review that was completed in July 2021 (Schnabel 2021). But the scope of intervention by CBs to prevent climate risk and support mitigation and adaptation efforts remains a matter of debate, particularly in developing regions. This is the case in Africa, which is one of the continents most vulnerable to climate change and with limited adaptive capacity, even though it contributes very little to climate change. Given the potential implications of climate risks for monetary and financial stability, some African CBs are starting to explore measures to address climate risks and even support mitigation and adaptation policies where their mandate allows. While these initiatives are still scarce and assessing their effectiveness is premature, they send a signal that CBs should not be left on the sidelines of the climate change issue.

This chapter examines how African CBs are addressing climate risks and supporting mitigation and adaptation policies. Section 1 reviews the risks of climate change on monetary and financial stability, illustrating the case of Africa, and discusses the ongoing debates on CB intervention in climate policy. The second part provides a comparative analysis of the initiatives undertaken by selected African CBs in terms of the inclusion of climate change in their mandates. The final section presents the main findings and draws conclusions.

4.1 Central banks and climate risks: Increasingly recognised risks but limited scope for action

Numerous CBs are becoming increasingly concerned about the consequences of climate change. Understanding how climate shocks are transmitted to the monetary and financial sphere can provide a better understanding of the scope of actions by CBs. This would also help shed light on the initiatives taken by African CBs on these issues, discussed in the second section of this chapter.

Climate change and monetary policy

The literature on the impacts of climate change on monetary stability is still nascent. Yet experts believe that climate shocks are likely to af-

fect monetary policy through supply and demand shocks (Bolton et al. 2020).[1] While the extent of such shocks is not substantially documented, few studies on inflation indicate that food prices tend to increase in the short run following natural disasters and extreme weather events (Parker 2018, Heinen et al. 2018, Debelle 2019). This is currently the case in the West African Monetary Union (WAMU) for instance, where prices of food products imported by WAMU countries[2] are projected to rise by 14.1 per cent in 2021 in connection with unfavourable weather conditions and significant demand from China (BCEAO 2021b). However, the medium- to long-term effects on inflation are unclear, in part because supply and demand climate shocks can pull inflation and output in opposite directions (Debelle 2019).

Moreover, the irreversibility of some climate impacts poses at least three new challenges for monetary policy (Olovsson 2018). The longevity of climate change may lead to stagflationary[3] supply shocks that monetary policy may be unable to fully reverse (Villeroy de Galhau 2019). Moreover, because climate change is a global problem that requires a global solution, it seems complicated to coordinate monetary policy across countries (Pereira da Silva 2019). Also, it is arduous to determine whether CBs would be able to take preventive measures to hedge *ex ante* against climate risks (Cœuré 2018). These reflections indicate that there is still no consensus on including climate risks in monetary policy and that more research is needed in this area.

Climate change and financial stability

The literature on the impact of climate change on financial stability and banking supervision is much more extensive. As the disruptive impacts of climate change on the financial system become progressively clear, some

[1] On the supply side, agricultural and energy supplies are subject to increased volatility due to climate change-related shocks. These supply shocks can reduce the productive capacity of economies, leading to reduced production (Batten 2018, McKibbin et al. 2017). On the demand side, climate shocks can reduce household wealth and consumption, while climate mitigation policies can cut back investment in some sectors.

[2] Benin, Burkina, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo.

[3] "Stagflation" is a situation in which the inflation rate is high, the economic growth rate slows and unemployment remains steadily high.

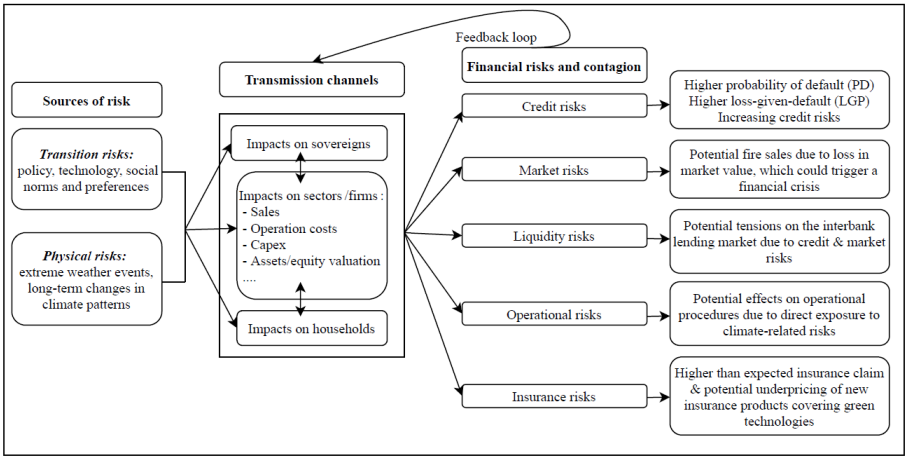
CBs, regulators and supervisors are beginning to take steps to integrate climate-related risks into their supervisory practices. According to the literature, climate risks can impact the stability of the financial sector through two main channels:

Physical risks refer to "risks that arise from the interaction of climate-related hazards with the vulnerability of exposure of human and natural systems, including their ability to adapt" (Batten et al. 2016). They represent the economic costs and financial losses due to the increasing frequency and severity of global warming and extreme weather events.

Transition risks reflect "the uncertain financial impacts that could result from a rapid low-carbon transition, including policy changes, reputational impacts, technological breakthroughs or limitations, and shifts in market preferences and social norms" (Bolton et al. 2020: 18).

Physical and transition risks are interconnected and can change over time. Thus, they must be analysed in the same framework, as they both increase financial risk in five main ways, as shown in Figure 1 (French DG Treasury 2017).

Figure 1 | Channels and spillovers for the materialisation of physical and transition risks



Source: Adapted from French DG Treasury (2017), Bolton et al. (2020): 20.

Furthermore, the exposure of financial institutions to physical risks may cause contagion and asset devaluations spreading over the entire financial system (Bolton et al. 2020). Concurrently, a "too rapid" transition towards a low-carbon economy can create substantial stranded assets, impact the value-added of other economic sectors dependent on fossil fuels and adversely disrupt financial stability.

This is particularly relevant for Africa, where the physical risks of climate change are already escalating. Devastating cyclones affected 3 million people (about the population of Berlin) in Mozambique, Malawi and Zimbabwe in spring 2018 (Yarnell and Cone 2019), while droughts in Africa nearly tripled in 2010–19 compared to 1970–79 (World Bank 2021). In addition, the GDP exposure of vulnerable African nations to extreme weather patterns is projected to increase from 895 billion US dollars in 2018 to about 1.4 trillion in 2023 (Dahir 2018). In addition, Africa faces transition risk, as it includes many oil and gas producing nations, particularly around the Gulf of Guinea and in North Africa. These regions are at increased risk of stranded assets if the transition at the national and regional levels is not properly managed. This raises the question of how African economies, and in particular CBs, should manage these risks.

Should central banks integrate climate risks in their prerogatives?

Only recently have some CBs begun to consider aligning their approaches with climate commitments. According to the literature, CBs can pursue diverse measures to address climate change risks. These measures can be classified as: (i) monetary or macroprudential;[4] (ii) regulation/supervision or microprudential; or (iii) leading by example and other functions such as research and capacity building.

The first category, monetary and macroprudential, involves CBs shifting their portfolios towards green assets, or asset purchase programmes that address carbon bias in the portfolios of CBs. Additional measures include quantitative easing (QE), accepting sustainability-linked bonds as collateral as in the case of the ECB, or pursuing lending facilities and open market operations, such as green targeted lending programmes. CBs can also incor-

[4] Once it has been established that climate change considerations are in line with the central banks' mandate.

porate climate-related risks into macroprudential regulatory frameworks by developing better models and staff forecasting that incorporate climate variables in macro-modelling[5] (Hansen 2022). The second category, regulation/supervision or microprudential measures, consists of climate stress testing,[6] along with supervisory and disclosure measures (microprudential policy) to better guard against climate risks in the short and medium term. Finally, CBs can choose to lead by example, either by embracing corporate social responsibility,[7] or by the sustainable management of their portfolio/reserves by integrating environmental, social and governance (ESG) policies, using negative screening strategies and sustainable investment.

CB intervention in long-term sustainability issues is not without criticism, as it is sometimes viewed as a second-best option to other government measures such as fiscal policy and taxation. In addition, some banks may have a relatively narrow interpretation of their mandate to be able to address climate change issues, while in other cases, pursuing a more direct climate change policy may require the CB charters to be amended, which may be perceived as an overstepping of their authority.[8] Moreover, the issue of CB "market neutrality" is often raised, especially when it comes to green QE programmes (OMFIF and MAZARS 2020, Baranović et al. 2021). Accounting for the impact of climate change raises another challenge for CBs pertaining to the unique characteristics of climate risk, namely: (i) the forward-looking nature of climate change financial risk rather than the usual backward-looking models that rely on historical data; (ii) its characteristic of nonlinearity, i.e., the uncertainty of how climate change events will manifest themselves over different time horizons and economic cycles. Investing in building more innovative quantitative models that explore how climate change could jeopardise financial stability is a laudable endeavour (Bolton et al. 2020). However, changing CB quantitative models may require a fundamental revision of the Basel framework (Ferrari et al. 2020).

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[5] That is, building quantitative models of so-called "systemic risk".

[6] "Climate stress test" refers to analysing the resilience of banks' portfolios to extreme volatility changes caused by climate change.

[7] For example, disclosing the carbon footprint of their own operations, upgrading the energy efficiency of their buildings, reporting on the carbon footprint of their activities.

[8] This is generally the case for monetary policy, where the prevailing rationale is that central banks' monetary responsibilities should play only an ancillary role.

With climate change being a critical concern in Africa, there is growing awareness of climate risks among African CBs. However, given that African CB resources are often already stretched to meet current monetary and financial stability challenges, which are further exacerbated by the Covid-19 pandemic, African CBs are likely to be under intense pressure to support their countries in dealing with climate these risks (Bradlow 2021). Based on the evidence presented in this section, the following section reviews the measures taken by selected African CBs to address climate-related risks.

4.2 African benchmark: How are African central banks including climate-related risks in their actions?

The effects of climate change on African economies and financial systems are more real than hypothetical. Climate change-related risks are increasingly part of systemic risks and need to be managed. Are African CBs able to cope with this recently extended mandate or will they remain stuck in their traditional roles? Today Africa has 41 CBs, which display strong monetary heterogeneity. A sample of eight CBs was selected from sparse areas of the continent (Northern, Western, Eastern and Southern), with differing political structures, natural resource endowment, history, culture, and so on, to examine the extent to which African CBs address climate-related risks and support sustainable finance.

Egypt

The Central Bank of Egypt (CBE) oversees the banking sector, whereas the Financial Regulatory Authority (FRA) is the regulator and supervisor of the non-banking sector, financial markets and instruments. The CBE's primary objective is to achieve price stability and banking system soundness, within the context of the general economic policy of the state. While the CBE's mandate does not include an explicit objective for the promotion of sustainable economic growth, it promotes climate mitigation and adaptation through banking supervision and sustainable finance. In 2018, the CBE, in close coordination with the Union of Arab Banks (UAB) and the Federation of Egyptian Banks (FEB), held a green banking forum

to highlight the importance of aligning the financial sector with ESG considerations. In 2021, the CBE issued voluntary guiding principles on sustainable finance, which aim to reinforce the development efforts and the national plans to achieve a sustainable growth in all areas and to secure the finance required for projects that contribute to achieving the sustainable development goals (CBE 2021). The CBE identifies six non-binding guiding principles (see Table 1).

Table 1 | The CBE six non-binding guiding principles on sustainable finance the CBE

Building the necessary apabilities and knowledge	Building and developing the capabilities of all bank employees and setting training plans that will contribute to building and enhancing their knowledge of the concepts and methods of applying sustainable finance.
Enhancing sustainable finance	Applying the concept of sustainable finance and working to integrate environmental and social elements and governance rules in the CB (and other banks) financing activities, as well as developing a conception of how to manage environmental and social risks considering the same when measuring the bank's risks.
Involvement of stakeholders	Enhancing cooperation with the ministries, government bodies and all stakeholders on the national and international level.
Managing climate risks	Laying the foundation for identifying and managing climate change risks, in addition to encouraging financing projects that contribute to addressing the issue of climate change.
Applying the principles of sustainability to the bank's internal activities and operations	Working on avoiding the negative environmental and social impacts resulting from the bank's activities and enhancing the positive environmental and social impact along with applying best corporate governance practices.
Reporting	Proceed in preparing periodic reports on the bank's activities in the field of sustainable finance.

Source: CBE (2021).

The FRA may follow suit in developing regulatory requirements for non-bank financial institutions, but nothing has been made official yet. Meanwhile, the FRA issued in July 2021 resolution No. 107 and 108, "which lay out the sustainability disclosure requirements to be applied from the 2022 financial year onwards" (AfDB 2021: 24). As a result, companies listed on the Egyptian Exchange and non-bank financial services companies with issued capital/net equity of at least 100 million Egyptian pounds will be required to make ESG disclosure, while those over 500 million will be required to make additional disclosures aligned with the Task Force on Climate-Related Financial Disclosures (TCFD). The FRA also launched the Regional Center for Sustainable Finance focusing on Egypt, the Middle East, and Africa.

Furthermore, since the CBE already tends to guide lending activities,[9] it has partnered with the International Finance Corporation (IFC) on the 30 by 30 Zero programme, which aims to help the banking sector increase climate-related lending by 30 per cent and reduce exposure to coal-related projects to zero by 2030 (Furness 2021). While there is no mandatory target yet for Egypt, the CBE and IFC are working to start raising awareness, before eventually agreeing on a specific target. Besides the Central Bank of Egypt, two major Egyptian banks, the Arab African International Bank (AAIB) and the Commercial International Bank (CIB), are involved in fostering a culture of sustainable finance in Egypt (UNEP 2021).

Kenya

The Central Bank of Kenya (CBK) supervises and regulates Kenya's financial sector, while the Capital Markets Authority (CMA) supervises the capital markets and the Nairobi Security Exchange. The CBK's primary objective is price stability, and its mandate is not charged with an explicit objective for the promotion of sustainable economic growth or development. However, extreme climatic events have posed a significant risk to regions in Kenya, making it one of the most disaster-prone countries in the world and increasing the vulnerability of its banking sector to cli-

[9] Earlier this year, the CBE asked banks to increase the share of their financing to small- and medium-sized businesses from 20 to 25 per cent by the end of 2022, after setting a 20 per cent target in 2016.

mate-related financial risks. As a response, the CBK and players in the Kenyan banking sector have taken some steps that recognise the potential impact of climate risk:

In 2013, the CBK introduced the Internal Capital Adequacy Assessment Process (ICAAP) for the banking sector, which includes climate risk among the risks banks are exposed to.

In 2015, the Kenya Bankers Association (KBA) issued the KBA Sustainable Finance (SFI) Guiding Principles that guided banks to create long-term value for their clients, firm, economy and the environment (CBK 2021).

More recently, in October 2021, the CBK issued Guidance on Climate-Related Risk Management for the banking sector, in recognition of the challenges and opportunities presented by climate change to the global economy. The aim of the Guidance is to sensitise the banking sector on mitigation of climate-related risks and harnessing of opportunities. It also offers guidance, that financial institutions should consider adopting, on the development and implementation of appropriate climate-related strategies and policies into their existing financial risk management practice (CBK 2021).

The CBK Guidance on Climate-Related Risk Management offers a roadmap for its implementation: (i) January to March 2022 marks the period of familiarising bank staff with climate change risk management; (ii) June 2022, banks should submit their implementation plans, which would need to be updated quarterly since September 2022; (iii) starting from 2023, banks should disclose climate-related information to enhance transparency benchmarked to the TCFD Framework.

Mauritius

The Bank of Mauritius (BoM) is mandated to ensure "the stability and soundness of the financial system of Mauritius". Its primary objective is to maintain price stability and to promote orderly and balanced economic development. The BoM recognises that climate-related and environmental risks can have important economic consequences that may pose risks to the safety and soundness of financial institutions and hence the stability of the financial system (Sewraj-Gopal 2021). The BoM has made impressive breakthroughs in this topic and undertook a methodical approach towards instating the current *supervisory and disclosure initiatives* starting from

early 2020, with the aim to *complement it with monetary policy by 2023*.

In January 2020, the BoM conducted a survey among banks to ascertain their level of preparedness in respect of climate-related risks; in July 2020, the BoM joined the Network for Greening the Financial System (NGFS); in June 2021, the BoM released a "Guide for the Issue of Sustainable Bonds"; in September 2021, the BoM issued a draft Guideline on Climate-related and Environmental Financial Risk Management to banks and non-bank deposit-taking institutions for consultation; on 14 October 2021, the BoM launched its Climate Change Centre (CCC), a vital arm of the BoM in managing climate-related risks; and finally on 3 November 2021, during COP26, the BoM published its climate change pledge (BoM 2021). The goal is the full implementation of the framework and the public release of disclosures by the 30 June 2023.

It is worth stopping at the workings of CCC, as it is a unique initiative and an African example in managing climate-related financial risks at CB level. This separate arm of the BoM has better chances of reaching its goals efficiently given its comprehensive set of roles and objective which group, inter alia: regulation, supervision, research, support, capacity building etc. The CCC's model organisation is also worth mentioning. It functions as one main committee, under the chairmanship of the Second Deputy Governor of the Bank, with four task forces: (1) the task force on regulation and supervision; (2) the task force on monetary policy assesses; (3) the task force on sustainable finance; (4) the task force on internal strategy.

Morocco

Morocco's banking system is regulated by the Central Bank, Bank Al-Maghrib (BKAM), while the non-banking financial system is regulated by the Moroccan Capital Market Authority (AMMC). BKAM's primary objective is price stability. But, without prejudice to the latter, the bank performs its functions in the framework of the government's economic and financial policy. Aware that the financial sector has a key role to play in addressing climate change and concerned about the threats posed by climate risks to financial stability, BKAM has made greening the financial system one of its priorities.

Since 2015, BKAM has been impact investing through green, social

and sustainable labelled bonds acquisition as part of its reserves management portfolio. In 2016, BKAM published a roadmap, in the margins of the COP22 held in Marrakech, aimed at aligning the Moroccan financial system with sustainable development goals aiming to support the achievement of the Paris Agreement. During the same year, the AMMC issued green bonds guidelines. Later in 2018, the AMMC launched the Green, Social, and Sustainability Bonds Guidelines. BKAM also embraces corporate social responsibility (CSR) and publishes an annual CSR report.

In 2019, BKAM created a Green Finance Unit, with the aim of risk assessment, international work, mitigation actions and roadmap coordination. The Unit is being supported by an internal task force dedicated to green/climate finance issues including prudential regulation specialists (Mouhaouri 2020). However, the specific instrument that will achieve these goals has not yet been made public. Furthermore, the year 2020 marked numerous initiatives by the BKAM. The bank adopted sustainable and responsible investment practices by formally including sustainability considerations in its foreign exchange reserves investment policy. It also participated in the Bank for International Settlements (BIS) intersectoral meeting on climate risk assessment and supervision (BKAM 2020). Moreover, it actively contributed to the NGFS. In particular, the bank has been involved in work on microprudential supervision practices for climate and environmental risks and methodologies for analysing these risks by financial institutions. BKAM was appointed to co-chair a working group under the Alliance for Financial Inclusion (AFI) to address inclusive green finance.

