

ANALYSIS

The IMF is going to significantly step up its climate work

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AUTHORS



Nea Tiirilä



Kristiina Karjanlahti

Climate change is one of the biggest macro-economic challenges the global economy will be facing in the coming decades. This has put pressure on international organizations to adapt and step up their work on climate. The IMF's new comprehensive Climate Strategy is a clear signal that the IMF intends to meet the challenge. Over the past years the IMF has strengthened its role in global climate discussions by publishing a series of policy papers, actively communicating on climate issues, and advocating for global solutions. The new Climate Strategy emphasizes the significant impacts that climate risks, climate policy actions as well as adaptation and transition needs will have on macroeconomic stability and envisions integrating climate change into most surveillance and capacity development activities. At the same time, climate change is increasingly featuring in IMF lending.



Climate change is a macro-critical policy challenge

Climate change is one of the most critical macroeconomic challenges that the global economy is facing in the coming years. It affects economies directly and through spillover effects (see Box 1 for further discussion on economic impacts and policy implications). Moreover, climate change can destroy wealth, complicate global trade, impact incomes and create volatility in asset valuations.

Macro-criticality is a guide defining to what extent and how the IMF should engage on global and local policy challenges such as climate change, while keeping within its mandate¹. According to the IMF, a macro-critical challenge is something that affects, or has the potential to affect, domestic or external macroeconomic stability. The IMF's activities are defined by the Articles of Agreement² and the Integrated Surveillance Decision (ISD)³, which indicate that the Fund should cover climate change adaptation and the management of the transition to a low-emission economy in its surveillance activities when the associated policy challenges are macro-critical.

Already today, climate change is a threat to the macroeconomic and financial stability of a large share of the International Monetary Fund's (IMF) membership with strong cross-border spillovers. Hence, the IMF recognizes climate change as a macro-critical challenge and will include climate-related risks and policies in its regular monitoring and reporting of economic conditions in member countries.⁴

From an economic point of view, climate change is a global negative externality. This means that households, firms and governments do not internalize the total cost of their actions on climate. When dealing with externalities, policy interventions are needed. As climate change is a universal

challenge, global policy coordination gains importance. In this respect, the IMF is in an important position in fostering global monetary and financial cooperation. International policy coordination can help minimize spillover effects resulting from inadequate mitigation policies and prevent carbon leakage and competitiveness losses.⁵



Climate related economic impacts, transmission mechanisms and policy implications

Direct and indirect economic impacts

The direct climate related economic damages originate from extreme weather events such as droughts, wildfires, heatwaves, floods etc. destroying land, property and infrastructure. Extreme weather events will be more frequent and severe as global warming continues. In the longer-term, climate change also contributes to rising sea levels, the destruction of habitable lands, the acidification of oceans, and more frequent outbreaks of vector-borne diseases.

Global warming has also indirect transmission mechanisms through lower productivity, increased heat related migration, increased investment risk, and risk of conflict and social unrest.⁶ Global warming impacts labor markets by decreasing labor productivity and compromising conditions for decent work. The International Labor Organization (ILO) estimates that more than 2 % of total working hours worldwide will be lost annually because it is too hot to work or because workers have to work at a slower pace.⁷ Climate change will also impact trade flows by changing relative prices and redistributing incomes across regions. Especially fossil fuel exporters and other countries that have an advantage in producing pollution-intensive activities will likely face decreasing exports. Changes in prices and income redistribution can have implications on exchange rates and managed exchange rate regimes.⁸ Climate change will also increase food prices and reduce access to fresh water, which will especially harm vulnerable and low-income countries. Overall, poverty is likely to increase globally because of climate change.