More recently, in 2021, BKAM published a directive for credit institutions to take climate issues into account in their operation and to put adequate systems in place to measure and mitigate their exposure to climate risks (BKAM 2021). This project is a strong signal from BKAM to the banking sector and clarifies its expectations in this area and aims at boosting the efforts undertaken by the banking sector in the development of green finance. The above-mentioned draft directive covers four areas relating to strategy and governance: the management of financial risks linked to climate change and the environment; training; awareness; and communication and reporting. BKAM is also working, with the World Bank, to assess the sectoral climate risks incurred by the Moroccan banking system, set up a system for supervising these risks within the bank,

and strengthen the capacities of the banking ecosystem in this area.

In the coming years, BKAM intends to carry out a series of actions under a new roadmap for the financial system which will be adopted in partnership with the stakeholders involved, including: (i) issuing guidelines to the banking sector for conducting stress tests and reporting on climate-related risks; (ii) conducting assessments of the banking sector's exposure to climate-related financial risks; (iii) contributing to the capacity building of banking and financial actors in the area of climate risk management; (iv) supporting the development of green loans and other financial products; (v) strengthening sustainable investment practices; (vi) integrating environmental, social and governance (ESG) factors into the risk management framework for foreign exchange reserves (BKAM 2021).

Nigeria

The Central Bank of Nigeria (CBN) is the monetary authority of the country: it supervises and regulates banks and other financial institutions. The core mandate of the CBN as spelt out in the CBN Act of 1958 include: (i) issuance of legal tender currency; (ii) banker and financial adviser to the Federal Government; (iii) lender of last resort to banks; (iv) maintenance of external reserves to safeguard the international value of the currency; (v) promotion of monetary stability and a sound and efficient financial system. The CBN's mandate does not explicitly mention sustainability, but it has in practice embraced sustainable banking since 2012 when it joined the Sustainable Banking and Finance Network (SBFN) and published and adopted along with the Nigerian Bankers' Committee the Nigeria Sustainable Banking Principles (NSBP), whose application by banks is binding.

Although the application of the NSBP by banks is binding and while the Committee provides guidelines, the principles are left to be interpreted and applied by each bank in a manner that fits it. It is left at the prerogative of the individual banks to define and establish their sustainable banking approach, systems, capacity building and implementation.

Furthermore, the CBN and the private sector of the banking industry have established a group, Sustainability Champions, which plays a capacity-building role and banks are invited every quarter to facilitate training

sessions on climate risks for banks. The CBN is not mandated to support the government's policy priorities; however, it seems appropriate to mention that the country does have a national adaptation strategy and plan of action for climate change, which started in 2011, and in 2013 the "National Policy on Climate Change" became the principal document for climate activities in Nigeria.

South Africa

The South African Reserve Bank (SARB) independently[10] oversees monetary policy. Its primary mandate is to achieve and maintain price stability using an inflation-targeting framework. Its mandate includes an explicit objective for the promotion of sustainable economic growth: SARB primary mandate, enshrined in the constitution, is "to achieve and maintain price stability" – this protects the value of the currency "in the interest of balanced and sustainable economic growth" and contributes to the stability of the financial system." (SARB 2021a: 1).

From a financial stability as well as a safety and soundness perspective, climate-related financial risk and its potential impact on financial institutions fall within the supervisory and regulatory remit of the Prudential Authority (PA), which operates under the SARB, and regulates and supervises the financial sector (both non-financial and financial institutions).

The PA recognises climate risk as a risk to financial stability (it was cited as one of the main risks to financial stability in the annual report of the SARB in 2020–21) and is working on a set of regulations expected to be enforced within the next three years. Sustainable finance is included in the set of key priorities of the PA in 2021 (SARB 2021b).

Among the performance highlights of the SARB is sustainable finance, including climate change in 2020/2021: (i) the SARB continued to participate in discussions on sustainability and climate change through the PA's membership in the Sustainable Insurance Forum, Basel Committee

[10] The independence and autonomy of the SARB are entrenched in the constitution. However, the Governor of the Bank holds regular discussions with the Minister of Finance and meets periodically with members of the Parliamentary Portfolio and Select Committees on Finance. The Bank publishes a monthly statement of its assets and liabilities and submits its annual report to Parliament. The Bank is therefore ultimately accountable to Parliament.

on Banking Supervision (BCBS) and the Network of Central Banks and Supervisors for Greening the Financial System; (ii) it established the PA Climate Think Tank to coordinate activities with the National Treasury on its technical paper "Financing a sustainable economy" published in May 2020, which formulates a list of recommendations for financial sector regulators and supervisors, assisting their assessments of sustainable finance and climate risk; (iii) the PA distributed two mandatory surveys to all registered banks, mutual banks, insurers and financial market infrastructure in 2019 and recently in May 2021 on TCFD disclosures (SARB 2021b). The survey results together with the PA's research on climate risk will inform its overall risk assessments of financial institutions. Furthermore, the SARB conducted a physical climate risk exercise using a bottom-up approach.[11]

Tanzania

The Bank of Tanzania (BoT) is the financial authority and the integrated regulator of all financial institutions in the country. The BoT's primary objective is price stability with a nominal anchor of monetary aggregate test and is charged with mandates that include an explicit objective for the support of "sustainable" economic growth. (1) "The primary objective of the Bank […] is to formulate, define and implement monetary policy directed to the economic objective of maintaining domestic price stability conducive to a balanced and sustainable growth of the national economy" (BoT 2020: vi).

According to the BoT's latest annual report spanning the year ending June 2020, the BoT monitors the impact of its operations on the environ-

[11] Bottom-up approaches involve financial institutions directly and top-down approaches are conducted entirely by the financial authority. Each approach has its distinct merits. Bottom-up approaches have a number of benefits: they allow financial authorities to gain insight into institutions' own methods and abilities to analyse climate-related risks; improve institutions' capabilities to perform climate scenario analysis; foster data collection within institutions; and increase awareness of economic and financial implications of climate-related risks. On the other hand, benefits of top-down approaches include: ensuring a consistent methodology across financial institutions; room for sensitivity analysis as assumptions and parameters can be easily adjusted; and a lower resource cost. In practice, approaches vary considerably, and sometimes elements of bottom-up and top-down exercises are combined.

ment which is more in the realm of CSR, with regards to "power, water and the generation of waste. The Bank minimises the impact through better use of its premises and inbuilt facilities to ensure that there is proper waste management" (BoT 2020: 66).

The BoT is also mandated to support the economic policies of the government: (2) without prejudice to subsection (1), the Bank shall "ensure the integrity of the financial system, support the general economic policy of the Government, and promote sound monetary, credit and banking conditions conducive to the development of the national economy" (BoT 2020: 52). Prior to 2015, Tanzania developed a diverse policy infrastructure, governing various environmental and climate-related issues in order address climate change-related risks. However, the 2015 elections brought about a renewed focus by the government on industrialisation, based on fossil fuels (Nachmany 2018). So far, the BoT seems to not be explicitly addressing climate-related risks.

West African Monetary Union

The Banque Centrale des Etats d'Afrique de l'Ouest (BCEAO) issues the WAMU's single monetary unit, the African Financial Community franc (CFA Franc), manages the monetary policy, whose objective is price stability, ensures supervision of banking activities, and supports member states. The BCEAO's mandate includes an explicit objective for the promotion of sustainable economic growth, as it states that without prejudice to the objective of price stability, the BCEAO supports the economic policies of the WAMU with a view to achieving sound and sustainable growth. The BCEAO also recognises the upside risks to the inflation outlook from climate change impacts, which would exacerbate the rise in food prices by affecting local cereal production and disrupting distribution channels for certain products (BCEAO 2020). Yet the inclusion of sustainability in the BCEAO mandate related to monetary policy remains a vague statement, as no explicit measures have been implemented.

So far, the activities of the BCEAO linked to addressing climate-related risks are linked to green finance. The BCEAO is part of the AFI and in 2020 it participated actively in the meetings of the AFI's bodies that covered specific themes, including inclusive green finance. Following these meet-

ings, the BCEAO and the AFI organised, in 2021, training on this specific issue to build BCEAO staff capacity regarding "policy development and initiatives on climate change and environmental degradation, the concept of inclusive green finance, the role of financial regulation and financial institutions in supporting resilience building and mitigating the impacts of climate change in the region" (AFI 2021).

Climate-related risks being a new concern for the WAMU, there is not enough evidence to assess the BCEAO's commitment to dealing with climate risks. What is clear, however, is that the BCEAO is acting more through its supervisory functions by setting standards for green finance. Addressing climate appears to be more espoused by the West African Development Bank, which was encouraged by heads of state and government of the WAMU during their 22nd ordinary session on March 2021, to intensify its actions to strengthen economies' resilience to climate change and improve the living conditions of vulnerable populations (BCEAO 2021a).

4.3 Main findings and conclusions

The mandates of selected African CBs and their primary objectives were probed, to check whether they are equipped with complementary objectives that task them with managing climate risk. The current arrangements were then compared with sustainability-related policies that CBs have adopted in practice. It should be highlighted that embracing "corporate social responsibility" or "sustainable banking" or "green finance" is different from "accepting climate change as a source of financial risk" as the distinction is quite nuanced.

The adherence of the selected CBs to different networks was also examined, with a special emphasis on the NGFS. This is crucial since all CBs that are members of the NGFS have explicitly accepted climate change as a source of financial risk and have hence concluded that ensuring the financial system's resilience towards these risks lies within their mandates or the mandates of the financial supervisory authority. As of 15 December 2021, the NGFS consists of 105 members, of which eight are African CBs and regulatory authorities, namely the Bank of Ghana, the Bank of Mauritius, the Central Bank of Seychelles, the Central Bank of West African States, the Financial Regulatory Authority of Egypt, the Central Bank of

Tunisia, the South African Reserve Bank and the Central Bank of Morocco.

It was also important to examine the SBFN, since all its members are bound to move their financial sectors towards sustainability. The SBFN counts 68 members, of which four are CBs and four banking federations, associations and capital market authorities: the Central Bank of Egypt (a member since 2019) and the Federation of Egyptian Banks (2016); the Bank of Ghana (2016) and the Ghana association of bankers (2016); the Kenya Bankers Association; the Central Bank of Morocco (2014) and the Moroccan Capital Market Authority (2018); and the Central Bank of Nigeria (2012). A recent SBFN report assesses member countries' progress in terms of banking and financial sustainability, categorising them into three stages: preparation; implementation; and maturation. Four African countries from the benchmarking undertaken in Section 2, namely Kenya, Morocco, Nigeria and South Africa, are advancing into the implementation phase, while Egypt is developing in the same phase (SBFN 2021: 15).

This benchmark of the policy landscape reveals new and emerging policy practices that are guiding the transition to more resilient low-carbon African CBs (see Table 2).

Table 2 | Climate change policy landscape benchmark

	CB mandate includes sustainability or sustainable economic growth objective	CB recognises climate risk as financial risk	CB committed to moving financial sector towards sustainability	CB incorporates sustainable finance in its portfolio	CB embraces CSR
Egypt		×	×	×	×
Kenya		×	×	×	×
Mauritius		×	×	×	×
Morocco		×	×	×	×
Nigeria			×	×	×
South Africa	×	×	×	×	×
Tanzania	×		Not clear	Not clear	×
BCEAO	×	×	×	×	×

Source: Authors' summary.

Although this benchmark is by no means a representation of all African CBs, two preliminary observations can be drawn from it. First, most African CBs covered have already adopted green finance policies or guidelines, whether in the management of their own portfolios or in a more integrated approach by moving the banking sector towards sustainability. Corporate social responsibility has also been adopted across the board. The exception remains the Central Bank of Tanzania. Nigeria's sustainable banking principles, while binding, are quite dated and lenient. The second observation is that CBs that operate under a mandate that explicitly includes the promotion of sustainable growth or development as an objective do not necessarily recognise climate risk as financial risk, and vice versa.

We interpret this as follows: recognising climate risk as financial risk is more contentious for CBs, more so than promoting sustainability and "greening" the economy, not least because of the possibility of distorting effects that direct interventions into the market aimed at greening the economy might have, but also due to potential conflicts with the primary goal of African CBs (which for most economies is maintaining price stability). This begs the question of the role and available scope of action of CBs in climate change. Each country has the prerogative to determine the level of independence and mandate of its CB according to its preferred economic ideology and policy. Some CBs only tackle climate change when it affects price stability. In this case, climate change is just another factor affecting prices and so can be dealt with using "standard" CB policy tools. Conversely, other CBs are more open to taking climate impacts into account *ex ante* when they make monetary and financial stability policy decisions.

The strategy of tackling climate risk, when it is recognised, seems to be uniform. To date, none of the African CBs in our benchmark envisage climate change as a primary objective of their monetary policy. All the initiatives undertaken can be classified as microprudential and supervisory measures, in addition to the publication of various principles and guidelines for the banking sector and leading by example through embracing sustainable finance and CSR. These type of initiatives constitute a positive starting point in incentivising climate action, which other African CBS should emulate in light of their mandate. However, given that these measures are still very recent, it is premature at this stage to assess their

success, as we are yet to see their outcome. Moreover, the technical instruments to implement these measures are not made explicit by CBs yet. Thus, we believe it will be useful if CBs were to disclose exactly the means and tools to technically implement these policies. Not only that, we also believe it would be useful and opportune to take stock, in the future, of the growth made by countries whose CBs tackle climate risk *vs* those that do not. This study, although highly enlightening, also left us with a myriad of questions. The cases of Tanzania and to a lesser extent Nigeria elicit the question of the independence of CBs. Numerous CBs in our benchmark are mandated to support national policy objectives. To the extent that the government's policy objectives include climate change mitigation or adaptation, a change of mandate for these CBs to further support the mainstreaming of the financial system would not be required. But what happens when the government ties its growth to industrialisation and fossil fuels, like in Tanzania or Nigeria? Knowing that the implications of CB intervention in mitigating climate are not yet appraised given the nascent nature of this issue, how should CBs, especially those of developing countries, proceed? Can this shift in policies towards a green economy be at the expense of growth? Moreover, should other socio-economic challenges (education, inequality, corruption, etc.) also be a central concern of CBs and tied to their mandate? How can African CBs find a balance between the competing pressures of Covid, climate change and other socio-economic challenges?

Annex: Sustainable management of central bank reserves

The debate surrounding how environmental sustainability objectives might fit within CB reserve management frameworks traces back to the objectives for holding those reserves in the first place.

Traditionally, foreign exchange (FX) reserves serve certain economic uses and are matched against some metrics such as short-term foreign borrowing, trade imbalances, sudden interventions, etc. Additionally, CB frameworks for managing foreign reserves comprise balancing three objectives: liquidity; safety; and return (Fender et al. 2020).

Achieving the reserves' economic uses while pursuing their objectives

involves explicit trade-offs. For instance, emphasis on returns may require CBs to forgo some safety and liquidity of their holdings. Mapping the trade-offs between economic uses of reserves and reserve management objectives has been eloquently elaborated in a 7x3 matrix (Fender et al. 2020; see Table 3).

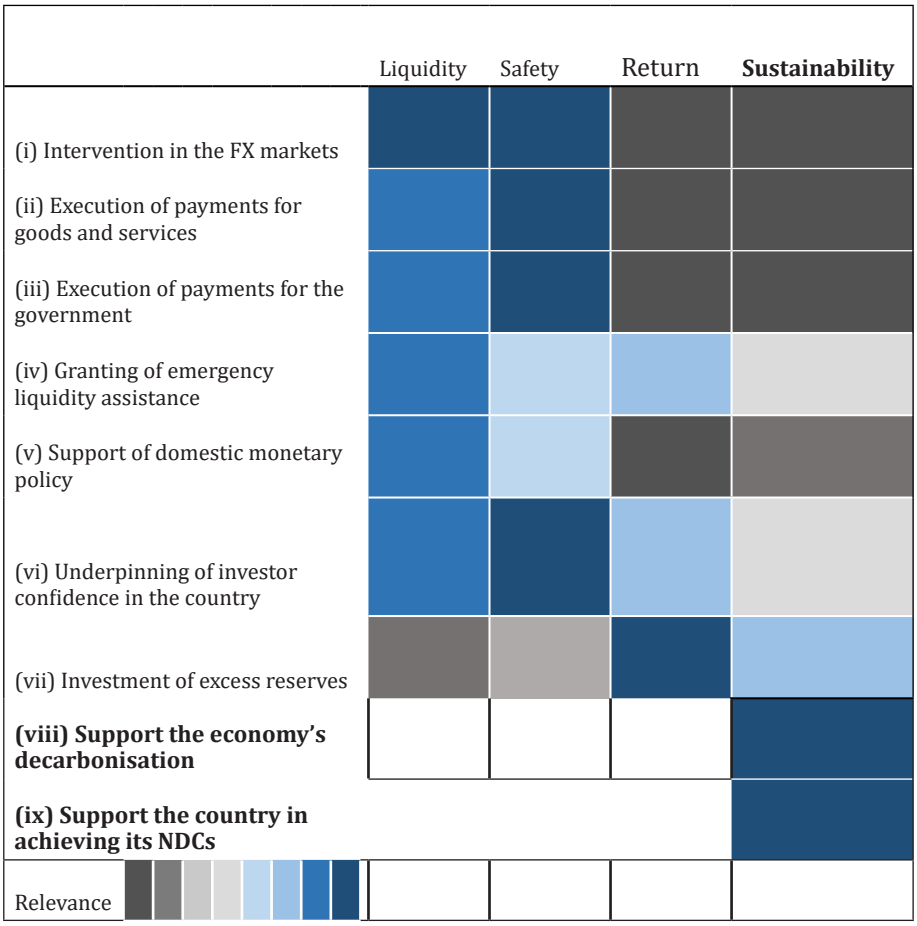
Hence, according to the same source, there are two – not mutually exclusive – ways for CBs to include sustainability into their FX reserve management process: explicit (as a new economic use); and implicit (as an objective) integration.

The application of any of these two approaches depends on governance considerations, particularly the mandate of the CBs. Explicit integration can be achieved by CBs that are able to specify sustainability as one of the policy purposes for holding reserves. This would entail adding one or more rows (marked in bold in Table 3), representing new economic uses of reserves to guide portfolio choice. Implicit integration involves introducing "sustainability" into the pursuit of reserve management objectives. This requires recognising the indirect ways in which sustainability (or the lack thereof) affects central banks' existing policy objectives. One key factor is risk management.

Among the instruments at the disposal of CBs for integrating sustainability in their reserve management (which are also coherent with one of their portfolios' core asset classes – fixed income) are green bonds. Concerning the greening of other financial capital of CBs, the CB can start incorporating climate change in its due diligence process for issuers when purchasing government or corporate bonds and equities. This might involve an assessment of transition risks, climate-related disclosures, carbon emissions and reduction targets.

Finally, an asset purchase programme targeted exclusively at green sectors would be labelled as "green quantitative easing" and would be classified under unconventional monetary policy. There remains to prove whether such policy is effective in reducing pollution while achieving welfare, which will require further research (Ferrari et al. 2020).

Table 3 | Mapping between economic uses of reserves (rows) and reserve management objectives (columns)



Source: Fender et al. (2020): 5.

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5.

Central Banks in Latin America: Actions for Sustainability, Including Mitigation and Adaptation Policies for Climate-Related Risks

Viviane Helena Torinelli and Serafín Martínez-Jaramillo[1]

As agreed at the World Economic Forum (2021), the most likely risks over the next ten years are related to environmental and climate risks, including climate action failure and human-led environmental damage, with material financial implications. These risks are relevant sources of economic and financial instabilities, not only due to the physical risks on the horizon, but also to the transition risks in the efforts to achieve a net-zero economy. This context calls for action from governmental authorities, regulators and central banks (CBs).

CBs are key in fostering the transition to a low-carbon economy and in addressing the management of climate risks, mainly by regulation, supervision, and monetary policy activities. In order to promote climate resilience against the possible next big crisis on the horizon, CBs are quickly increasing their knowledge of how to incorporate environmental, social and governance factors (ESG) – especially climate-related standards – into their duties and actions. When looking at CBs from different regions, Latin America stands out in the discussion in terms of relevance to the overall discussion. On the one hand, the region has the greatest diversity of ecosystems in the world (ECLAC and UNEP 2002: 73) and nearly one billion hectares of land covered by forests (Alves 2021). On the other hand, countries in Latin America face challenges to reach ESG global standards, as wildfires and expansion of mining put in danger one

[1] This chapter expresses academic and personal understandings, not institutional ones.

of the most precious sources of oxygen in the world. The matter becomes even more complex when dealing with huge social and economic gaps in the region.

5.1 International cooperation towards sustainability and climate-risk management

In order to address the common and specific challenges regarding sustainability, ESG factors and climate-risk management, CBs in Latin America have reached out to global networks and organisations, such as the Network of Central Banks and Supervisors for Greening the Financial System (NGFS), and they have joined specific initiatives in other organisations of CBs, such as the Bank for International Settlements (BIS) and the Center for Latin American Monetary Studies (CEMLA).

NGFS – The NGFS was founded in December 2017 during the One Planet Summit in Paris. On 15 December 2021, the NGFS consisted of 105 members and 16 observers in the five continents,[2] including 10 CBs of Latin America: Brazil, Mexico, Chile, Colombia, Uruguay, Paraguay, Peru, Argentina, Costa Rica, and the Dominican Republic. This growing organisation aims to reach the goals of the Paris Agreement by setting standards and best practices to be implemented within and outside the network. To do so, the network encourages CBs and supervisors to better understand how climate-related factors translate into financial risks and opportunities.

NGFS members have acknowledged that "climate-related risks are a source of financial risk. It is therefore within the mandates of central banks and supervisors to ensure the financial system is resilient to these risks" (NGFS 2019: 4). To support CBs in its actions, NGFS members are organised into lots of different working groups with an extensive production of more than ten reports a year.[3]

BIS – The BIS also plays a strategic role in the cooperation between CBs for promoting sustainability, with initiatives such as incentives to green investments to analysis and management of climate risks. BIS is also a member of the NGFS, and the membership contributes to the bank's purpose to promote the transition to a global sustainable economy.

[2] See NGFS website: *Membership*, https://www.ngfs.net/en/node/212000.

[3] See NGFS website: *NGFS Publications*, https://www.ngfs.net/en/node/217251.

The 63 CBs which are the owners of BIS account together for about 95 per cent of world GDP. In Latin America, BIS includes the CBs of Brazil, Mexico, Chile, Colombia, Argentina, and Peru. The mission of BIS is to support the pursuit by CBs of monetary and financial stability through international cooperation, and to act as a bank for CBs.

In this sense, BIS promoted and shared a report exploring how climate-related risk drivers can arise and affect both banks and the financial system via micro- and macroeconomic transmission channels (BCBS 2021a). The key findings of the report are: a) the "economic and financial market impacts of climate-related risks can vary according to geography, sector and economic and financial system development"; b) "traditional risk categories used by financial institutions and reflected in the Basel Framework (e.g. credit risk, market risk, liquidity risk, operational risk) can be used to capture climate-related financial risks" and c) "there is limited research and accompanying data that explore how climate-related risks feed into the traditional risks faced by banks. A better understanding of climate-risk drivers and their impact on banks' exposures across all risk types would be gained from further research by a broader community".

Also, BIS issued in November 2021 a public consultation on principles for the effective management and supervision of climate-related financial risks (BCBS 2021b). The consultation paper seeks to promote a principles-based approach to improve banks' risk-management practices and supervisory practices related to climate-related financial risks. Further, BIS is a relevant global player when looking into green bonds investments. In 2019 it launched an open-ended fund for investments in green bonds by CBs (BIS 2019). Following that, in October 2021, BIS announced the development of an Asian Green Bond Fund for central banks.

CEMLA – Sustainability, ESG factors, climate risks and biodiversity loss were also the focus of many activities and studies of CBs in Latin America, promoted or supported by the Center for Latin American Monetary Studies (CEMLA). This organisation, established in 1952, allows CBs in Latin America to improve their capacities and to promote better knowledge of the substantive issues of central banking. More than 50 institutions are part of CEMLA.[4]

In 2019, CEMLA co-organised with Banco de México the conference

[4] See CEMLA website: *Fundación y Funciones*, https://www.cemla.org/acerca.html.

"Climate Change and its Impact in the Financial System" with a mixture of academic papers and policy panels. In 2020, the Center co-organised with the Financial Stability Institute the Seminar on Climate Risk Assessment in the Financial Sector. In 2021, the Center co-organised, again with Banco de México, a conference to discuss the biodiversity and environmental challenges for the financial system,[5] with speakers from Latin America and references from Europe and other regions. CEMLA supports the *Latin American Journal of Central Banking* (*LAJCB*), which includes among its topics climate change as it relates to financial systems. The journal published "Environmental Risk Analysis in the Strategic Asset Allocation of the International Reserves Managed by Central Banks" (Torinelli and Silva 2021), which was also discussed at the XXVI Meeting of the Central Bank Researchers Network.[6]

The study mentioned above proposes a multicriteria analytical framework for the evaluation of the environmental risk exposure of an investment portfolio, compatible with the investor profile of the CBs. The framework includes the environmental risk analysis in the traditional strategic asset allocation approach for the management of the international reserves. Also, it suggests that for each viable portfolio, a central bank should use scenarios of environmental risks along with probabilities and potential impacts to choose the appropriate portfolio. The risk-and-return relationships of the portfolios in each scenario should be evaluated based on environmental factors. Thus, the main argument of this study is that with the environmental risk analysis being included in the management of the international reserves, these investments will be more resilient to environmental and climate-risk exposure.

[5] CEMLA website: *Biodiversity and Environmental Challenges for the Financial System*, https://www.cemla.org/actividades/2021/2021-12-biodiversity-and-environmental-challenges-for-the-fs.html.

[6] CEMLA website: *XXVI Meeting of the Central Bank Researchers Network*, https://www.cemla.org/actividades/2021-final/2021-11-xxvi-meeting-of-the-central-bank-researchers-network.html.

5.2 Functions of CBs

This snapshot of what CBs are doing to promote collaboration and exchange of information related to ESG and climate issues in Latin America brings to the surface the value within CB functions, through the formulation of regulatory and monetary policies. One of the main objectives of a CB is to maintain price stability – keeping inflation under control – and guarantee liquidity through monetary policy. CBs are relevant stakeholders for determining the value of money, as they set interest rates. Apart from the management of a country's currency and monetary policy, CBs contribute to the stability of the financial system, as they play a role in regulation and supervision of the actors in the banking system (ECB 2015).

Although these roles and responsibilities seem to be not directly related to sustainability issues, climate change poses a great danger to the financial system, as natural disasters arising from global temperatures going above reasonable standards can cause – as can be seen today from shifts in weather patterns – heatwaves, floods, and other disasters. Those natural consequences from climate change will affect the long-term growth and stability of financial systems. This places CBs in a position where action is needed to understand the physical risks that climate change poses to the financial institutions that they supervise (Durrani et al. 2020).

In addition, CBs can contribute to the ongoing transition to a low-carbon economy through regulations, especially involving the financial system and the use of money for sustainable purposes.

Further, the just transition implies changes in policies, regulations, and capital flows, as well as in investor choices and economic patterns, which in turn bring new relevant financial risks which need to be disclosed, analysed and managed. This is the context for the action of CBs.

5.3 OVERVIEW OF CLIMATE-RELATED ACTIONS BY CBS IN LATIN AMERICA

CBs in Latin America are aware of ESG factors as relevant sources of financial risk, especially those that are climate related. An overview of actions already taken by CBs in the region shows changes in regulations, metrics, policies, and practices. Highlights of the advances made by the Central Bank of Brazil (Banco Central do Brasil), Mexico (Banco de México), Colombia (Banco de la República and Superintendencia Financiera de Colombia), Chile (Banco Central de Chile) and Costa Rica (Banco Central de Costa Rica) are summarised in Table 1. Some future actions have already been announced, and the public information related to this thematic is also given in Table 1 and in further detail below.

Table 1 | Key sustainability and climate-related actions by CBs in Latin America

Central Bank of Brazil – Banco Central do Brasil (see BCB 2021)	
Done	**Future**
Regulation: 1) Improvements to the regulatory framework on risk management and social, environmental and climate responsibility (BCB 2021); 2) Requirement of more information disclosure by financial institutions, based on the recommendations from the Task Force on Climate-Related Financial Disclosures (TCFD), for qualitative aspects; *Supervision*: 3) Structuring and expanding the gathering of information on social, environmental, and climatic data; *Metrics*: 4) Adoption of a carbon metric in the management of the international reserves (weighted average carbon intensity – WACI); 5) Disclosure of the allocation of the international reserves in green bonds in a five-year period; *Governance*: 6) Creation of the Social and Environmental Responsibility Policy of the Central Bank of Brazil (PRSA); *Policies*: 7) Inclusion of a sustainability criteria for selecting counterparties in the management of international reserves and for selecting investments. *International alignment*; NGFS (BCB in the Steering Committee of the NGFS), Sustainable Banking and Finance Network (SBFN), Bank for International Settlements (BIS), Financial Stability Board (FSB), TCFD and Climate Bonds Initiative (CBI);	*Regulation*: 8) Expansion of information disclosure by FIs, based on TCFD recommendations: Phase 2 Quantitative aspects (December 2022); 9) Creation of a sustainable rural credit bureau; *Supervision*: 10) Stress test to climate risks (2022); *Policies*: 11) Adoption of criteria linked to sustainable finance in the design of its new liquidity financial lines.

Central Bank of Mexico – Banco de México	
Done	**Future**
1) Founding member of the Network of Central Banks and Supervisors for the Greening of the Financial System; 2) Active participation in defining the sustainable international financial agenda within the Financial Stability Board, the Basel Committee on Financial Supervision and the G20 Sustainable Finance Working Group; 3) Creation of the Sustainable Finance Committee within the Financial System Stability Council; 4) Creation of the Environmental and Social Risk Analysis and Policies Directorate of Banco de México; 5) Collaborated on the creation of the TCFD consortium in Mexico; 6) Organised two conferences on climate change in 2019 and one on environmental and biodiversity risks and opportunities in 2021; 7) Has done research on physical and transition risk for climate (published on its Financial System Report) and has done some preliminary studies on biodiversity loss; 8) Declared commitments through the "Declaration towards UN Climate Change Conference of the Parties (COP26)", detailed in the Annex.	8) Full implementation of ESG material factors; 9) Completion of framework for assessing climate-related macro-financial risks with a forward-looking perspective (2022); 10) Contribution with other financial authorities in conducting climate scenarios on the financial system; 11) Reduce greenhouse gas (GHG) emissions by 22 per cent (2030).
Central Bank of Chile – Banco Central de Chile (BCCh)	
Done	**Future**
1) Contribution to NGFS participation in international associations, including Financial Stability Board and Bank of International Payments. Participating in the Task Force to Incorporate Climate-Related Risks into the International Reserves Management Framework and regularly monitoring strategic risks that could impact BCC; 2) Incorporate climate and, more broadly, environmental issues into its standard toolkit for macroeconomic analysis, including the effects of physical and transitional risks (2021);	Involvement with NGFS: 3) Maintain cooperation and coordination in the areas of macroeconomic, financial and research analysis, in relation to other national authorities; 4) Responsible for the regulation and supervision of the financial system and the capital market; 5) Specific analysis of the financial stability reports (FSRs) aimed at understanding climate risks, being fully dedicated to the topic (2022); 6) Bring macroeconomic forecasting models via satellite, to assess relevant sectoral changes, as well as inflationary pressures.

Superintendencia Financiera de Colombia and Central Bank of Colombia – Banco de la República
In November 2021, the Financial Superintendence of Colombia (Superintendencia Financiera de Colombia – SFC) and the World Bank jointly published the first comprehensive climate-risk stress test in an emerging market. Entitled "Not-so-Magical Realism: A climate stress test of the Colombian banking system", the report examines different climate scenarios and their potential effects on the Colombian banking sector (Reinders et al. 2021). The report concludes that the sector is vulnerable to gradual and more acute risk, stemming from both transition and physical risks. It also provides a series of recommendations, including to issue guidelines on governance, risk management and climate-risk disclosure to the banking sector, and to provide more detailed guidance to the financial sector on how de-carbonisation policies will be implemented. In addition, the Central Bank of Colombia – Banco de la República issued the publication "Climate change: policies to manage its macroeconomic and financial effects" (Bernal-Ramírez and Ocampo 2020).
Central Bank of Costa Rica
The Central Bank of Costa Rica developed a roadmap for the implementation of its commitments towards integrating climate change and environmental considerations into its decision-making processes, including: the development and publication of information and statistics; the integration of sustainability considerations into monetary policy; the incorporation of climate-related risks into financial stability assessments; and the gradual greening of the Central Bank's international reserves (BCCR 2021, Rico 2021).
Central Bank of Argentina
Creation of the Sustainable Finance Technical Group (2020), led by the Ministry of Economy, with the support of the Inter-American Development Bank (IDB). Also, signatory, with regulators of the banking, insurance, and capital markets sectors, to the joint declaration to promote sustainable financial development in Argentina.
Central Bank of Honduras
Approval of the "Environmental and Social Risk Management Standard applicable to Financial System Institutions" (2020).
Central Bank of Paraguay
Resolution No. 8, Law No. 78 dated 11.22.18 – Approval of the Guide for the Management of Social and Environmental Risks for institutions regulated and supervised by the Central Bank of Paraguay.
Central Bank of Peru
SBS Resolution No. 1928-2015,establishing minimum requirements for the management of social and environmental risk, in order to promote the implementation of good practices and prudent risk-taking in companies in the financial system.

Source: Prepared by the authors based on public reports and information from the analysed CBs.

Central Bank of Brazil

The Central Bank of Brazil has the sustainability dimension in its strategic agenda (BC#),[7] with the objective to promote sustainable finance and the adequate management of social, environmental and climate risks in the economy and in the national financial system, in addition to integrating sustainable variables in the BCB's decision-making process.

The BCB sustainable agenda is aligned with the international agenda. BCB is a member of the Sustainable Banking and Finance Network (SBFN), maintained by the International Finance Corporation (IFC), linked to the World Bank, and focused on the private sector in developing countries. Also, BCB is a member of the NGFS and is supporting the Task Force on Climate-Related Financial Disclosures (TCFD), an initiative created to develop parameters for quality and dissemination of clear, comparable and consistent information about the risks and opportunities presented by climate change. BCB also participates in multilateral cooperation programmes, such as FiBras – Sustainable Brazilian Finances (Brazil–Germany Cooperation), which contribute to the construction of knowledge aimed at achieving international standards of sustainable finance, essential in a financially globalised world.

BCB has been putting a lot of effort into adjusting regulations, metrics, policies, and internal actions to promote sustainable development, as well as proper climate-risk management, in line with the international standards. However, the regulation to promote sustainable finance is not new in Brazil.

Regulation – From 2008 to 2010, the National Monetary Council (CMN)[8] issued resolutions requiring extra documentation on compliance with environmental laws to release loans at cheaper rates to Amazon farmers (CMN Resolution 3.545/2008) and sugarcane producers (CMN Resolution 3.814/2009), aiming to prevent the financing of deforestation and carbon emissions. Resolution 3876/2010 toughened the need to comply with labour laws in order to curb the practice of work analogous to slavery, while Resolution 3896/2010 created the Low Carbon

[7] Agenda BC#, available at https://www.bcb.gov.br/acessoinformacao/bchashtag.

[8] The CMN is composed of the Minister of the Economy, the President of the BCB and the Deputy Minister for Finance of the Ministry of the Economy.

Agriculture (ABC) Program, managed by the National Bank of Economic and Social Development (BNDES), which encourages, with credit at lower interest rates, the use of sustainable techniques that bring more efficiency to the countryside and allow for a reduction in the emission of greenhouse gases.

Between 2011 and 2017, other relevant regulations were issued focused on climate financing and ESG policies. The CMN Resolution 4,008/2011 established rules for climate-friendly loans, supported by resources from the National Plan for Climate Change (PNMC). This one was revoked by CMN Resolution 4,267/2013, which in turn regulated the financing of climate mitigation and adaptation projects, supported by resources from the National Climate Change Fund (Climate Fund – Federal Law 12,114/2009). In 2014, BCB published Resolution 4,327/2014 and started to require from financial institutions a social and environmental responsibility policy (PRSA) to guide their activities and operations. Three years later, in 2017, resolutions 4,595 and 4,557 reinforced the compliance rules of financial institutions by providing for integrated risk management, including social and environmental factors.

In 2021, BCB made improvements in the rules related to the management of environmental, social and climate risks applicable to the financial institutions, under the supervision of the central bank, through CMN Resolution 4,943/2021 (amended the Res. 4,557/2017), CMN Resolution 4,944/2021 (amended the Res. 4,606/2017) and CMN 4,945/2021. This last one will revoke the Res. 4,327/2014 up to December 2022 for all involved institutions, and will establish new requirements for the Social, Environmental and Climate Responsibility Policy (PRSAC), as well as the implementation of actions aimed at its effectiveness.

Brazil took two steps ahead of many other countries by establishing mandatory disclosure of social, environmental, and climate-related risks by financial institutions (international practice is voluntary adoption) and by defining a single standard for the presentation of information, in templates, for example. As banks need information from their credit portfolio customers to assess risk, the expectation is that there will be a "ripple effect", with more non-financial companies adopting similar reporting. Large banks will also have to run stress tests to measure the impact of climate change and assess factors such

as concentration of risk in regions or sectors more susceptible to environmental and climate damage.