In addition to above mentioned risks, the potential for extreme outcomes, or tipping points, from global warming (e.g. thawing of the permafrost, melting of glaciers, changes in

monsoon patterns, reversal of ocean currents) creates high uncertainty in assessing the damages from climate change. The world could enter a new climatic state if tipping points materialized. The potential catastrophic outcomes strengthen the need for mitigation actions.⁹

In the longer-term, a persistent increase in temperatures and changes in precipitation patterns together with more volatile weather events are likely to lead to slower productivity and reduced investment in most sectors of the economy. However, the impacts of global warming on GDP are non-linear and uneven across regions. An increase in the average temperature is likely to reduce GDP in regions where the annual average temperature is high whereas increasing temperatures can have a positive impact on GDP in some cold regions. Hence, many of the already vulnerable low-income countries will likely suffer the most due to their geographical location. Adding to the vulnerability, these countries are usually also more dependent on climate sensitive sectors such as agriculture. Policy coordination is essential to ensure that climate-vulnerable countries have access to sufficient financial and technological means to implement adaptation and mitigation policies.¹⁰

The estimated impacts of climate change on income vary significantly in the literature. An IMF policy paper¹¹ summarizes the results from existing macro-economic literature highlighting that with a one Celsius increase in the temperature in poorer (hotter) countries, income growth is expected to fall between 1-2 percentage points in the short and medium term, while the impacts on rich (temperate) countries are more moderate. The estimates of the longer-term impacts are larger and suggest that all regions (hot and cold and rich and poor) would experience a relatively large GDP per capita fall by 2100 without mitigation policies, while the size of the impact varied significantly between countries. In a more recent study, Kahlkul and Wenz¹² find evidence that temperature has significant effects on productivity. They estimate that a 3.5°C increase in global mean surface temperature by the end of the century would reduce global output by 7–14% in 2100, with higher damages falling on tropical and poor regions.¹³

Challenges for macro-economic and financial sector policies

Climate change triggers wide-ranging policy challenges that require global macroeconomic, monetary and financial policy actions. In this regard, the IMF is in a unique and important position in fostering global policy cooperation. Climate change

adaptation policies and resilience building are especially important to countries that are most vulnerable to climate change. As these countries often have weaker fiscal policy space, international support may be needed to complement domestic efforts. Transition policies will affect all countries as achieving the emission reduction targets under the Paris Agreement requires changes in tax policies, regulation, public spending and subsidy systems. Also, social and structural policies are needed to enable a just transition.¹⁴

Climate change is likely to lead to revenue losses and extensive spending pressures, underlining the importance of *fiscal policy*. Fiscal policy has a key role in scaling up public investments to mitigate climate change. Investments will be needed especially in energy, infrastructure, real estate and R&D. Moreover, reforming tax policies and subsidy frameworks is important to provide correct incentives enabling the green transition. Structural policies are key to enhance economic diversification especially in countries where national income is highly dependent on fossil energy.¹⁵

Improving public *debt sustainability* is also an important policy priority in the fight against climate change. Sovereign debt has been increasing globally during the last decade and Covid-19 intensified debt growth further, leaving a large number of countries close to their debt sustainability limit. High debt levels limit countries' fiscal policy space and reduce the possibilities to invest in critical climate adaptation, transition and mitigation actions. This is a major challenge especially for low-income countries that have limited access to financing due to debt sustainability concerns but also for developed economies that struggle with returning to a sustainable fiscal path after the Covid-19 crisis spending.

Climate change impacts financial markets through various channels and is seen as a systemic risk. Financial losses of insurance companies, banks and investors can be significant if physical risks materialize destroying insured property and land or impacting negatively assets used as collateral or a portfolio holding. Also, transition risks can be extensive as climate policies, technological innovations and changes in consumer preferences make carbon-intensive businesses financially unviable. Financial institutions are exposed to transition risks through revaluations of assets and liabilities as companies are adjusting their business towards low carbon emissions. Moreover, climate change can create liquidity and reputational risks to financial firms. *Financial policies and supervision* will need to ensure that financial firms take into account the changes in their business environment and strengthen their risk tolerance in preparation for climate change. Supervision and regulation can also improve disclosure and enhance transparency on

climate risks.