Green Credit Bureau – Also, if taken into consideration that Brazil is one of the largest agricultural producers in the world, policies and regulations destined to rural credit play an important role in making sure that this type of credit line doesn't reach projects involved in illegal deforestation or the ones that have slave-like working conditions, among other environmental or social issues. Another regulation (BCB Resolution 140/2021) brings a series of impediments to the granting of rural credit, a step towards the construction of a "green credit bureau". This bureau, announced as being concluded by 2022, will consolidate several laws and legal provisions dispersed in several legislations to be a source of consultation. For this, the System of Rural Credit Operations (SICOR) will be automated and will include information about the number of the Rural Environmental Registry (CAR) and about work in conditions analogous to slavery. It will also include information on conservation units, indigenous lands, quilombola lands[9] and embargoed areas in the Amazon. Consequently, with this information, lenders will be able to make more informed decisions and properly price the loans. This can provide better support for green bonds and other bonds backed by credits that meet sustainability criteria.

Management of the international reserves – The BCB adopted a carbon metric in the management of the international reserves (IRs), the weighted average of carbon intensity (WACI). The WACI of the IR's portfolios was 202.2 in 2020 against 259.8 in 2015, with Currency Composition of Official Foreign Exchange Reserves (COFER) as a benchmark and totalling 200.9 in 2020 and 247.4 in 2015 (BCB 2021: 25).

The power-generation profile of the IRs was also calculated and disclosed. In 2020, hydro and renewable energy accounted only for 10 per cent of total investment portfolio, against approximately 36 per cent in oil, 32 per cent in natural gas, 12 per cent in coal and 10 per cent in nuclear.

Further, the allocation of the international reserves in green bonds in a five-year period was disclosed. The maximum total reached 195 million US dollars in March 2019. Finally, there is a commitment to include

[9] Quilombola lands refer to communities of black slaves who resisted the slavery regime that prevailed in Brazil for over 300 years and was abolished in 1888.

sustainability criteria for selecting counterparties in the management of international reserves and for selecting investments.

Alignment of strategic planning with the SDGs – In its Institutional Strategic Plan, the BCB emphasises attention to risks associated with the ESG factors in the forward-looking statement and in the statement of the strategic objective to "promote sustainable finances and contribute to the reduction of socio-environmental and climatic risks within the economy and the Financial System".[10] Also, BCB reports the alignment between its Institutional Strategic Plan and various sustainable development goals (SDGs).

Other relevant actions – When looking into what the bank is doing in terms of socio-environmental responsibility, the promotion of the culture of sustainability by the Central Bank's Committee for Organizational Social and Environmental Responsibility (CRSO) was relevant progress. In addition, and in terms of disclosure and reporting, it has developed and launched the BCB report on socio-environmental risk. Finally, BCB also signed a memorandum of understanding with the Climate Bonds Initiative (CBI) in 2020.

Central Bank of México

For context, Mexico is highly exposed to environmental risks – especially those related to natural resources, physical and transition risks. Between 2000 and 2018, extreme weather events caused an average annual cost of more than 46,000 million Mexican pesos (CENAPRED 2018). Those risks are expected to generate more negative costs as global temperatures increase.

When looking at the physical risks Mexico faces, tropical cyclones are among the main risks, with more than 2.5 million people being affected by these events between 2001 and 2013. Also, Mexico faces water scarcity risks with temperatures increasing between 2.4°C and 4.5°C. This could imply 25 per cent of productivity lost for agricultural activity by 2050.[11]

Mexico is expecting to face severe impacts in the next few years due to climate change. Impacts such as hurricanes and severe weather events,

[10] BCB website: *Strategic Planning*, https://www.bcb.gov.br/en/about/strategicplanning.

[11] For a detailed description of the economic impacts of climate change see SEMARNAT (2014).

sea-level rises, and other water security issues. Those risks that Mexico faces will have a direct impact in different sectors of the economy, such as tourism, agriculture, and infrastructure, among others. In the transition risk perspective, there are great risks that Mexico faces involving stranded assets, health costs and energy demand.

In this context, committing to fostering the transition to a low-carbon economy is key for the Central Bank of México. México have committed to reduce 22 per cent of GHG emissions by 2030, under the Paris Agreement. Banco de México has been working actively on sustainable finance and climate-related policies, to promote changes in the Mexican financial system (UNEP and Banco de México 2020: 19).

Banco de México is one of the founding members of the Network for Greening the Financial System (NGFS), contributing to the development of the international sustainable finance agenda for managing climate risks.

In 2018, Banco de México, in collaboration with the German Development Agency (GIZ), the Cambridge Institute for Sustainable Leadership (CISL) and the Autonomous Technological Institute of Mexico (ITAM) worked together to introduce the integration of scenario analysis into environmental risk-management practices in Mexico. This effort resulted in the release of the first report on the subject in Mexico (Seega 2018).

In January 2019, Banco de México promoted the first seminar for North, Central and South America to discuss green finance. This seminar allowed regional central banks to align their strategies and to develop common agendas. In the same year and in 2020, the Central Bank issued "Climate and Environmental Risk and Opportunities in Mexico's Financial System, from Diagnosis to Action" (UNEP and Banco de México 2020).

In 2020, Banco de México proposed the creation of the Sustainable Finance Committee within the Financial System Stability Council. The Committee, among other objectives, is responsible for providing education and capacity-building on topics related to ESG disclosures and climate-risks analysis for financial authorities and financial market participants.

In 2021, the bank published on its Financial System Report estimations on physical and transition risk associated with climate change. In 2022, it is expected that Banco de México will release a framework to assess climate-related macro-financial risks with a forward-looking perspective. It is currently under development, however research has already been

published, by Roncoroni et al. (2021). In addition, in 2021 the Mexican central bank performed a preliminary study on biodiversity loss and its relation to the financial system.

Banco de México is also researching and analysing ESG data and rating providers and their different methodologies. When looking into international reserves, the bank has integrated ESG investment into its portfolios.

The recent creation of the Directorate of Analysis and Policies of Environmental and Social Risks was strategical for Banco de México as this allowed the bank to have the mandate to engage transversally, within the bank and other important players on Mexico' financial authorities and interested parties, to develop policies and research.

On the capacity-building and awareness front, Banco de México has been very active, organising two international conferences in 2019 on climate risks[12] and one on environmental and biodiversity in 2021.[13]

Central Bank of Chile

Chile has sustainability initiatives of reference in areas such as tourism, transport and academic offerings. For instance, Santiago's subway, which is the second largest and most modern network in Latin America, is expected to be the world's first public transit system mostly powered by solar energy (Learn Chile 2021).

In this case, the Central Bank of Chile has a great responsibility for making sure businesses involved in these kinds of project gain access to credit lines through Chile's financial system, as well for implementing policies and regulations to guarantee that commercial banks are aligned with the international sustainability agenda. As an example of action being taken, the Central Bank of Chile promoted the adoption of environmental, social and governance criteria in the financial sector by facilitating data collection and providing analysis to support decision-making (Central Banking 2019).

[12] See CEMLA website: *Conference on Climate Change and its Impact in the Financial System*, Mexico City, 5-6 December 2019, https://www.cemla.org/actividades/2019-final/2019-12-climate-change-and-its-impact-in-the-financial-system.html.

[13] See Banco de México website: *Biodiversity and Environmental Challenges for the Financial System*, 30 November-2 December 2021, https://www.banxico.org.mx/publicaciones-y-prensa/seminarios/biodiversity-and-environmental-challenges-for-the-/biodiversity-financial-syst00001.html.

Like the Central Bank of Brazil, the BCCh became an NGFS member after joining the network in 2021, participating in plenary sessions and in three NGFS working groups. It also joined other international associations, including the Financial Stability Board (FSB), an international body that monitors and makes recommendations on the global financial system. Following the invitation extended by the Ministry of the Environment it joined the Natural Capital Committee, a group supported by the National Council of Science, Technology, Knowledge and Innovation (Consejo CTCI) with the objective to provide recommendations on the measurement of the stock of Natural Capital in Chile.

In the long run, the BCCh has committed itself to important advancements, such as continuing its cooperation with the NGFS in the areas of macroeconomic and financial analysis and research. It has also committed to its participation in the pilot exercise led by the NGFS Working Group 2. In this initiative the BCCh is designing a climate change stress-test exercise estimating the financial impact on approximately 200,000 companies resulting from a shock to carbon prices and the effects of an increase in the occurrence of natural disasters (BCCh 2021).

Regarding macroeconomic analysis, the BCCh is committed to develop forecasting models via satellite to assess sectoral changes and inflationary pressures. These advancements, as well as others, are responsible for the good reputation of the BCCh internationally when looking at climate policies.

Central Bank of Costa Rica

"Costa Rica has been a pioneer in the protection of peace and nature. With effective policies that involve the state, citizens, scientists and the private sector, the country will achieve its goals and set an example to the region and the world", said Leo Heileman, UN Environment Programme Regional Representative and Director for Latin America and the Caribbean (UNEP 2019).

Costa Rica is one of the countries in Latin America that set an example in many sustainability factors, with 98 per cent of its energy being renewable and the aim is to achieve net-zero emissions by 2050.

In this context, the Banco Central de Costa Rica (BCCR) – Costa Rica's

Central Bank – is making advancements in incorporating climate and environmental questions into its monetary policy. December 2021 was the due date announced to delivering the roadmap for the implementation of BCCR's commitments towards integrating climate change and environmental considerations into its decision-making processes. The roadmap also has the objective of gradually greening the Central Bank's international reserves (BCCR 2021).

The following statement was made by the Banco Central de Costa Rica about the roadmap implementation: "With the implementation of the actions contained in the roadmap, the Central Bank of Costa Rica expects to become a more effective contributor to local, national and global resilience to the impact of climate change, by promoting a gradual and orderly transition of the financial system in a changing physical environment, with due consideration to the protection of the most vulnerable". It adds: "In completing this roadmap, the Bank has benefited from, and gratefully acknowledges, the Network for Greening the Financial System (NGFS) knowledge base and peer discussions" (Rico 2021).

Central Bank of Argentina

In 2020, the Argentine economy was facing an economic reality where high levels of inflation and a deep recessive process were pressing levels of unemployment, precarity and poverty to increase. In this scenario, Banco Central de la República Argentina (BCRA) is in a place where the correct management of monetary policy is fundamental in managing population welfare. For instance, the new national government adopted social, regulatory, and fiscal consolidation measures with the objective of facing the most visible signs of the crisis and stabilising the macroeconomy. In this way, they were able to redefine policy priorities to lay the foundations for a sustainable economic development process and to provide the conditions for fiscal and public debt sustainability.

Even though this scenario is not favourable to the implementation of new sustainable finance policies and regulations, in 2021 the Minister of Economy for Argentina, the BCRA's President, the Head of Argentina's Securities Commission (CNV) and the Head of the National Superintendence of Insurance (SSN) signed a joint declaration to boost sustainable finance

development in Argentina. This declaration has the objective to increase investments by the public and private sector within the framework of the sustainable development goals and to address climate change through the financing of mitigation and adaptation strategies (BCRA 2021).

They have agreed between them to assess potential risks to the stability of the financial system and the balance of payments connected with environmental, social and governance factors.

Conclusion

Relevant CBs in Latin America are aware of environmental and social risks as relevant sources of financial risk, especially climate-related risks. An overview of actions already taken by CBs in the region show changes in regulations, metrics, policies, and practices. Highlights include the advances made by the central banks of Brazil (BCB), México (Banxico), Chile (BCCh) and Colombia (Banco de la República) and Costa Rica (BCCR).

Some future actions have been announced, highlights being the sustainability agenda of the Central Bank of Brazil, with the objective of promoting the allocation of resources towards a more sustainable economy, or the proposal from the Central Bank of México to create the Sustainable Finance Committee within the Financial System Stability Council.

For the time being, the Central Bank of Brazil has committed to the construction of a stress test (TE) for climate risks in April 2022, to expand information disclosure by financial institutions based on TCFD recommendations, to reduce environmental impact of banknotes processing for December 2023, among others.

The Central Bank of México has announced so far that it will be fully implementing ESG material factors. Also, it will complete the framework for assessing climate-related macro-financial risks with a forward-looking perspective for 2022. The bank has also contributed to the creation of the TCFD consortium in México, with important implications for the financial system and the real economy. It has also committed to work with other financial authorities in conducting climate scenarios for the financial system. Additionally, it will continue to work in relation to biodiversity loss, which is as important as climate change and yet receives less attention.

That said, the Central Bank of Chile has also made commitments for the future, such as maintaining its involvement with the NGFS, coordinating the areas of macroeconomic, financial and research analysis, in relation to other national authorities. In addition, it will conduct in 2022 specific analysis of the Financial Stability Reports aimed at understanding climate risks.

These forward-looking commitments and initiatives are important steps towards fulfilling the mandates within CBs, especially in Latin America, to mitigate climate, physical and transition risks and to promote a transition to a low-carbon economy. These actions signal that the largest central banks in Latin America have understood that climate and environmental policies and regulations can generate more stability to the financial system by fostering a transition to a more resilient economy, thereby reducing negative outcomes that climate risks pose to the financial system.

Good practices and lessons are shared among CBs in Latin America and with the overall worldwide community of CBs, though the NGFS and the forums previously discussed, and the maintenance of these productive sharing mechanisms is important for the constant improvement and global alignment in the sustainability agenda.

Annex: Banco de México Declaration towards UN Climate Change Conference of the Parties (COP26), 4 November 2021

Banco de México has been actively working to improve the resilience of Mexico's financial system to climate-related risks. Banco de México is a founding member of the Network of Central Banks and Supervisors for Greening of the Financial System (NGFS) and actively participates in setting forth the international sustainable finance agenda within the Financial Stability Board, the Basel Committee for Financial Supervision, and the G20 Sustainable Finance Working Group.

In 2020, following an in-depth assessment of Mexico's financial system's preparedness to tackle climate and environmental risks, Banco de México proposed the creation of the Sustainable Finance Committee within the Financial System Stability Council. The Committee is chaired by the Ministry of Finance and Banco de México acts as Secretariat. All Mexican

financial authorities participate as members and the chairs of the main financial sector associations as observers. It has set out specific plans for its four working groups. These groups have the following tasks: developing a sustainable finance taxonomy, integrating climate and Environmental, Social and Governance (ESG) risk factors in supervisory and financial market activities, improving the amount and quality of disclosures and reporting by non-financial and financial institutions, and enabling conditions to increase sustainable capital mobilisation.

The Committee and Banco de México are leading an intense financial education and capacity-building program on the topic of ESG disclosures and climate risk analysis, targeting financial authorities and financial market participants; are promoting disclosure of climate and environmental information by companies and financial institutions; and are assessing the regulatory framework for gradual implementation of ESG material factors.

Banco de México's Directorate General of Financial Stability is undertaking an in-depth analysis of both physical and transition risks exposures of the banking system. In this regard, it has already published a preliminary analysis on previous financial stability reports. It is currently developing a framework to assess climate-related macro financial risks with a forward-looking perspective, which is expected to be completed in 2022.

Banco de México's Directorate General of Comptrollership and Risk Management and the Directorate General of Central Banking Operations are assessing the different approaches and methodologies of the main ESG data and rating providers, and have integrated ESG considerations in the investment and risk management of international reserves.

Banco de México's recently created Directorate of Analysis and Policies of Environmental and Social Risks has the mandate to engage transversally, within the bank as well as with Mexico's financial authorities and interested parties, to develop regulations, public policies and research that favor sustainable development for the activities and services carried out in the financial system; to integrate sustainability criteria in the relevant activities of the central bank; to develop relevant metrics to evaluate and monitor the physical and transition risks and the opportunities that derive from the transition to a low-carbon and sustainable economy; to collaborate in the analysis and implementation of best practices for the

management of loans and assets in the financial system to foster sustainable development; and, to develop, promote, and disseminate best practices in financial education in the field of sustainable development.

Banco de México is committed to improving financial institutions' capacities to effectively identify, monitor and manage the climate-related and ESG risks they are exposed to. To this effect, it stands ready to collaborate with other financial authorities in conducting climate scenarios on the financial system.

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6.

IMF Surveillance and Climate Change Transition Risks: Exploring Implications for IMF Policy Advice

Jon Sward and Niranjali Amerasinghe

6.1 Introduction: Article IV surveillance and climate risk

As part of its mandate, the International Monetary Fund (IMF) conducts annual surveillance of all its member countries, to assess balance of payment and general macro-stability issues. In May 2021, the IMF published the Comprehensive Surveillance Review (CSR)[1] – which will guide the Fund's surveillance work for the next five to 10 years. The CSR establishes that the Fund has a clear mandate under its Articles of Agreement, "to cover climate change adaptation and the management of the transition to a low-carbon economy in Article IVs wherever the associated policy challenges are macro-critical" (IMF 2021a: 13). The CSR also notes that the Fund will seek to engage on climate change mitigation policies with the 20 largest emitters, although this dialogue will be voluntary for the countries in question.

The primary focus of this chapter is on transition risks,[2] which, as noted by the Climate Policy Initiative, are commonly defined as "the risk that the value of assets and income are less than expected because of climate policy and market transformations" (Huxham et al. 2019: 11). An IMF staff climate strategy published at the end of July 2021 included a

[1] See IMF website: *Comprehensive Surveillance Review*, https://www.imf.org/en/Topics/Comprehensive-Surveillance-Review.

[2] This chapter is based on the report published in August 2021 by ActionAid USA and the Bretton Woods Project. See Sward et al. (2021).

strong emphasis on "transition management" to a low-carbon economy (IMF 2021b) – an acknowledgement by the Fund that weaning its members off fossil fuels will involve traversing considerable macroeconomic challenges, particularly for countries heavily reliant on revenues from carbon-intensive sources. The strategy notes, "Transition management is a macro-critical policy challenge for almost every IMF member" (IMF 2021b: 15), with the macroeconomic implications of meeting national climate plans one area highlighted by the Fund. As such, the Fund proposes to look at the issue in Article IV reports in all countries, once every 5–6 years, meaning 33–34 reports focusing on this topic annually. However, details on how the Fund conceptualises transition risks are sparse and will need to be elaborated further in guidance on the CSR that will be developed for staff in the first half of 2022. The guidance linked to the implementation of the CSR is expected to become mandatory for IMF staff conducting surveillance from late 2022 onwards.