Climate change can create volatility in output and prices and potentially lead to persistent changes in relative prices e.g., through raising fossil fuel prices. In the longer-term, climate change-related policies may affect real interest rates. These developments need to be internalized by *monetary policy*.¹⁶

Global trade can provide solutions to adapt to climate change by offering consumers lower-emissions goods and services and facilitating the use of climate-friendly technologies. Lowering trade barriers on green technologies would be important to boost trade. *Trade policy* can also support climate goals for example by introducing carbon border adjustment measures. Revising WTO subsidy rules can encourage investment in green energy and innovative research and development. Also, global cooperation will be needed to mitigate greenhouse gas emissions from international shipping.¹⁷

The IMF improves focus on climate change in surveillance and capacity development

The IMF has taken part in the climate change debate since 2008 when it identified climate change as “a potentially catastrophic global externality and one of the world’s greatest collective action problems”¹⁸. However, the IMF’s engagement has been unstructured, on an ad-hoc basis, and has mostly focused on bi-annual flagship reports¹⁹ and policy papers. Moreover, as climate change has become a more urgent challenge, the demand from IMF members for climate work has grown especially regarding surveillance and capacity development (CD) activities. In June 2021, the IMF published a comprehensive climate strategy to help members address climate change related policy challenges²⁰. The strategy envisions a scale up the IMF’s capacity to deal with climate related macroeconomic and financial policy challenges, to assist its membership effectively.

Multilateral surveillance, analytics and policy

Climate change has been part of the Fund’s multilateral surveillance since 2008 when the first World Economic Outlook’s (WEO) climate chapter was published. Since then, climate-related issues have been increasingly but irregularly present in the flagship reports and policy papers. Going forward, multilateral surveillance will involve regular discussions on climate-related policy

challenges that require policy coordination in the IMF’s flagship reports, regional surveillance reports and policy papers (see table 1).²¹

Publication frequency and content of multilateral surveillance products IMF (2021f)			
Flagship chapters	Regional Surveillance reports	Policy papers	Staff Climate Notes
1–2 per year	1–2 per year	1–3 per year	3–7 per year
Include institutional positions and global climate politics discussion e.g. related to carbon price, sustainable finance and green investments	Include policy responses to climate change across peers, reflect region-specific circumstances and characteristics in more detail	Topics include e.g. adaptation policies, integration of climate risk into debt sustainability analyses, transition risks for fuel exporters, climate adaptation in disaster-prone countries, international coordination of mitigation policies, the political economy of climate mitigation, financial regulation and supervision of climate risks, assessments of physical and transition risks and assessing the financial stability implications of climate risks	Staff Climate Notes aim to provide timely analysis on critical climate related economic issues to member countries and the broader policy community

The IMF is also going to enhance its analytical work by developing models and toolkits. These include various global macroeconomic models²² with detailed components for energy production and use to analyze the macroeconomic, sectoral, and trade implications of climate-related policies. The Fund will also integrate countries’ exposures to climate risks in Debt Sustainability Analyses (DSAs). An essential part of the IMF’s Climate Strategy is to upgrade the climate expertise in the Fund. This will be done through new recruiting and training of the existing staff. For example, the IMF will launch a “climate 101” -course that is mandatory for all IMF economists.²³

Bilateral surveillance

To date, climate change has been covered in the IMF’s bilateral surveillance, namely in the Article IV (AIV) reports and Financial Sector Assessment Program (FSAP) reports mostly on an ad-hoc

basis. Climate policies have been included in AIVs approximately in two consultations per year and mostly in climate vulnerable economies. Recently, several AIV consultations have been complemented with a separate assessment on mitigation policies and transition management. For example, the IMF did a working paper on Finland’s fiscal policies to achieve the authorities’ emissions neutrality target²⁴. In financial sector assessments, physical and/or transition risks have been covered on average in two FSAPs per year.²⁵

Going forward, the IMF’s objective is to provide high-quality, granular, and tailored advice to the membership on macroeconomic and financial policy challenges related to climate change. According to the IMF’s surveillance mandate, the IMF should cover climate change *adaptation* and *transition management* policies in its surveillance activities when the associated policy challenges have significant impacts on domestic stability i.e. they are macro-critical. Climate change *mitigation* is primarily a global policy challenge in need of policy coordination, and thus mitigation policies are integrated mainly to the Fund’s multilateral surveillance. However, under the IMF’s surveillance mandate, countries’ contributions to the global mitigation effort should be discussed when deemed systemic. This approach is explained with the global public good character of mitigation meaning that no country can provide sufficient mitigation on its own, but a country can make an appropriate contribution to the global mitigation effort. Thus, the IMF is strongly encouraging coverage of mitigation efforts in AIVs for the 20 largest “systemic” emitters of GHGs whose economic and financial policies create significant spillovers, and thus, are most critical for the global mitigation effort.²⁶