It is notable that the IMF's surveillance had scarcely touched on transition risks from climate change prior to the Fund releasing its climate strategy, with just three Article IV reports explicitly recognising transition risks related to climate change in 2020 (Gallagher et al. 2021). The Fund only considered risks related to carbon stranded assets in two countries in that year, and this was accompanied by contradictory advice about incentivising investment in carbon-intensive sectors (Gallagher et al. 2021: 7). While the CSR noted the need to address transition risks in IMF surveillance going forward, it failed to commit to assessing how the IMF's own common policy prescriptions – including promotion of austerity measures and carbon-intensive exports – may be exacerbating countries' exposure to transition risks. For example, the IMF has sent a false signal to countries and investors in Africa during the past two decades by repeatedly over-estimating the impact of new oil and gas discoveries on future government revenues (Mihalyi and Scurfield 2020). This is worrying as such projections provide a key signal, which can encourage countries to develop their extractive sectors for export based on the promise of future revenues that are unlikely to accrue, which can exacerbate stranded asset risk[3] and contribute to debt crises. As the final Section of this chapter

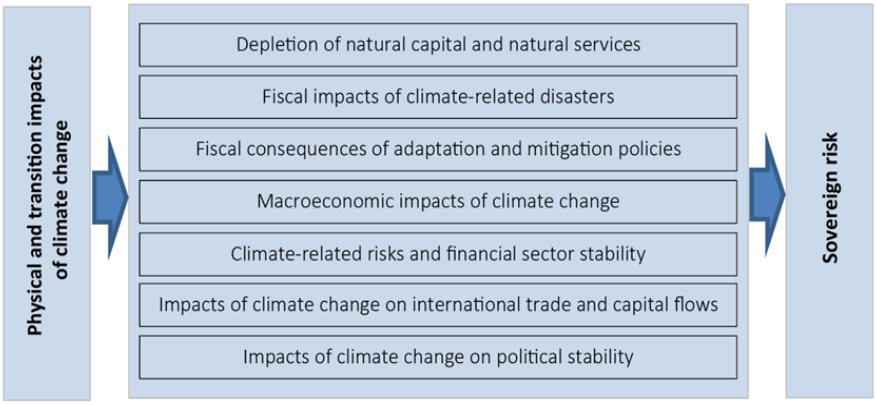
[3] For a discussion of this in the Latin America and Caribbean context, refer to Caldecott et al. (2016).

will argue, these trends are symptomatic of the Fund's wider support for an "extractive" development paradigm that undermines economic, social, and environmental wellbeing – a key tension which needs to be resolved in order for the IMF's policy advice to support a feminist, green, and just energy transition. Resolving this tension is especially important for developing countries due to the Fund's outsized influence on their macroeconomic policy space.

Growing evidence base on climate transition risk belies IMF lack of engagement to date

While the IMF has been slow to tackle the issue of climate change transition risks, recent academic and policy literature identifies the myriad macroeconomic, financial and fiscal impacts of climate change. One significant contribution to this field is Volz et al.'s (2020) report on *Climate Change and Sovereign Risk*, which sets out a comprehensive framework for conceptualising physical and transition risks from climate change, and the impact that these different "risk channels" have on states' "sovereign risk", or "the risk that a government will become unable or unwilling to meet its debt obligations" (Volz et al. 2020: 2; see also Volz 2020, 2021) (see Figure 1). Crucially, with evidence that climate change is already negatively affecting the cost of capital in many climate-vulnerable countries (Economist 2021), a systemic approach is needed to reform macro-finance and ensure greater resilience to climate risks. Within this broader framework, transition risks can pose direct fiscal, macroeconomic and financial risks to IMF member countries. The ways in which a low-carbon transition is likely to affect macro-stability vary widely, with transition risks emerging both within national contexts and via spill-over risks. Gallagher and colleagues (2021: 5) argue that "transition risks are perhaps the most macro-critical in their potential impacts on the real economy and livelihoods, financial systems, and public finance."

Figure 1 | Transmission channels of climate risk



Source: Volz et al. (2020): 10.

The driving force behind climate transition risks is the need to rapidly reduce greenhouse gas emissions in order to avoid catastrophic climate change impacts – which will require a managed drawdown of fossil fuel production and use (Stockman et al. 2019). Volz et al. (2020: 22) point out that "some governments rely heavily on revenues from the extraction of oil, natural gas, and coal resources." These revenues comprise "5.6% [of revenues] for G20 countries on average", but reliance and thus associated risk are spread extremely unevenly among members of this bloc, as well as among IMF member countries more broadly.[4] The IMF's newly published dashboard of climate change indicators likewise demonstrates that countries in developing regions have highly varied exposure to these risks.[5] There are already signs that the so-called "carbon bubble" (the over-valuation of the fossil fuel assets) could "burst" sooner than many expected in the face of renewable energy alternatives and climate change mitigation policies. According to analysts at Carbon Tracker, "falling demand, lower prices and rising investment risk is likely to slash the value of oil, gas and coal reserves by nearly two thirds, increasing the risk and

[4] See IMF's *Climate Change Dashboard*, https://climatedata.imf.org.

[5] See IMF, *Climate Change Dashboard*: Financial and Risk Indicators, https://climatedata.imf.org/pages/fi-indicators/#fr4.

likelihood of stranded assets" (Bond et al. 2020) in the coming decades.

Clearly, new investments in fossil fuel extraction and infrastructure are particularly at odds with these emerging trends. Gallagher et al. (2021: 5) note that coal is acutely vulnerable in this context:

> a number of central banks see transition risks due to coal extraction and coal-fired power plants closings as the most macro-critical form of climate risk given the depth of such exposure and the consensus that coal should be the first energy source to diversify from.

In this vein, a joint report by the Sierra Club, Carbon Tracker and the Rocky Mountain Institute argues that "although coal has long been viewed as the cheapest way to power the global economy, this is no longer the case" (Bodnar et al. 2020: 6). The report's global analysis of 2,500 coal plants found "the share of uncompetitive coal plants worldwide will increase rapidly to 60 percent in 2022 and to 73 percent in 2025" (Bodnar et al. 2020: 6). These will represent a fiscal burden where plants are privately owned and states are required to continue to make "capacity payments" (i.e. minimum payments required under the terms of long-term contracts) for underperforming or offline plants. Alternatively, if states attempt to retire uncompetitive coal power early, they risk facing expensive compensation claims from private investors under investor-state dispute mechanisms (as discussed in more detail below).

Coal mining and other forms of fossil fuel extraction are also highly vulnerable to the combination of falling renewable energy costs and lower prices or demand. For example, in South Africa coal exports are particularly at risk from a low-carbon transition, with one estimate predicting a loss of 83.7 billion US dollars by 2035 from falling prices and demand (Huxham et al. 2019: 11). Countries reliant on oil and gas extraction are also not immune to such trends, particularly as the early months of 2021 saw a new wave of 2030 emission reduction targets introduced in key markets, which, if implemented, will significantly reduce demand for imported natural gas. In the case of the European Union, one of the largest importers of natural gas, its 2030 target to reduce emissions by 55 per cent could result in natural gas use dropping by 32–37 per cent of final energy consumption compared to 2015, with a significant drop in

demand continuing thereafter (European Commission 2020). The US and UK will also see deep reductions in gas demand by 2035, if they enact recently announced commitments to further decarbonise their power sectors (Rosslowe 2021). These commitments follow on the heels of a grim year for the oil and gas sector in 2020, when oil majors undertook historic write-downs of oil and gas assets, such as Exxon's 20 billion US dollars write-down of gas assets in North and South America in November 2020. The low-carbon transition is likely to accelerate the rapid "re-assessment" in the value of such assets.

With the outlook for the "carbon bubble" entering even more uncertain terrain due to Covid-19, which caused a severe – if temporary – exogenous shock to the sector, the lack of sufficient attention to transition risks[6] – and indeed the Fund's de facto support for fossil fuel infrastructure expansion, as detailed in Section 3 of this chapter – is a critical blind spot in IMF policy advice to date. Both the limited reference to transition risks in Article IV surveillance reports and the failure to examine whether existing policy advice has hampered a just energy transition are causes for concern.

[6] While the IMF has a very limited focus on transition risks to date, transition risks have been included in "stress tests" created by the Network for Greening the Financial System (NFGS), primarily for the use of central banks. However, the credibility of NGFS's scenarios have been criticised by NGOs for under-estimating the pace at which private investors will need to stop providing finance to fossil fuel assets. This point has been echoed by Professor Daniela Gabor (2020: 9) in her research on the discussion of transition risks among private investors, which she argues is largely "designed to protect the status quo of financial globalisation", rather than ensuring rapid decarbonisation. Thus, even examples of "best practice" in this space require improvement to meet global climate goals.

6.2 Methodology: An overview of the research approach

To better understand how IMF policy advice is shaping member countries' vulnerabilities to transition risks, ActionAid USA and the Bretton Woods Project reviewed the 595 Article IV reports published between December 2015 and March 2021 (see Box 1 for a methodological overview).

This review analyses IMF policy advice in three policy areas that could undermine a just energy transition to a carbon-free energy paradigm, namely:

1. *support for the expansion of fossil fuel infrastructure* – which can undermine the ability of countries to transition by locking in carbon-intensive investments with extended lifecycles;
2. *advice on the privatisation of state-owned enterprises in the energy sector* – which can lead to additional costs if assets are stranded and potentially fragment the sector in ways that make a low-carbon transition difficult to achieve;
3. *reform or removal of energy subsidies, particularly demand-side consumer subsidies* – the IMF's current focus on reform or removal of consumer subsidies risks ignoring overproduction of fossil fuels and is unlikely to be effective, especially if it is not coupled with front-loaded investment in green energy.

To avoid duplication of existing analyses of IMF surveillance, this report does not cover the full range of policy actions required for a just energy transition, including abandoning austerity (for instance: Munevar 2020, Oxfam 2020, ActionAid 2020), the impact of Fund advice on gender equality (see, for an overview: Bürgisser 2019), and the extent to which IMF surveillance supports a green recovery from the Covid-19 pandemic (for instance: Mainhardt 2020, Gallagher et al. 2021); rather, it looks at the above three areas, to complement existing analyses.

Box 1 | Methodological overview

In an assessment of the Fund's treatment of key policies relating to a just energy transition, ActionAid USA and the Bretton Woods Project reviewed the 595 Article IV reports published between 1 December 2015 and 25 March 2021 for instances where:
1) The Article IV report advised or supported the development of fossil fuel infrastructure.
2) The Article IV report advised or otherwise supported the privatisation of established power or electric SOE utilities.
3) The Article IV report explicitly or implicitly advised the reduction or elimination of energy subsidies.

The data sample includes 457 observations of policy advice originating from 293 Annual Reports published between 1 December 2015 and 25 March 2021 (since the Paris Agreement was made). The data inform statistics indicating the relative frequency of policy advice to compensate for the smaller samples in years 2015 and 2021, as well as the decrease in publication frequency during the 2020 pandemic, when many Article IV reports were delayed. A keyword search was carried out in order to generate results (for more detailed methodological information, see the accompanying Methodological Note; to access data repository, see: https://doi.org/10.17632/ypr7z8cdmm.1).

Where a keyword was found, the keyword was analysed for relevance to the policy advice. Each observation therefore does not merely indicate the presence of any particular term or combination of terms – given the terms searched for are extremely common and would not provide meaningful insights on their own – rather, each observation indicates the verified presence of policy advice relevant to the study.

6.3 KEY FINDINGS: IMF SURVEILLANCE POTENTIALLY EXACERBATING TRANSITION RISKS IN IMF MEMBERS

The findings of the review of IMF surveillance reports from December 2015 to March 2021 included the following results, as outlined below.

From December 2015 through to March 2021, the IMF advised or encouraged 55 per cent of all member countries to develop fossil fuel infrastructure (see Figure 2 for an overview of countries). In total, of the 595 Article IV reports reviewed, 193 reports, or 32 per cent, contained at least one instance of policy advice encouraging the development of fossil fuel infrastructure. Policy advice tended to focus on the expansion of fossil fuel-dependent energy infrastructure, increasing investment in fossil fuel extraction and distribution, or the expansion and development of infrastructure projects.

In some cases, there was excessive optimism around fossil fuel revenue

streams and potential growth opportunities. Fossil fuel-related industries were frequently mentioned as investment or growth opportunities. This was most notable in many African countries with growing extractive industries, including Ghana,[7] Tanzania,[8] Uganda[9] and Mozambique. Such optimism tends to foster a macroeconomic environment that supports greater fossil fuel expansion as a key driver of the economy.

The Fund also supported increased fossil fuel extraction and new power plants, through advice detailing opportunities to exploit fossil fuel reserves. For instance, citing coal reserves valued at 1 trillion US dollars, the 2017 Article IV report for Mongolia encourages coal extraction as an opportunity to export to Chinese power plants. By noting that the investment in new coal-fired power plants could export electricity if "China downsizes its own coal industry for environmental reasons", it encourages coal extraction, while failing to recognise transition risks, resulting from (*inter alia*) alternative energy sources being cheaper than new coal (or gas) in many countries. This is a view backed by new research from the IMF itself, demonstrating that renewable energy may be a better public investment than fossil fuels, showing the disconnect between IMF policy and research (Batini et al. 2021).

Article IV reports also showed encouragement for incremental steps to transition to lower-carbon fuels, such as substituting incumbent fuel sources with natural gas – despite the fact that this could lock countries into future stranded asset risks and delays a rapid and just energy transition. For instance, the 2018 Article IV report for Jamaica painted the conversion of the Bogue power plant from heavy fuel oil to gas as an environmental advancement that would reduce both emissions and mortality. Undoubtedly, the combustion of a shorter carbon chain results in less particulate pollution, but a decrease in greenhouse gas emissions from gas is commonly overestimated unless its significant upstream emissions are properly accounted for (Howarth et al. 2011). The IEA's 1.5°C scenario modelling released in May 2021 also shows that there is limited space for

[7] For instance, the 2019 Article IV notes that it expects a 5 per cent growth driven by new potential oil and mining discoveries.

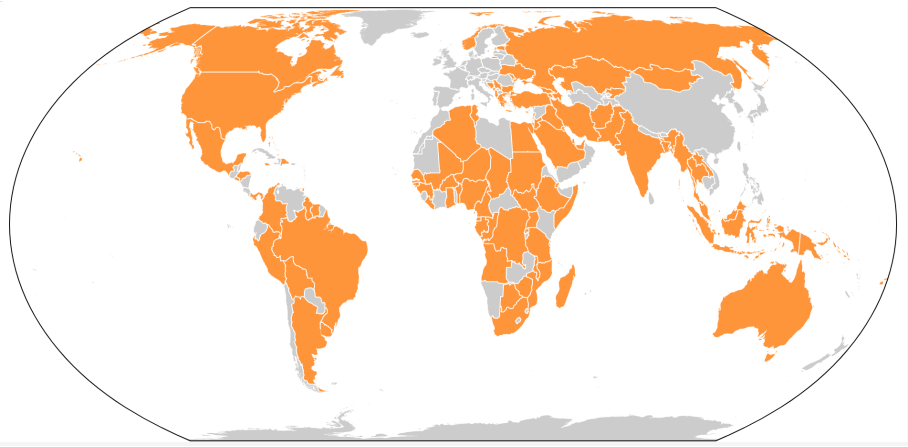
[8] For example, the 2016 Article IV notes: "Growth is projected to remain strong at about 7 percent in 2016, on the back of low oil prices (a positive shock for Tanzania)".

[9] For example, Uganda's 2017 Article IV notes that "over the medium term, infrastructure and oil sector investments could yield growth rates of 6 to 6½ percent."

gas as a transition fuel if the world is to meet global climate goals, including in low-income countries (Gaventa and Pastukhova 2021). In short, the notion of gas as a transition fuel is out of step with robust, science-based efforts to achieve the 1.5°C goal embedded in the Paris Agreement.

In sum, references to the expansion of fossil fuel infrastructure in IMF surveillance since the Paris Agreement was signed illustrate that the IMF's macroeconomic advice to countries is very often couched in a business-as-usual approach to fossil fuel-based energy infrastructure, that is misaligned with global climate goals. This is important, in terms of illustrating the baseline from which IMF policy advice is starting, as the Fund begins the process of developing more detailed guidance for staff on implementing the CSR.

Figure 2 | Countries advised by IMF on development of fossil fuel infrastructure (December 2015 to March 2021)



Source: Sward et al. (2021): 21.

The Fund advised 36 per cent of member countries to privatise their energy-related state-owned enterprises (SOEs) or gave generalised calls to privatise SOEs between December 2015 and March 2021 (see Figure 3). In total, 117 of the 595 Article IV reports, in a total of 69 countries, encouraged the privatisation of SOEs in a way which is likely to impact on

energy SOEs. Of this total, 52 reports contained explicit advice, in 40 of the 69 countries, to privatise or reform SOEs in the energy or power sector. In the remaining countries, the Fund gave generalised calls to privatise SOEs, which were considered likely to impact on SOEs in the energy and power sector.[10]

The privatisation of SOEs more generally forms one pillar of the Fund's larger austerity agenda. Advice around the privatisation of SOEs was almost always given in the interest of fiscal sustainability, often as part of fiscal consolidation measures, and sometimes to support the reduction of the public sector wage bill. Neutral or positive mentions of any type of SOE were rare, and SOEs are described almost invariably as a fiscal risk in the Article IV reports. Calls for public sector reform of SOEs are often widespread and based on an assumption that the predicated gains in "efficiency" far outweigh any value in conserving a government's capacity to control public investments.

Yet, the extent to which the privatisation of SOEs is seen as effective in bolstering fiscal sustainability in practice remains unclear, and in energy and power provision, this can be particularly problematic, where the privatisation of ownership can potentially affect the coordination role required for a just energy transition. In a context where government leadership is required to steer urgent and bold action, and governments are required to act as midwives of a just transition, the Fund's assumptions underpinning this advice require greater scrutiny.

This is particularly critical as the world moves ever deeper into transitioning to a low-carbon economy and as some fossil fuel assets need to be retired. Governments often sign long-term power purchase (or other) agreements with private sector partners, which can leave countries at fiscal risk, while also limiting the prospects of rapidly phasing out fossil fuel-based energy sources in favour of cleaner and increasingly cheaper renewable energy alternatives.

For example, in both Indonesia and Pakistan, the net-benefit is already

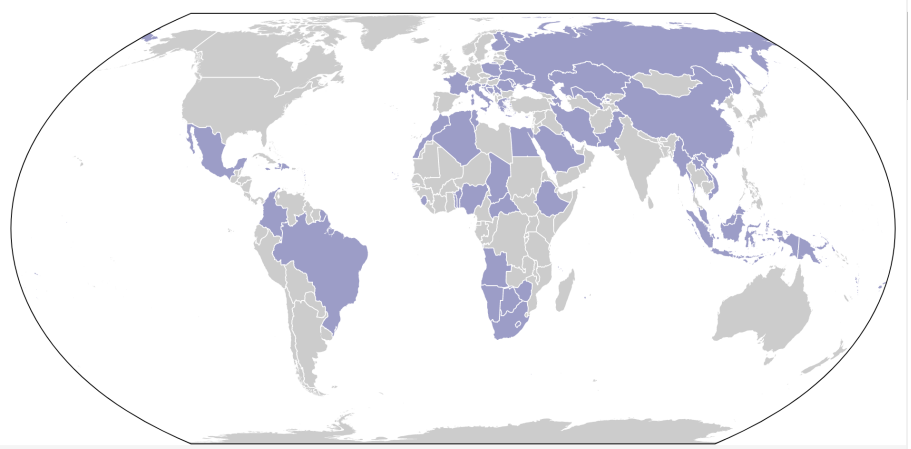
[10] Fifty-two of the 117 recorded observations had direct and/or explicit reference to privatisation or to reform of SOEs in the power or energy sector. In the remaining recorded observations, a wholly generalised call for SOE reform with insufficient specificity to rule out the power sector was recorded (often these would include broad and sweeping recommendations to reform large sections of the SOE sector and can be assumed to include some energy-sector privatisation).

questionable, as privatised energy has resulted in substantial fiscal obligations on these governments to comply with unfavourable contractual obligations (Nicholas 2021). In Pakistan, IMF advice repeatedly calls for SOE privatisation. Yet, as the 2015 Article IV report noted, government guarantees to energy companies already amounted to 2.3 per cent of GDP.[11] Pakistan is set to channel 10 billion US dollars per year in "capacity payments" to private companies by 2023 related to underperforming fossil fuel energy plants and is struggling with significant debts as a result of this – including "coal debts" to China (Nicholas 2021). This is a massive fiscal burden, even though such advice is painted as fiscally prudent (IMF 2021c). Such privatisation efforts have already resulted in the country agreeing to liquefied natural gas (LNG) privatisation with long-term contracts with private investors, which could constrain the government's ability to retire these assets due to contractual obligations protected by investor-state dispute settlement (ISDS) arbitration (Tienhaara and Cotula 2020). ISDS presents an increasingly dire threat to the low-carbon transition, more generally. As a report published in 2020 by the International Institute for Environment and Development noted, "ISDS protects most of the world's 257 foreign-owned coal plants, which must be retired early in order to put the planet on track to keep temperature rise below 1.5°C above pre-industrial levels" (IIED 2020). This is also explored in more detail in the Indonesia case study in Section 2.3 of Sward (2021).

In cases where privatisation *does* potentially lead to increased renewable energy power sources in the power mix, it is unclear from the results whether the IMF is doing enough to ensure that this shift occurs alongside an effective social dialogue with national unions and workers that ensures a just transition for those who lose out.

[11] IMF Article IV 2015 "government guarantees and circular debt among energy SOEs represent contingent liabilities amounting to 2.3 per cent and 0.8 per cent of GDP, respectively".

Figure 3 | Countries advised to directly or indirectly privatise energy SOEs (December 2015 to March 2021)



Source: Sward et al. (2021): 23.

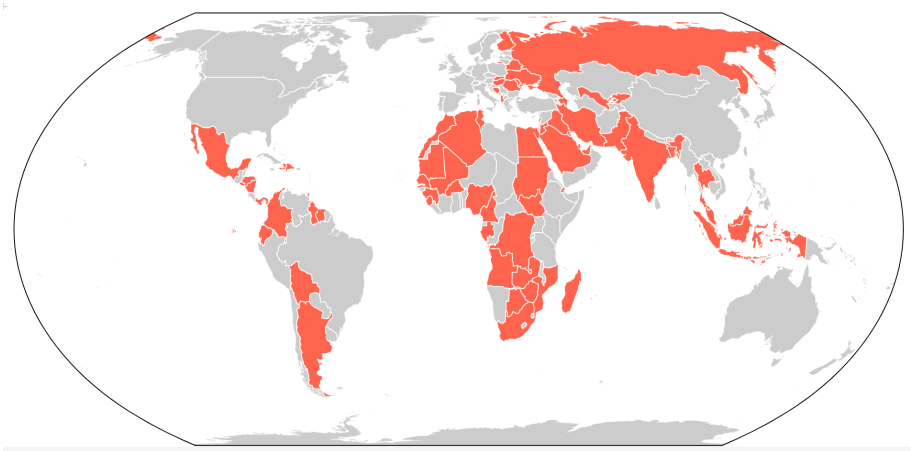
The Fund advised 37 per cent of member countries to reduce or eliminate fossil fuel subsidies in 22 per cent of reports since December 2015 (see Figure 4 below), with this advice mainly focusing on demand-side policies (i.e. consumer subsidies). This advice is largely positioned in Article IVs as part of a broader agenda to constrain public spending and as part of fiscal consolidation.

A reduction in demand-side energy subsidies cannot be expected to produce a dramatic reduction of consumers' carbon-dependent energy consumption where renewable energy provisions are not yet established as immediately viable alternatives. Thus, in this form, it can be seen as a type of "green structural adjustment", particularly in emerging and developing economies, where financing for investment in green alternatives may be limited currently.

Further, although the IMF advice to remove broad-based fuel subsidies is often backed by advice to compensate the poorest through targeted social safety-net measures to account for the socio-economic impacts of

subsidy removal, such measures are often rife with targeting errors, according to research (for instance, see Kidd and Athias 2020), which limits their effectiveness in mitigating harms to the poorest recipients.

Figure 4 | Countries advised to reduce energy subsidy (December 2015 to March 2021)



Source: Sward et al. (2021): 24.

Overall, the IMF's demand-side reforms are insufficient to address transition risks, and often negatively impact citizens of emerging and developing economies in a world still largely dependent on fossil fuels (Sweeney 2020). As noted in a 2019 report by UN Women and the International Labour Organization, "Higher energy prices […] tend to slow down economic activity and thus generate unemployment. The sudden removal of fuel subsidies and consequent increases in prices have sparked protests and violent riots in many countries" (Ortiz et al. 2019: 120). In some cases, for example Jordan in 2012 (Al-Khalidi 2012), and Ecuador in 2019 (IISD 2019), these reforms have been linked to large-scale political unrest. In 2019, prices in Haiti rose by 51 per cent after IMF advice to "eliminate regressive fuel subsidies", with widespread riots in 2019 culminating in the prime minister's resignation just eight days after announcing the cuts (Perrigo 2018). In Nigeria, the IMF has called for cuts to consumer

fuel subsidies over a number of years, with reforms ultimately enacted in 2020 during the Covid-19 pandemic. In 2012, these reforms led to widespread riots and nationwide strikes. In 2020, record low oil prices led to less resistance, but with pressure from rising prices building (George 2021), there are predictions of new large-scale protests, leading the 2020 Article IV to advise the government to hold fast to its decision (IMF 2020). These examples show that the IMF's fixation with demand-side fossil fuel subsidies is often at odds with populations at large – pointing to the need for a reset in how the IMF engages on this issue in a way that is better aligned with an inclusive social dialogue on how to ensure a green and just energy transition, in order to help avert runaway climate change impacts.

Conclusion: Connecting the dots between a just energy transition and IMF policy advice

Ultimately, transition risks, as they are emerging in the Global South, are embedded in wider unequal power relations within the global economic system, with new research indicating the global North drains from the South of commodities worth 2.2 trillion US dollars per year, in Northern prices (Hickel et al. 2021). IMF policy prescriptions, which have often encouraged an increase in carbon-intensive exports alongside fiscal consolidation measures, have played a significant role in embedding these extractive processes in the economies of many countries. This chapter seeks to contribute to the wider discourse around the need to reverse this trend, which will only be possible through a radical re-imagination of how the international financial architecture is governed. While this may seem a lofty aim, it is a prerequisite for achieving a just energy transition that at once allows countries to achieve global climate ambitions while addressing the increasing inequality gap within and between countries. Furthermore, just energy transitions, particularly in the Global South, must be embedded in wider efforts to build resilience to climate and other shocks.

In practice, addressing transition risks from climate change in an equitable manner will require the IMF to abandon its continued adherence to fiscal consolidation prescriptions. For emerging and developing economies, entering another era of austerity on the heels of the Covid-19 cri-

sis will render the climate commitments of these countries impossible to achieve. This is particularly the case given the larger flaws of the global financial system, including the lack of an effective sovereign debt workout mechanism or an international tax body to improve domestic resource mobilisation efforts.[12]

In response to the CSR, civil society groups have set out a framework for IMF engagement in country-level surveillance that explains how the IMF can better respond to multiple crises, including the climate crisis, growing structural inequalities and the impacts of the Covid-19 pandemic that all undermine the achievement of women's rights (ActionAid et al. 2021, Saalbrink and Amerasinghe 2021). Despite this, there is evidence that the IMF's policy advice is headed in the opposite direction, based on civil society analysis of IMF staff reports. Research by Eurodad published in October 2020 found that 72 countries which received IMF Covid-19 financing made commitments to begin fiscal consolidation as early as 2021, worth 2 per cent of GDP on average (Munevar 2020). Similarly, research conducted by Oxfam in 2020 found that in 84 per cent of IMF Covid-19 loans, IMF staff encouraged, if not directly required, countries to adopt tougher austerity measures in the aftermath of the crisis (Oxfam 2020). Research by ActionAid International found that "despite the virus exposing the manifest shortcomings of developing country health systems, [public sector] wage bills remain a target for rapid cuts once the initial stages of the crisis are over" (ActionAid 2020).

The IMF plays a critical role in shaping policies that governments adopt to achieve macroeconomic stability. This chapter shows how existing IMF policy advice is exacerbating transition risks for many member countries and undermining their ability to achieve a just energy transition. For the IMF, aligning policy advice with just transition principles will require moving beyond a strict climate lens. Indeed, a just transition requires that policy frameworks address, rather than exacerbate, inequalities; transform energy systems to work for people, nature and the planet; and ensure inclusiveness and participation (Anderson and Kwizera 2020). This

[12] Rich countries have thus far failed to meet the 100 billion US dollars a year commitment, with the UN Environment Programme estimating that adaptation costs alone for developing countries could rise to up to 300 billion US dollars a year by 2030. See United Nations (2021).

presents a direct challenge to the IMF's policy orthodoxy, which tends to be centred on ensuring reduced public spending and increasing export revenues, including through carbon-intensive sources.

The IMF also has significant influence on what are considered financially viable investments, an important consideration for developing countries seeking climate finance for green initiatives. Governments and investors often look to IMF analysis and advice in assessing risks. Therefore, the IMF needs to contend with its role in the broader climate finance architecture and how it can facilitate finance flowing away from carbon-intensive sectors and toward the transitions that are required. Crucially, this will also require the IMF to concurrently collaborate with governments, trade unions, employers and civil society at large to integrate a just transition into countries' macroeconomic policies.

The newly adopted CSR takes steps to increase attention to climate, but the Fund is only at the beginning of developing its policy recommendations to address transition risks. Author recommendations for such guidance are contained in the report *IMF Surveillance and Climate Change Transition Risks* (Sward et al. 2021), upon which this chapter is based.

They include:

- The IMF must develop clear guidance for staff on how to assess transition risks in Article IV surveillance, based on the principle of "do no harm", including the risks posed by the Fund's own advice on, *inter alia*, fiscal consolidation and support for carbon-intensive energy and exports.
- The IMF should shift its focus to eliminating fossil fuel producer subsidies and expanding investment for renewable energy and other green alternatives, rather than focusing primarily on eliminating or reducing consumer subsidies, while ensuring these efforts remain firmly embedded in countries' national just transition dialogues.
- The IMF should re-evaluate its advice on privatisation in the energy sector, particularly given the risks of compensation claims for stranded fossil fuel assets by private investors, and instead support governments to strengthen public institutions and public services, so that they can effectively respond to climate change. As part of this re-think, the Fund should create an institutional view

on sustainable industrial policy that empowers IMF operations to support effective and coordinated strategies for sectoral and economic transformation.

- The IMF can help countries to better judge the costs of transitioning to a low-carbon future. For low- and middle-income countries, this should be part of a wider discussion about mobilising greater resources from wealthy countries to fund a "just energy transition". This is particularly the case in emerging and developing economies where governments already face rising costs of capital – or lack market access altogether – and where efforts to "de-risk" green investments for the private sector may lead to the state taking on substantial liabilities. An essential pillar of this process will also be supporting countries to strengthen labour market institutions and achieving universal social protection, including social protection floors, to enable a just transition.
- Given the current context, the Fund's climate work should not be siloed. Climate efforts need to be considered alongside more significant debt cancellation efforts; investing in gender-responsive public services; increasing fiscal and policy space for countries to respond to the Covid-19 pandemic; abandoning austerity; and improving the quality and quantity of climate finance. The IMF should solicit input from UN institutions and preeminent experts in the field in developing guidance, as the IMF has limited expertise on climate change at present.
- The IMF should improve national level consultation on Article IVs, including with civil society organisations, women's rights groups, trade unions, climate groups and indigenous peoples' organisations, in an effort to integrate social dialogue into surveillance and the design of lending programmes.

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7.

Green Investments from Sovereign Wealth Funds: The Case of Russia

Yaroslav Lissovolik

In 2021 the global policy agenda became significantly more geared towards green development. This relates to all the main centres of the global economy, including the US and China. Russia was also part of that trend. The Ministry of Economic Development adopted a host of strategic documents governing Russia's energy transition, while Russia's President Vladimir Putin made public Russia's goal of achieving net-zero carbon emissions by 2060.

This increase in the prominence of the green agenda translated into discussions about the need to develop Russia's "green finance" instruments, including such segments as the rouble green bond market. One important debate that emerged was on the possibility of investing Russia's key sovereign wealth fund (SWF) – the National Wellbeing Fund (NWF) – into green instruments. In autumn of 2021, Russia's Deputy Finance Minister Timur Maximov confirmed that the Ministry was entertaining the possibility of investing part of the National Wellbeing Fund into sustainable projects.

This chapter seeks to explore the scope and the possibilities offered by the possible investment of NWF's resources into "green instruments". The chapter is organised as follows. The first section provides a general overview of the approaches and trends observed in green strategies of the SWFs. The second section discusses the current setup of the National Wellbeing Fund as well as the ongoing debate about the possibility of investing part of the Fund into green projects. The final section assesses the prospects and the implications of such investment based on the existing international experience, including that of Norway's Pension Fund.

7.1 The role of sovereign wealth funds in advancing green development

With green investments increasingly taking on significant size across the world economy there is more discussion about the need to create cooperative platforms among the SWFs to co-finance sizeable outlays. Apart from the global platforms that bring together the largest SWFs (most notably the G20 countries), there may also be a need to create cooperative platforms among the regional SWFs. In fact the regional ambit may prove more relevant for ecological projects given that environmental development inherently exhibits strong spillover effects that defy national borders.

At this stage there are a number of global networks and initiatives that bring together the world's largest institutional investors, including SWFs, to drive the green investment agenda. These include European Long-Term Investors, the Institutional Group on Climate Change and the Network on Climate Risk. Some of the wealth funds from the Middle East, including the Abu Dhabi Investment Authority, the Kuwait Investment Authority, the Qatar Investment Authority and the Public Investment Fund of Saudi Arabia, are signatories to the One Planet SWF Framework. At the meeting held by the International Forum of Sovereign Wealth Funds in 2016, "participants highlighted that SWFs are particularly well-positioned to become trailblazers in green investment" (Braunstein et al. 2017).

Recent data and surveys reveal a growing integration of the green agenda into the decision-making and strategies of the world's SWFs. These were the findings of an inaugural survey of 34 SWFs, representing 43 per cent of the world's sovereign funds, conducted in September 2020 by the International Forum of Sovereign Wealth Funds and the One Planet Sovereign Wealth Funds (IFSWF and OPSWF 2021).

The survey reveals that climate-related strategies represent more than 10 per cent of portfolios for 30 per cent of responding wealth funds. The survey also found that these funds made 18 investments in agriculture technology, forestry and renewables opportunities in 2020 at a total value of 2 billion US dollars, up from eight investments valued at 324 million in 2015. Overall, according to the survey "sovereign wealth funds have invested more than $5 billion in agritech, forestry and renewables op-

portunities over the past five years as part of an increased push toward climate change-aware investing" (Baker 2021).

Just over a third of responding funds (36 per cent) have a formal climate-change strategy in place, with 55 per cent of these funds adopting the policies since 2015 and 30 per cent since 2018.

The survey came up with the following recommendations to wealth funds based on the survey findings (IFSWF and OPSWF 2021: 4):

- to adopt and implement climate-related strategies;
- to seek appropriate talent and expertise;
- to explore board member and executive education;
- to use metrics to show not only climate impact but also comparable returns and risk reduction;
- to communicate to all stakeholders the strategic importance of climate change;
- to partner with peers and international initiatives to share experience and generate greater leadership from within the wealth fund network.

The latter recommendation dovetails the recent Valdai Club initiative to enhance cooperation among the largest SWFs against the backdrop of the Covid-19 pandemic. In particular, in 2020 the Valdai Club together with Shafi Aldamer and Curran Flynn from King Fahd University of Oil and Minerals advanced the proposal to create a platform for the SWFs of G20 countries to boost long-term cooperation, direct investments and the formation of bilateral/ trilateral/ multilateral investment accords (Aldamer et al. 2020). The findings of this policy brief were included in the T20 communiqué, which encourages the G20 to promote "the creation of a platform that would bring together the sovereign wealth funds of its members, possibly in coordination with the International Forum of Sovereign Wealth Funds" (T20 2020: 13).

Such a platform would encourage the G20 states to strengthen their economic cooperation, bolster mutual interests, improve multilateralism and develop opportunities for their SWFs. Additionally, it would act as an emergency tool in easing the impact of a global crisis, such as the current Covid-19 pandemic, as it can be employed as an anti-crisis measure via the investments of the G20 states' SWFs. One important avenue of cooperation for such a platform for SWFs could be the elaboration of green

investing principles and benchmarks for the major SWFs, which in turn would support the advancement of a green recovery in the global economy in the aftermath of the Covid-19 pandemic.

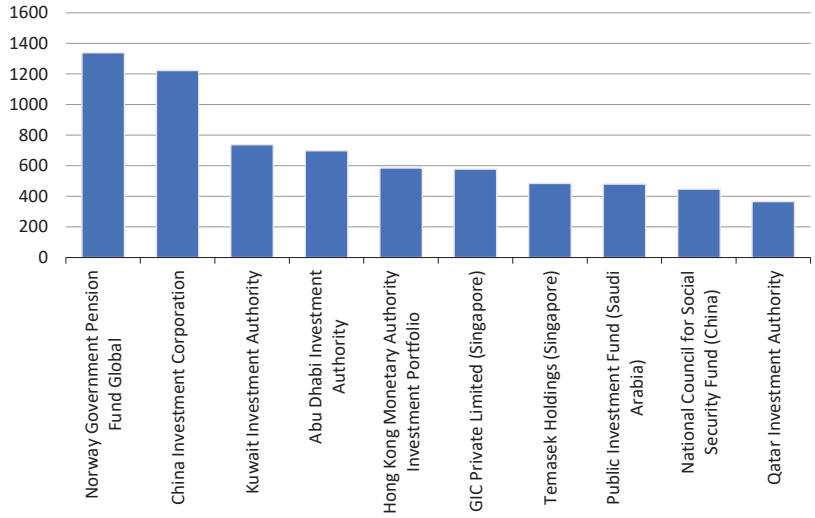
7.2 International experience of green investments from SWFs

SWFs accorded significantly more emphatic in the past several years. According to Bloomberg Intelligence (2021), from 2021 to 2025, global environmental, social and governance (ESG) assets could grow from 38 trillion to 53 trillion US dollars with the SWFs likely becoming a dynamic part of the growth in green investments. Part of the growth will likely come from large volumes of green bonds – the volume of green bonds is projected to grow from 2.2 trillion in 2021 to 11 trillion US dollars in 2025 according to Bloomberg Intelligence (2021).