Covering climate change mitigation in IMF’s surveillance requires a yardstick that even-handedly describes what mitigation effort is appropriate. The IMF is planning to take an approach where the starting point would typically be a country’s National Determined Contribution (NDC). However, the Paris targets²⁷ are voluntary, and they are easier to meet for some countries than others. Thus, the AIV reports will look into the ambitiousness of a country’s Paris targets and stress that NDCs are, at this stage and in the aggregate, insufficient to achieve the mitigation ambition of the Paris Accord. AIV reports will also compare a country’s NDCs with peer countries that have similar income levels and economic structures to provide a benchmark for assessing the appropriateness of a mitigation objective.²⁸

Climate change and related policies in the IMF’s AIV reportsIMF (2021f)		
Adaptation and resilience building	Transition management	Climate change mitigation

Climate change and related policies in the IMF's AIV reportsIMF (2021f)		
Includes an assessment of country-specific climate vulnerabilities, adaptation policies (e.g. strategies to build up physical and financial resilience, dealing with more frequent supply-side shocks and changes in relative prices), and financing needs to build resilience.	Includes domestic policy efforts to achieve a country's NDC targets, which define the country level commitments to the Paris Agreement including changes to tax regimes, regulatory frameworks, and accompanying social and investment policies.	Includes assessment of the authorities' mitigation objectives, their effectiveness in reaching the mitigation targets and a comparison of mitigation efforts with peer countries.
For 60 countries that are the most vulnerable to climate change	For all countries	For the 20 largest emitters
Every three years	Every 5-6 years, in-depth coverage 8-9 per year, more standardized analysis 25 per year	Every three years, 6-7 per year

Financial sector surveillance includes managing the countries' exposure to climate risks by understanding the pressure points for the financial system arising from physical climate shocks and the transition to a low-carbon economy. Financial sector surveillance also includes policies to enhance risk management and the resilience of the financial system. Climate risks will be covered in all FSAPs and the main components will be stress testing to physical and transition risks and assessments of climate-relevant financial regulation and supervision.²⁹

Capacity Development

The IMF helps its members to strengthen their economic institutions by providing technical assistance and training on critical economic issues. The usual recipients of capacity development (CD) are low-income countries and small states, and this applies to climate related CD as well. The IMF is expecting the demand for climate-related CD to increase in the coming years. The coverage of CD varies depending on the countries' needs but most of the CD focuses on fiscal issues. Going forward, the IMF aims to increase CD especially on financial sector issues but also on data, macro frameworks, legal and financial integrity issues. The new Climate Strategy envisions three main CD components: developing the Climate Macroeconomic Assessment Program (CMAP), meeting the increased demand for climate-related single country CD and external trainings.³⁰

Data

There is a growing need for climate data globally. Even though there is a lot of data available, a big challenge is the lack of comparable and interpretable climate data that can be used for economic analysis. The IMF has contributed to these challenges by launching a Climate Change Indicators Dashboard in April 2021³¹. The content of the Dashboard is being improved and broadened constantly. The Dashboard is an international statistical initiative³² aiming to address the demand for climate related data used in macroeconomic and financial stability analysis. Most of the experimental climate change indicators in the Dashboard are developed by the IMF and based on various public data sources and indicators from other international organizations. The IMF's intention is to include aggregate statistical indicators on climate change, greenhouse gas emissions from economic activity, trade in environmental goods, green finance, government policies, and physical and transition risks. These will be published in a standardized format and with the same frequency as economic indicators.