Norway may feature as an important benchmark for Russia in introducing the principles of sustainable and green investing into the practices of the National Wellbeing Fund. Firstly, Norway's counter-cyclical reserve accumulation was the main inspiration for Russia's creation of its Stabilization Fund several decades ago. Secondly, Norway's Pension Fund – currently one of the largest SWFs in the world – is one of the leaders in promoting the principles of sustainable finance. Norway's Pension Fund was one of the first to forego investments into companies that violate ESG principles. The list of companies that the Fund considers to be unfit for investments has continuously expanded and now it is more than 150 companies.[1] To 2021 the Fund sold its entire portfolio of oil-producing companies (Holter and Sleire 2019). Overall, however, sustainable investments are still a relatively small share of the total size of the Fund – they account for at least 11.5 billion US dollars since its foundation out of 1.35 trillion US dollars of the total size of the fund in 2020 (NBIM 2021).

[1] Norges Bank Investment Management (NBIM) website: *Observation and Exclusion of Companies*, latest update 21 December 2021, https://www.nbim.no/en/the-fund/responsible-investment/exclusion-of-companies.

Figure 1 | Top-10 largest sovereign funds by assets, billion US dollars



Source: Sovereign Wealth Fund Institute (SWFI).

The second largest SWF in the world – China Investment Corporation (CIC) –adopted its sustainable investment strategy in 2020. Another leading player in the SWF universe, UAE's Mubadala fund, which owns an international renewable energy and sustainability company Masdar. The company financed the construction of one of the world's largest solar power plants and offshore wind farms. Masdar has acquired a 50 per cent share in three wind-electricity and five solar electricity projects in the US (SWFI 2020).

In Russia, investments in renewable energy were publicly announced by the Russian Direct Investment Fund (RDIF). In December 2020, the Fund created a joint venture with Fortum to invest in the renewable energy sector in Russia. The first deal was the acquisition of wind-power plants in the Ulyanovsk and Rostov regions with a total capacity of over 350 MW (RDIF 2020). Apart from the RDIF, there are a number of other investment vehicles in Russia, most notably Russia's largest SWF – the National Wellbeing Fund that is yet to develop its roadmap for investment into "green instruments".

7.3 Russia's National Wellbeing Fund

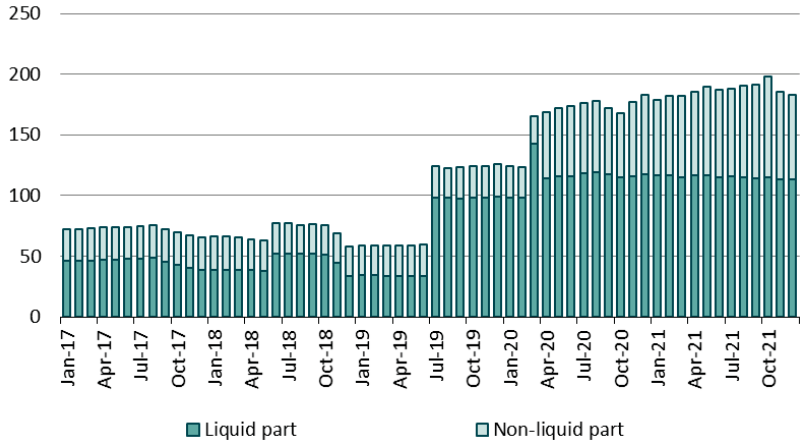
Russia's experience with building reserves and creating its own SWFs was to a considerable degree inspired by the experience of Norway. Given concerns with the country's dependence on oil prices, back in 2004 the government created the Stabilization Fund. The Stabilization Fund accumulated excessive oil revenues (above 20 US dollars/barrel and later 27 US dollars/barrel) and was spent on various purposes, including budget deficit funding, external debt redemptions and financing of public development companies. At its peak in late 2007 the Stabilization Fund assets reached around 150 billion US dollars.

In 2007 the Stabilization Fund was split into the Reserve Fund and the National Wellbeing Fund. Initially, the Reserve Fund received oil and gas revenues in excess of the oil and gas transfer amount set in advance (which was later replaced by the base oil price), but below its normative value and income from its assets. If oil and gas revenues exceeded the normative value of the Reserve Fund, they were accumulated into the National Wellbeing Fund. Similar to the Stabilization Fund, the Reserve Fund was spent on various purposes, including financing budget expenditures. The aim of the NWF was financing of voluntary pension savings and the Pension Fund deficit. After 2014 due to low oil prices the Reserve Fund had dwindled and was merged with the NWF at the end of 2017.

Since 2017, Russia's fiscal policy was focussed on reducing the dependency of the economy on oil prices and forcing it to operate as if the oil price were at a level considered to be sustainable in the long run. This principle is referred to as the "budget rule". For 2017, the government chose a "base" level of 40 US dollars/barrel. This price is increasing by 2 per cent per year and is used as the base price from 2018 onwards (so it was 40.8 US dollars/barrel in 2018, 41.6 in 2019, 42.4 in 2020, 43.3 in 2021). This base price is then used to calculate what the government refers to as "additional oil and gas revenues". This is the reserve that will be added to the National Welfare Fund and represents the difference between actual oil and gas revenues and the revenues collected at the base oil price (Stroutchenevski and Lomivorotov 2017). If oil price falls below the base level, the NWF will finance insufficient funding of the planned budget expenditures.

The fund currently consists of the liquid and non-liquid parts, the former comprising "additional" oil and gas revenues. The annual intake of these additional reserves is typically transferred into the liquid part of the NWF in the middle of the year (an exception was the pandemic year of 2020). The liquid part (113.3 billion US dollars as of 1 December 2021), together with the accumulated additional revenues, reached nearly 147 billion US dollars as of 1 December (Stroutchenevski et al. 2020b). The "non-liquid" part of the NWF represents long-term deposits at VEB, VTB and PSB, as well as domestic and international bonds and stocks. This part of the NWF is relatively stable and stood at 71.9 billion US dollars as of 1 December 2021. The total amount of the NWF assets as of 1 December 2021 stood at 185.2 billion US dollars.

Figure 2 | NWF assets, end of period, billion US dollars



Source: Russian Finance Ministry.

With regard to the non-liquid part, the NWF has already invested in several infrastructural projects prior to introducing the budget rule. These include the Central Ring Road, Baikal–Amur and Trans-Siberian railways, the Elegest–Kyzyl–Kuragino railway, a coal port terminal in the Far East, the mineral resource base of the Republic of Tyva, "smart grids", Yamal LNG, the Eastern part of the Baikal–Amur Mainline, Hanhikivi Nuclear Power Plant. These investments constitute around 8 billion US dollars in

total as of 1 December 2021. In addition, there are about 7.1 billion US dollars of deposits in VEB and 1.8 billion of deposits in VTB and PSB. The NWF holds about 48.2 billion US dollars of common stocks, 3.9 billion in preferred equities and 3 billion in sovereign bonds of foreign countries.

In accordance with the budget rule, in 2017–19 additional oil and gas revenues were invested exclusively in highly liquid financial assets in FX, thus becoming part of Russia's gross international reserves and kept with the National Wealth Fund. At the same time, the budget rule states that if the liquid part of the NWF exceeds 10 per cent of GDP, the array of financial instruments for investment may be widened to include:

- foreign sovereign debt of lower quality, liabilities of national agencies and central banks;
- debt of international financial organisations such as the Eurasian Development Bank;
- debt and equity of foreign companies;
- Russian securities related to the financing of infrastructure projects;
- deposits with banks, including VEB;
- shares in investment funds operating in cooperation with the Russian Direct Investment Fund (Stroutchenevski et al. 2019).

The liquid part of the National Wellbeing Fund has accumulated 113 billion US dollars and its composition is concentrated in euro (39 per cent), yuan (31 per cent), gold (20 per cent), British pounds (5 per cent) and Japanese yen (5 per cent). The investment from the National Wellbeing Fund into rouble-denominated sustainable projects and financial instruments will involve the conversion of hard-currency reserves into roubles – a factor that may provide some support to the rouble exchange rate.

The government was granted the opportunity to invest the liquid part for the first time in 2020, and it proceeded to acquire a stake in Sberbank from the CBR and Aeroflot. Under the fiscal rule, the National Wealth Fund may be used to finance infrastructure investment once the liquid part of the fund exceeds 10 per cent of GDP (Stroutchenevski et al. 2020a). There is clearly scope to extend the range of the possible projects that could be financed from the National Wellbeing Fund to include sustainable development/environmental projects, particularly given the notable changes in Russia's policy agenda in 2021.

7.4 The green debate around Russia's National Wellbeing Fund

Starting from 2021 the policy agenda in Russia was notably transformed, with environmental standards and norms taking on greater prominence. In particular Russia has formulated its net-zero goal to be attained by 2060. With respect to Russia's fiscal reserves, Russia's Deputy Finance Minister Timur Maximov declared the Russian authorities would evaluate the possibility of investing the resources of the National Wellbeing Fund into environmental projects.

However, the approaches of the Ministry of Finance and the Ministry of Economic Development in this regard have diverged. The Ministry of Finance believes that there is no need for a special tax for the ESG market; meanwhile the Ministry of Economic Development discussed with the Central Bank a zero tax on income on green bonds for three years and reimbursement for the verification of green projects up to 1 million roubles, according to Deputy Minister of Economic Development Ilya Torosov. However, these initiatives have not yet taken shape.

Regarding the regulation of the issuance of green instruments, at the end of 2020 the Bank of Russia created a working group to develop the financing of sustainable goals. Among the tasks of this group are the development of sustainable bonds and loans markets and the promotion of green mortgages. Several concessions were introduced. From November of this year, issuers can label their bonds as "green" if they are called upon to finance "green" projects that pass not only international, but also Russian criteria. Also the requirement to repay a loan early if the use of funds was inappropriate was declined – instead, investors can demand to increase the coupon or redeem bonds.

The first sustainable bonds in Russia were issued in December 2018. Currently the volume of these bonds is only 5.5 billion US dollars, versus worldwide 2.1 trillion US dollars at the end of the first half of 2021, according to the Climate Bonds Initiative. Across Russia's corporate sector the largest share of green bonds has been issued by Russian Railways; the company uses the proceeds from these bond placements to acquire electric freight locomotives, which is used to reduce the company's carbon

gas emission. Across regional constituencies, the city of Moscow placed a green bond to finance the purchase of 400 electric buses and expand the subway network; the overall effect from these measures is expected to result in a reduction in the number of diesel cars used by the population.

In delineating the potential directions of investments from the National Wellbeing Fund, the government will be guided by the taxonomy of the classification of projects as green (approved in September 2021) as well as the strategy of development with low gas emissions (approved in October 2021). In line with these normative regulations some of the projects that could be selected for the financing from the NWF could include those pertaining to the transportation of Russia's hydrogen to the domestic market as well as its exports. Potential investments from the National Wellbeing Fund may include sustainable development projects undertaken by Russia's corporates as well as sustainable development projects in power generation and transportation. Some of these projects are listed in the table below.

Table 1 | Sustainable development projects undertaken by Russia's corporates

Company	Details of the project
Oil and gas sector	
Novatek	The company is considering building a green ammonia plant in Yamal with an annual capacity of 2.2 million tonnes and 130 kilotons of hydrogen.
Gazprom	It created the subsidiary Gazprom Vodorod, which will act as the centre of all hydrogen projects. Methane pyrolysis is being considered as a method of hydrogen production, but the implementation of large-scale projects requires corresponding long-term supply contracts. Currently, several potential projects are being discussed, including supplying hydrogen to German M&M companies, as well as supplying blue ammonia to Japan.
Gazprom	Gazprom proposes to include its gasification programme in ESG projects. The programme is expected to lead to a decrease in the use of coal and diesel fuel in the generation of electricity and heat. Gazprom estimates that it will reduce CO_2 emissions by 23 million tonnes by the end of 2024. The cost of investments is estimated at 1.5 trillion roubles over the next 10 years.
Rosneft	The company develops wind-power projects in Taimyr.

Metal and mining	
NLMK	The company is planning to build a new mining and metallurgical complex at the Stoilensky GOK. The total investment is estimated at 250 billion roubles and the project is to be implemented over 2024–27 with commissioning in 2027–28. The company expects to halve its carbon dioxide emissions from hot-briquetted iron (HBI) steelmaking versus conventional technology.
Metalloinvest	In 2024, the company plans to launch two projects, which should increase HBI production capacity from 5 million tonnes to 9 million tonnes: the HBI-4 complex at Lebedinsky GOK will add 2 million tonnes, and another 2 million tonnes will be contributed by a project in Kursk Region, Mikhailovsky HBI (55 per cent owned by USM, 45 per cent owned by Mikhailovsky GOK). Both projects are designed with the capability to fully substitute natural gas with hydrogen.
MMK	The company plans investments for 2022–25 at 5 billion US dollars, about 60 per cent of which will be directed toward projects related to the environment. MMK plans to reduce the intensity of carbon dioxide emissions by 20 per cent from 2021 to 2025 through the construction of a new blast furnace, a coke oven battery and energy-saving measures. The company is also exploring how to achieve carbon neutrality after 2025.
Nornickel	Nornickel plans to invest 6 billion US dollars of the planned 35 billion capex in environmental projects in 2021–30. It seeks to reduce sulphur dioxide emissions by Norilsk Division under the so-called "Sulphur Programme 2.0" and reduce the intensity of carbon dioxide emissions (by 16 per cent versus the 2020 level by 2028). It also will carry out the clean-up and removal programme for legacy industrial and construction waste in Norilsk area.
Rusal	Rusal intends to modernise four of its plants in Siberia. The plan entails the construction of new capacity with pre-backed anode technology, as well as the simultaneous dismantling of modernisation of old capacity on Soderberg technology. Overall, the total volume of capacity to be modernised is estimated at 1.4 million tonnes. The project is to be completed over 2021–30. Investments for it, along with the expansion of the Taishet anode plant, are estimated at 4.9 billion US dollars, most of which will be invested in 2023–27. The aim is to reduce emissions of carbon dioxide, benzopyrenes and fluorides into the atmosphere, as well as to reduce electricity consumption by 17 per cent.

Source: SberCIB Investment Research.

Thus far the Russian authorities have not specified the list of potential instruments for the green investments of the NWF. The Russian government has already approved investments from the National Wellbeing Fund for the amount of 2.5 trillion roubles in 2022–24. These investments are to include infrastructure projects such as the high-speed Moscow–Kazan

M12 highway as well as the Russian Railways project for the transportation of coal from Yakutia.

In 2021 the threshold for the accumulation of reserves in the National Wellbeing Fund was raised from 7 to 10 per cent of GDP. This effectively postponed the accumulation of extra reserves that could be directed into the investments into projects in the real sector of the economy as well as investments into green instruments. In effect the Russian authorities are opting for greater emphasis to be placed on the attainment of macroeconomic stability and reserve accumulation rather than boosting growth. According to the estimates of Russia's Finance Ministry, the 10 per cent of GDP threshold level is likely to be reached by 2023–24.

According to the estimates of SberCIB, the amount that could be allocated to sustainable development projects from the NWF could reach 4 billion US dollars starting from 2023 (based on the Bank's projections for the dynamics of the oil price). The size of such allocations is likely to grow further in 2024–25, provided oil prices remain elevated. According to the investment guidelines developed for the NWF, investment into one given project should not exceed 40 per cent of the entire funding of that project. In the case of financial instruments, the upper limit is set at 50 per cent of the total size of the issue, with the limit for high-liquidity instruments set at 80 per cent. This implies that the total amount of investments related to the NWF's allocations to sustainable projects in 2023 could reach 5–10 billion US dollars.

Conclusion

Russia's market could receive a significant boost in terms of the development of "green instruments" via investments from the country's SWFs, most notably the National Wellbeing Fund. With the 10 per cent of GDP cap likely to be exceeded in the next few years if oil prices remain elevated, additional reserves could be channelled into green bonds and environmental investment projects. Given the low base effects, even moderate levels of investments from the National Wellbeing Fund amounting to several billion dollars in the next few years would represent a significant boost to the development of the green segments of Russia's financial markets.

To bolster the green transformation across the respective SWFs, the corresponding provisions could be introduced into the regulations and guidelines governing the operations of such funds, including the so-called Santiago principles. Greater activism across the respective SWFs in building platforms to co-finance and promote green development could also be advanced. Multilateral organisations such as the International Monetary Fund as well as the World Bank could play an important role in coordinating and guiding the process of cooperation in sustainable financing across the SWFs as well as national and multilateral/regional development institutions/development banks.

Future areas for research could include an analysis of the effects of green investments from the SWFs on the respective segments of countries' financial markets, most notably local-currency bond markets as well as stock market effects. There may also be scope to examine the potential for coordinated anti-crisis measures across national SWFs that are geared towards achieving a "green recovery".

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8.

ESG Investing: Toward a Common Framework

Claude Lopez

ESG investing, short for environmental, social and governance investing, has been booming globally in recent years, with asset owners and managers increasingly incorporating ESG into their financial analyses and decisions. The Global Sustainable Investment Alliance reports that the value of assets under management with an explicit ESG mandate reached "USD35.3 trillion in 2020, a growth of 15% in two years, and in total equating to 36% of all professionally managed assets across regions covered" (GSIA 2020: 5). Investment strategies that incorporate ESG criteria command a significant fraction of all professionally managed assets, ranging from 24.3 per cent in Japan to 61.8 per cent in Canada.

Several factors drive this enthusiasm. The benefits of identifying and managing ESG risks in addition to the financial risks for a firm and its investors are well documented. Reducing exposure to polluters or companies with poor waste management policies, for example, can help mitigate regulatory risk. Similarly, screening for good social practices (such as respectful workplace culture) can reduce exposure to scandals that could damage a company's reputation.

Furthermore, the number of investors who rely on ESG investing to meet their values (e.g., ethical, religious, political or cultural) keeps increasing. Investors, for instance, may integrate ESG factors into their financial decisions to identify and exclude companies engaging in practices they find morally questionable, including low labour standards or human rights violations.

Finally, some investors, such as institutional investors or financial ad-

visors acting on behalf of a third party, may rely on ESG criteria to satisfy specific legal requirements. One of the world's largest investment funds, for example, the Norwegian Government Pension Fund Global, is mandated to avoid companies that contribute to or are responsible for "serious or systematic human rights violations, [...] serious violations of the rights of individuals in situations of war or conflict, severe environmental damage, [...] gross corruption, [or] other particularly serious violations of fundamental ethical norms" (NBIM 2018).

As a result, many investors have already been incorporating ESG issues into their investment frameworks. However, the modern reference to ESG investing denotes a more explicit, systematic integration of ESG factors into the investment process instead of a more informal, less structured approach.

Table 1 | Examples of environmental, social and governance factors

Environmental	Social	Governance
• Climate change policies, plans and disclosure practices • Air and water pollution • Deforestation • Biodiversity impact • Water stress • Waste and hazardous materials management • Usage of renewable energy	• Community engagement • Human rights • Labour practices • Product safety • Data security and customer privacy • Diversity and inclusion • Customer relations • Ethical supply chain sourcing	• Management structure • Executive compensation • Board composition • Business integrity • Transparency • Bribery and corruption • Lobbying • Whistleblower schemes • Shareholder relations

Source: Lopez et al. (2020): 11.

8.1 Investors' standpoint

Despite its growing popularity, ESG investing remains confusing for investors (State Street Global Advisors 2018). From substantial terminological and conceptual inconsistencies to the lack of standardised assessment, it is increasingly difficult to assess a firm's ESG performance.