The role of climate change in IMF lending

IMF member countries can access financial support from the IMF, when hit by a crisis. Financing is provided to create breathing space and implement adjustment policies to restore economic stability, address balance of payment (BoP) challenges and reach a sustainable growth path.³³

Within this lending mandate, the IMF has provided financing for members hit by climate change-related natural disasters through its emergency facilities, the Rapid Financing Instrument and Rapid Credit Facility. On the other hand, climate-related policy measures are included in IMF programs where they are deemed critical in solving the member's BoP problems, not primarily for their climate impact. Here climate-related program conditions have been often added in the context of needed fiscal adjustments. For example, policies to reform fuel and energy subsidies or carbon taxation proposals can both improve BoP imbalances and reduce incentives for using fossil fuels. For countries vulnerable to frequent climate-related shocks, developing coherent resilience building strategies has been part of IMF programs to help address the related longer-term BoP needs.³⁴

Considering the quickly increasing effects of climate change both on physical risks and the needed macro-economic policy changes, it is very likely that the role of climate change in Fund lending increases in the future. First, the increasing frequency and severity of climate-related natural disasters and other possible shocks is likely to translate into growing demand for IMF's emergency financing. Second, as the macroeconomic relevance of mitigation, adaptation and transition policies related to climate change increases, their implications for IMF members' macroeconomic

stability and balance of payment needs grow and thus will be more likely to be included as critical measures in solving the members' BoP-challenges in IMF programs.

For example, the IMF has discussed possibilities of including green budgeting under public financial management reforms (PFM) in IMF programs to help increase and track climate-related spending across budget cycle phases. Another aspect discussed is measures designed to off-set the distributional implications of climate mitigation policies e.g. through targeted cash transfer programs, which are important to ensure political support for adjustment and green recovery. However, IMF programs have a clear objective of solving the balance of payment challenge of a country. Thus, conditionality should be parsimonious and climate-related policies only included when critical to meet the BoP objective.³⁵

A new climate focused Resilience and Sustainability Trust

Following the general SDR allocation³⁶ to boost member reserves made by the IMF in August 2021, there has been significant movement to channel the “extra” SDRs of IMF members in stronger BoP positions to the benefit of vulnerable countries. To this effect, the IMF is currently considering establishing a new Resilience and Sustainability Trust (RST). The new trust is envisioned to support longer-term structural policy reforms for economic resilience and sustainability in low-income countries, small states and vulnerable middle-income countries focusing initially on climate change and other longer term structural issues, such as pandemic preparedness and digitalization.³⁷

The process of developing the RST is still on-going. While there is a consensus to establish the trust supporting countries undertaking macro-critical reforms to reduce risks to prospective balance of payment stability, including those related to climate change and pandemics, many questions remain open.³⁸ These include questions such as how the RST will fit within the larger framework of international development and climate finance, how the IMF will estimate the longer-term prospective financing needs, what the associated policy programs will look like and whether there will be demand for RST financing.

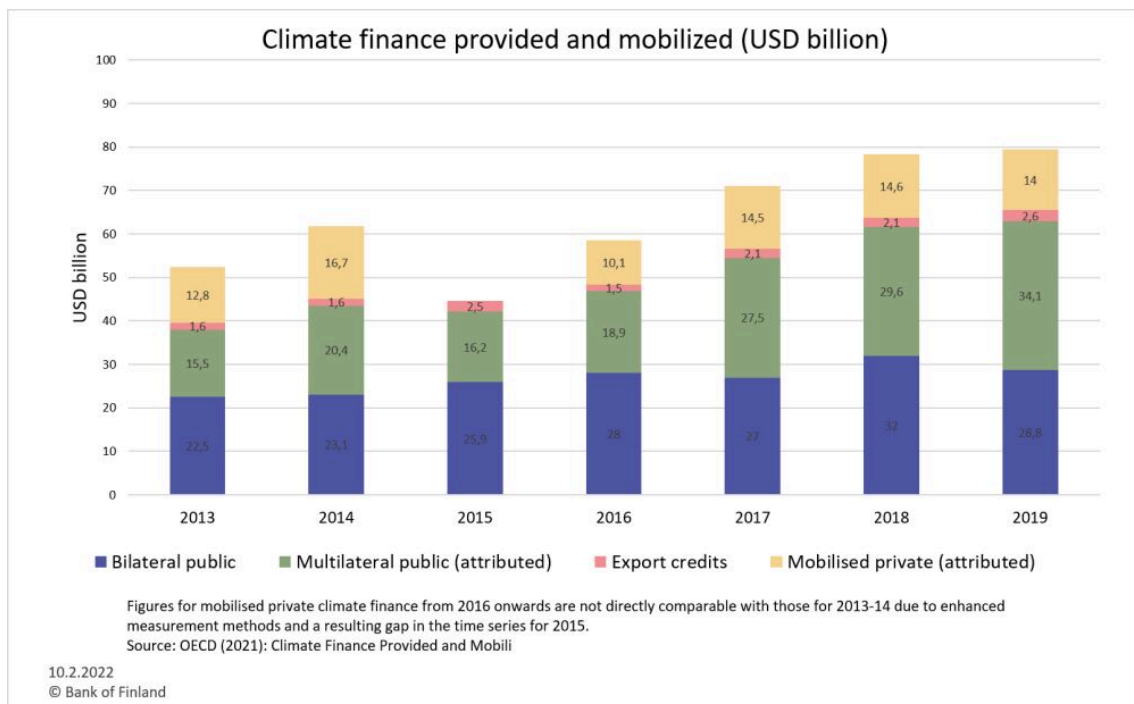
International climate financing - role of the IMF's RST?

Reducing emissions and adapting to the changing climate will require significant increases in global climate finance. The IMF estimates that the world will need to increase investments in sustainable infrastructure by 2 percent of pre-pandemic GDP for this decade and beyond to reach the required net zero emissions by 2050³⁹. Developing countries face a particular challenge in mobilizing the needed longer-term financing on the necessary scale and at a reasonable cost.

According to the UNFCC⁴⁰ data from 153 developing countries' NDCs, the aggregated cumulative financing needs to meet the costed targets until 2030 amount to USD 5.8–5.9 trillion⁴¹.

At COP15 of the UNFCC in Copenhagen in 2009, developed countries committed to mobilizing jointly USD 100 billion annually, by 2020 the latest, to support developing countries in meeting their climate mitigation targets and adaptation needs.⁴² The overall financing consists of bilateral public climate finance, multilateral public climate finance attributed to developed countries, climate-related officially supported export credits, and private finance mobilized by bilateral and multilateral public climate finance, attributed to developed countries (Chart 1).⁴³ By COP 26 it was noted that the 2020 target of USD 100 billion annually was not met and developed countries were called to increase their commitments to meet this annual target. In addition, developed countries committed to at least doubling their support for adaptation measures by 2025, compared to 2019 levels, which will help developing countries prepare for climate change. This would imply that adaptation funding could reach USD 40bn annually by 2025, from USD 20bn in 2019.⁴⁴

Chart 1.



There is still an open question on how the RST with a possible climate focus would fit into the general context of official climate finance⁴⁵, where the objective is to support more vulnerable

countries in their mitigation and adaptation efforts. The RST could have an important role in contributing to meeting the global climate finance gap. However, even if the ambitious USD 30-50 billion lending target set for the RST by the IMF's Managing Director⁴⁶ was reached, a wide gap will remain. An added impact could arise from a catalytic effect, as the RST could be set to support policies to create a favorable environment to attract private and other public sources of financing for climate needs.

Conclusions

Climate change is one of the biggest macro-economic challenges the global economy will be facing in the coming decades. This has put pressure on international organizations to adapt and step up their work on climate. The IMF's new comprehensive Climate Strategy indicates that the IMF intends to meet the challenge. Over the past years the IMF has strengthened its role in global climate discussions by publishing a series of policy papers, actively communicating on climate issues, and advocating for global solutions. The new Climate Strategy emphasizes the significant impacts that climate risks, climate policy actions as well as adaptation and transition needs will have on macroeconomic stability and envisions integrating climate change into most surveillance and capacity development activities.

Large changes are occurring also in IMF lending. First, as the macro-economic relevance of climate change increases, climate is increasingly featuring in IMF financing. This is visible for example in the large BoP needs arising from more frequent natural disasters or in policy requirements that are both critical to meet the BoP stability target of IMF programs and at the same time have a climate association, e.g. removing energy subsidies or preparing disaster resilience strategies. While climate is increasingly featuring in the "normal" IMF financing, it is always a secondary objective contributing to resolving the BoP need. Second, as a departure from the traditional role of financing, the IMF is currently considering establishing a new Resilience and Sustainability Trust, which would entail policy programs and financing to address longer-term prospective BoP needs with a possible initial focus on climate, pandemic preparedness, and digitalization. In light of the IMF's traditional role in mitigating and managing acute or imminent balance-of-payment crises, this would be a totally new approach which could entail a role for the IMF as a climate finance institution.