ESG ratings have become essential in that process. There are currently at least 125 organisations, including niche players and major data providers and credit rating agencies, providing ESG ratings and research (Kram-

er et al. 2020). Yet, recent surveys find that many investors lack clarity around ESG terminology and definitions and find the ratings challenging to use, especially due to their lack of comparability (Wong and Petroy 2020, GAO 2020).

Divergences in ESG ratings are well documented. Berg et al. (2020) find that divergence in the definition of ESG, its scope and the factors used to measure it, explain the low correlation across ratings. Lopez et al. (2020) show that even when ratings rely on similar definitions, assessment of a firm can differ. Using publicly available data,[1] they identify two further issues that impact the ratings.[2] First, the measurement is an issue: rating providers may measure the same ESG factor differently. They employ hundreds of ESG-related variables. Some information comes from company reports and regulatory filings and should be consistent across agencies. Yet much information comes through interviews or questionnaires and third-party analyses that can diverge widely. Second, the methodology used differs. Each ESG agency has developed its methodology to decide what ESG-related indicators to consider and how to aggregate them into an overall score.

The inability to reconcile some of these rankings or understand why they differ makes it challenging for investors to integrate them in assessing a firm's risk profile.

8.2 Firms' standpoint

Incorporating an ESG framework into business operations and processes can help safeguard a company's long-term success by taking steps to mitigate ESG risks and potential related economic costs and reputational

[1] A total of 207 ESG indicators (58 related to environmental factors, 70 to social factors,and 79 to corporate governance factors), as well as 35 financial variables and information on both headquarters location and economic sector. The indicators were publicly available.

[2] Using machine learning technique called random forest, Lopez et al. (2020) analyse three distinct and complementary angles: (i) the variables' ability to predict the ESG scores; (ii) their contribution to the ratings predicted by our estimation; and (iii) the importance of the variables' interaction when predicting the ESG scores. Exercises (i) and (ii) help understand how informative individual variables are regarding the content of the ratings. On the other hand, (iii) provides insights into how that information is aggregated into a single score (not how agencies actually do it, but how it is done in terms of the estimated relations between ratings and explanatory variables).

damage (Lev 2021). Yet the increasing number of inquiries from investors and different disclosure forms depending on the framework or standards makes it challenging for companies to identify and disclose the relevant information.

So far, there are five major alternatives to help firms understand the key materiality issues they should consider and report on. These frameworks have different purposes, audiences and articulations of the materiality concept. More specifically, the global initiatives are as follows (Rifkin 2019: 5):

- CDP, formerly the Carbon Disclosure Project, "runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts."[3]
- CDSB, the Climate Disclosure Standards Board, "committed to advancing and aligning the global mainstream corporate reporting model to equate natural capital with financial capital."[4]
- GRI, the Global Reporting Initiative, "helps businesses and other organizations take responsibility for their impacts, by providing them with the global common language to communicate those impacts."[5]
- VRF, the Value Reporting Foundation, "offers a comprehensive suite of resources designed to help businesses and investors develop a shared understanding of enterprise value—how it is created, preserved and eroded." It now combines the Integrated Reporting (IR) Framework, previously known as International Integrated Reporting (IIR), which "provides principles-based, multi-capital guidance for comprehensive corporate reporting" and the Sustainability Accounting Standard Board (SASB) Standards that "inform disclosure to investors and guide investor decision making when embedded in investment tools and processes."[6]

SASB and GRI have the most holistic approach to ESG. With investors as their primary audience, the SASB standards strongly emphasise ESG is-

[3] See CDP website: *Who We Are*, https://www.cdp.net/en/info/about-us.

[4] See CDSB website: *About the Climate Disclosure Standards Board*, https://www.cdsb.net/our-story.

[5] See GRI website: *About GRI*, https://www.globalreporting.org/about-gri.

[6] See Value Reporting Foundation website: *About*, https://www.valuereportingfoundation.org/about.

sues expected to have a significant financial impact. In contrast, GRI standards focus on the firms and facilitate sustainability-reporting for them. CDP and CDSB focus solely on collecting critical environmental data.

In addition, there are two frameworks from the intergovernmental side:

- TCFD, the Task Force on Climate-related Financial Disclosures established by the Financial Stability Board, strengthens and expands climate-related financial disclosures "around four thematic areas that represent core elements of how organizations operate: governance, strategy, risk management, and metrics and targets".[7]
- UNGC, the UN Global Impact, is a "voluntary initiative based on CEO commitments to implement universal sustainability principles and to take steps to support UN goals".[8]

It is worth noting the distinction between ESG reporting standards and reporting frameworks. SASB and GRI standards provide specific instructions on what should be reported on ESG issues and which metrics should be disclosed. Frameworks such as TCFD or UNGC provide principles-based guidelines on what areas organisations should report on and how the data should be organised. While reporting standards and frameworks should go hand in hand, their current complexity and the numerous reporting alternatives available make understanding the disclosure process difficult.

Beyond these voluntary sustainability reports, several countries already require ESG disclosures. Krueger et al. (2021: 2) identified 29 countries that "introduced mandates for firms to disclose ESG information [between 2000 and 2017], including Australia (2003), China (2008), South Africa (2010) [and] the United Kingdom (2013)." Since 2018, EU companies with more than 500 employees have been required to report on environmental and social- and employee-related matters, human rights, anti-corruption and bribery matters following the corporate sustainabil-

[7] See TCFD website: *About*, https://www.fsb-tcfd.org/about.

[8] See UNGC website: *About the UN Global Compact*, https://www.unglobalcompact.org.

ity reporting – the EU directive on non-financial reporting.[9] Since 2020, all listed companies in Indonesia are required to publish sustainability reporting under the Financial Services Authority.

ESG disclosure is not mandatory at the federal level in the US. Still, the Securities and Exchange Commission (SEC) requires all publicly traded corporations to publish their environmental compliance costs.

8.3 Toward global standards

The different frameworks and formats, combined with the growing demand for information from investors, make it challenging for the firms to identify which information they should report and how it may impact them. Even if they use materiality to guide their internal strategy development process, firms are more and more reluctant to share their materiality matrices publicly.

In the face of the increased pressure from investors for information and complexity in reporting, public and private sectors seem to agree on the next step: ESG reporting needs to be consolidated, simplified and transparent.

In September 2020, the CDP, the CDSB, the GRI and the Value Reporting, combining SASB and IR Council, suggested that "existing frameworks, standards and standard-setting processes can provide the basis for progress towards a comprehensive corporate reporting system" (CDP et al. 2020: 13). In parallel, the Big Four accounting firms, Deloitte, EY, KPMG and PwC, unveiled their reporting framework for ESG standards (IBC 2020).

On the regulatory side, the International Organization of Securities Commissions (IOSCO) identified in February 2021 three priorities: "encouraging globally consistent standards", "promoting comparable metrics and narrative", and "coordination across approaches" (IOSCO 2021: 1). In March 2021, the European Commission published two reports on non-financial reporting standards, proposing a roadmap for developing a comprehensive set of EU sustainability goals and reforms to the existing governance structure to establish a non-financial reporting pillar to com-

[9] See the European Commission website: *Corporate Sustainability Reporting*, https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

plement the financial one (Gauzès 2021, EFRAG 2021). At the same time, the SEC announced the creation of a Climate and ESG Task Force in the Division Enforcement that will "develop initiatives to proactively identify ESG-related misconduct". The task force will also "coordinate the effective use of Division resources, including through the use of sophisticated data analysis to mine and assess information across registrants, to identify potential violations" (SEC 2021b).

In November 2021, the International Financial Reporting Standards Foundation (IFRS 2021) announced:

- The creation of a new standard-setting board, the International Sustainability Standards Board (ISSB), in order to design "a comprehensive global baseline of sustainability-related disclosure standards that provide investors and other capital market participants with information about companies' sustainability-related risks and opportunities to help them make informed decisions."[10]
- The consolidation with CDBS and VRF by June 2022.
- The publication of prototype disclosure requirements.

This is the first attempt by the CDP, CDSB, GRI and VRF to combine their standards and frameworks into a common approach for sustainability reporting focused on enterprise value. It has the support of multiple stakeholders, including the International Monetary Fund, the UN and the Financial Stability Board. Finally, the G7 finance ministers accepted it as an extension of the TCFD framework.

The consensus around the necessity of standards and a unified framework is encouraging. However, this initiative will be globally beneficial only if it is a coordinated effort across: (a) the different stakeholders, including the private sector, auditors, standard-setters, governments and international institutions, and the companies (this seems to be the case); and (b) the developed and less developed economies or jurisdictions (this is less clear).

The G20 is the right platform to support the last point. Unlike the G7, the G20 is the natural intergovernmental forum to ensure international coordination among developed and less developed markets. It also has

[10] See IFRS website: *About the International Sustainability Standards Board*, https://www.ifrs.org/groups/international-sustainability-standards-board.

some experience in facilitating the development of a global framework in response to a common shock: the macroprudential framework was designed under its leadership in response to the 2008 financial crisis. That is why it should play a larger role in designing the global standards and framework.

8.4 Necessary next steps

If properly designed, the global ESG framework and standards should guide firms to disclose ESG information that will help: (1) the companies to adjust their strategy depending on their goals and understand the corresponding impact on their ESG-assessment; (2) the investors to have a better understanding of a firm's non-financial risk and be able to compare that information across firms; and (3) the domestic and international regulators and authorities to better monitor how firm-level efforts help advance longer-term goals at the societal or country levels, such as the Sustainability Development Goal and other countries' specific ESG goals.

While points 1 and 2 above help mitigate firm and investment risks, point 3 is a longer-term goal. Depending on the criteria considered, this may require more guidance than realising 1 and 2 to achieve its goal. The timelines vary, ranging from years for a corporation business cycle to decades for societies and countries.

In their four actionable policy recommendations in the context of the G20, Lopez and Siaba Serrate (2021) highlight the importance of an overall and global ESG strategy and benchmarks to assess progress at the firm and the country levels. These would also help clarify the concept of ESG investing and its purpose to the different participants. The recommendations can be summarised as follows:

1) *What are the definition and goals of ESG investing in the medium term?* The definitions and goals differ depending on the context: corporation, society, and environment. While these can be reconciled, the prime focus of ESG investing is to mitigate non-financial risk at the firm level. The terminology should clarify this to avoid the current level of ambiguity: sustainability or resilience at a firm's level is different to sustainability at a country or society level. Furthermore, the definitions and goals should account for industry's specificities.

2) *What are the policies that will allow achieving these goals?* The ESG goals defined in the previous stage are global. However, the policies and the timeline to achieve them will differ depending on the country's level of development. This is why both developed and less developed economies needs to participate in designing the framework.

Countries' competing necessities and needs strongly influence their willingness to prioritise ESG goals in their policies. That is why the framework, or a companion programme, needs to provide the proper incentives and support to facilitate the buy-in of the countries where ESG goals are low in their priorities. Similarly, an inclusive process in defining the framework and policies will minimise potential unexpected consequences that usually arise when solely developed markets drive global regulation (Beck and Rojas-Suarez 2019).

3) *What are the relevant metrics, benchmarks and narratives?* In addition to the lack of international standards and a common framework, most of the current ESG metrics focus on whether organisations engage in specific ESG-related activities (O'Connor and Labowitz 2020). They do little to understand the impact of these policies and activities or measure their progress.

The metrics should leverage existing sustainability-related reporting frameworks and standards and identify the components that help assess progress toward the ESG goals. While the metrics are shared across the firms, the benchmarks and narratives may differ depending on the industry and the country.

Finally, in less developed countries where ESG goals are a low priority, creating a companion programme funded by international institutions to ease the burden of ESG monitoring while making sure the monitoring is done properly is necessary.

4) *How can it be ensured that both the data collection and the assessment process are transparent?* The previous steps will lead to a more transparent and streamlined information-collection process. The resulting data will be consistent across firms and of higher quality; however, third parties' aggregation process leading to the ESG assessment of firms needs to be more transparent. The ratings and scores are useful to companies and investors only if they understand what these assessments entail. Users then will choose which rating aligns with their priorities, alleviating the

concerns regarding different ratings or scores for the same firm.

Concluding thoughts

ESG investing's credibility lies in its ability to be held accountable for all its promises, from non-financial risk assessment and long-term valuation to the positive impact on societies and the environment. Global standards and a common framework are the necessary next step to ensure the proper changes at the corporation's level. If done properly, these changes will trigger societal and environmental changes.

There is little doubt that global sustainability-reporting standards focused on enterprise value will emerge in the next year or so. What is less clear is how inclusive the process to define them will be. As discussed, the different stakeholders from developed and emerging markets need to be involved in setting the goals, standards, benchmarks and timelines. It would be counter-productive to global sustainability to have developed markets imposing the rules.

That is why the G20 is a natural platform to facilitate this work across geographic jurisdictions and actors. It would not be the first time for the G20 to develop a global framework in response to a common shock across the globe. The previous one was the macroprudential policy framework after the financial crisis. This experience could provide helpful insights into the challenges of defining a framework and standards that will have the buy-in of most countries.

Furthermore, the process of developing the common standards and framework will be iterative. The metrics and benchmarks, similar to the scores and ratings, must be evaluated regularly in their ability to protect investors from significant underlying risks and help achieve the goals agreed. They should be adjusted when necessary.

However, the framework and standards are not an end in themselves. The next question will be about their application: should they be mandatory and for whom?

There are clear arguments in favour of mandatory ESG disclosure. Krueger et al. (2021) show that it improves the availability and quality of ESG reporting, increases the analysts' earnings forecasts accuracy, and reduces harmful ESG incidents and the danger of a stock market crash.

Hence, mandatory ESG disclosure, according to the research, has both informative and real-world benefits. However, it places undue pressure on businesses while some are just beginning their sustainability journey. Many claim that voluntary reporting is market-driven and gives reporting enterprises a competitive advantage, making it inevitable. However, in April 2021, the SEC issued a risk alert to raise investors' awareness of "misleading statements regarding ESG investing processes and representations regarding the adherence to global ESG frameworks" (SEC 2021a: 3-4).

Furthermore, there is a question of firms' size. So far, most of the mandated reporting instruments focus on large or publicly traded enterprises. Small and medium enterprises (SMEs) represent around 90 per cent of businesses, but only 10 per cent of reports in the GRI Sustainability Disclosure Database.[11] SMEs are essential in achieving the UN sustainable development goals. Similarly, they will be essential in achieving the ESG goals at country and industry levels. The common framework and global standards will minimise the burden of compliance, especially when compared to the cost of filing for several reportings. It will make it feasible for SMEs to join and compete on the global ESG playing field.

Finally, mandatory or not, the sustainability reports need to be regularly and fairly checked by local authorities. Unfortunately, high levels of corruption in the less developed countries could erode public confidence in the environmental impact data provided nationally and to the international community.

In other words, for ESG investing to lead to societal changes, each participant must play its part.

[11] See the World Bank website: *Small and Medium Enterprises (SMEs) Finance*, https://www.worldbank.org/en/topic/smefinance.

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Conclusion

Jürgen Braunstein

This volume on central banks and green monetary policies is distinctive because it covers, geographically and thematically, not only the contemporary debate on the financial-stability implications of climate change, but also the nonstate and international actors critical to governing decarbonisation of the global financial system.

The issues that permeate the chapters – from reinterpreting central bank mandates in the context of climate change and the challenge of adjusting monetary policy to environmental risks without compromising the banks' traditional mandates of price stability; to coordinating among monetary authorities and central banks located in countries with different macroeconomic characteristics – will remain at the centre of debate about the role of central banks and green monetary policy in decarbonisation.

Although many central banks in Asia, Africa, Europe and Latin America recognise that the physical and transition risks associated with climate change have implications for financial stability, how much they are primary concerns of monetary policy varies. While some central banks, especially in emerging and developing Asia, have mandates that support their governments' decarbonisation efforts, many central banks in advanced economies have strict financial and monetary stability mandates. Some central banks particularly in advanced economies only tackle climate change when it affects price stability. Again, this is much more the case where prices are vulnerable to climate change – as in many African countries, which frequently suffer drought, conflict and runaway inflation and have only limited adaptive capacity through macroprudential instruments.

Variations are also reflected in the different structural contexts in which monetary authorities operate, notably the level of financial matu-

rity, which has implications for financial vulnerabilities and the transmission mechanisms of environmental risks. Consequently, the effectiveness of micro- and macroprudential instruments varies accordingly.

In many emerging and developing countries, capital markets are often at an earlier stage of development and tend to be bank-dominated. The central banks of advanced economies with deep capital markets are more hesitant to explore an explicit role in scaling up sustainable finance through positive incentives or penalties for unsustainable investment. For example, an overweighting of climate-friendly assets in asset purchase programs would promote the expansion of climate-friendly sectors. In turn this raises concerns about trade-offs between market neutrality versus market efficiency of monetary policy.

Climate change requires global solutions involving harmonising and consolidating reporting standards and more coordination among central banks and other financial actors. ESG reporting needs to be consolidated, simplified and transparent. Many important first steps have been taken, such as the creation of a new standard-setting board, the International Sustainability Standards Board (ISSB). And new platforms for potential high-level dialogue, such as the G20, need to be identified. Although spaces for dialogue and collaboration among different financial actors and institutions are opening up globally, more effective coordination remains difficult because of the functional constraints of central banks operating in different contexts.

This diversity of banks and contexts, however, will aid our understanding of the effects of monetary policy actions on greening the financial system. Suggestions range from experimenting with unconventional monetary policy, such as climate-friendly weighting in asset purchase programs and collateral to access central bank liquidity, to discussions about the state taking a more activist role through, for example, sovereign wealth funds investing in green instruments.

Central banks in advanced countries will benefit from the experiments of central banks in developing and emerging countries. The consequences and implications of green monetary policy actions within complex systems cannot be fully determined ex-ante because of the continuously unfolding net of interdependencies between monetary policy and elements of the economy exposed to transition and physical risks. Uncertainties

remain about whether and to what extent monetary interventions toward decarbonisation have distorting negative side-effects, and whether this could compromise the effectiveness of the role of central banks as monetary agent, supervisor and lender of last resort.

The role of the IMF in addressing transition risks equitably and in shaping the policies that governments adopt to achieve macroeconomic stability will, of course, remain critical. Because transition risks are embedded in the unequal power relationships within the global economic system, the IMF can help avoid reinforcing these by discouraging increases in carbon-intensive exports.

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Climate change has quickly become one of the most pressing challenges of our society. Financial actors could play a key role in supporting and fostering a shift towards a low-carbon economy. In this context, central banks could have a primary function in both tackling climate-related risks and the ones related to the transition and, potentially, proactively redirecting resources towards green initiatives. Central banks are indeed exploring how different types of climate-related risks and considerations could be incorporated into their activities. However, this effort is proceeding at a different speed and with a different geometry across the globe.

This edited volume aims at shedding light on how central banks and international financial institutions are currently addressing climate change worldwide, with a focus on central banks in the European Union, the United States, Asia, Africa and Latin America, and on the potential role of the International Monetary Fund, sovereign national funds and ESG (Environment, Social and Governance) standards.

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