The IMF has set a goal and allocated resources to incorporate climate change comprehensively into all of its main functions: surveillance, capacity development and lending, including possibly setting up a new trust that enables direct financing of climate policies. These recent developments point to a conclusion that the IMF is quickly stepping up and emerging as one of the most significant international financial institutions in the fight against climate change.

Sources

ILO (2019): Working on a WARMER planet - The impact of heat stress on labor productivity and decent work

IMF (2008) World Economic Outlook, Chapter 4 Climate change and the Global Economy.

IMF (2019): Working Paper: Long-Term Macroeconomic Effects of Climate Change: A Cross-Country Analysis; Matthew E. Kahn, Kamiar Mohaddes, Ryan N. C. Ng, M. Hashem Pesaran, Mehdi Raissi and Jui-Chung Yang.

IMF (2021a): 2021 Comprehensive Surveillance Review— Background Paper on Integrating Climate Change into Article IV Consultations

IMF (2021b): 2021 Comprehensive Surveillance Review—Background Paper on the Surveillance Priority Ensuring Economic Sustainability

IMF (2021c): Blog “Sharing the Recovery: SDR Channeling and a New Trust”

IMF (2021d): Communiqué of the Forty-Fourth Meeting of the IMFC

IMF (2021e): Fiscal Policies for Achieving Finland’s Emission Neutrality Target:
<https://www.imf.org/en/Publications/WP/Issues/2021/06/25/Fiscal-Policies-for-Achieving-Finlands-Emission-Neutrality-Target-460890>

IMF (2021f): IMF Strategy to Help Members Address Climate Change Related Policy Challenges—Priorities, Modes of Delivery, and Budget Implications

IMF (2021g) Staff Note: Not Yet on Track to Net Zero

IMF Finance and Development (2021): our last, Best Change on Climate; Amar Bhattacharya and Nicolas Stern

Kahlkul and Wend (2020): The impact of climate conditions on economic production. Evidence from a global panel of regions; Journal of Environmental Economics and Management Vol 103

OECD (2021): Climate Finance Provided and Mobilized by Developed Countries: Aggregate trends updated with 2019 data.

PIIE (2019): Blog “How US trade policy can support climate change goals”

UNFCCC (2021a): Draft CMA decision proposed by the President https://unfccc.int/sites/default/files/resource/Overarching_decision_1-CMA-3.pdf

UNFCCC (2021b): First report on the determination of the needs of developing country Parties related to implementing the Convention and the Paris Agreement

Notes

1. According to its mandate the IMF promotes monetary cooperation and provides policy advice and capacity development support to preserve global macroeconomic and financial stability and help countries build and maintain strong economies. The IMF also provides short- and medium-term loans and helps countries design policy programs to solve balance of payments problems when sufficient financing cannot be obtained to meet net international payments obligations. ↑
2. <https://www.imf.org/external/pubs/ft/aa/index.htm> ↑
3. <https://www.imf.org/external/np/pp/eng/2012/062612.pdf> ↑
4. IMF (2021f) ↑
5. ILO (2019) ↑
6. IMF (2019) ↑
7. Kahlkul and Wend (2020) ↑
8. It should be noted that the estimations are done based on earlier IPCC reports, while the recent report portrays more severe risks of increasing temperatures which would affect the results of the estimations. ↑
9. PIIE (2019) ↑
10. IMF (2008) ↑
11. World Economic Outlook, Global Financial Stability Review and Fiscal Monitor ↑
12. Global Integrated Monetary and Fiscal Model—GIMF, a dynamic real CGE model, an Integrated Assessment Model ↑
13. IMF (2021e) ↑
14. The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. Nationally Determined Contributions are countries own plans for climate action under the Paris Agreement. ↑
15. IMF (2021f) and IMF (2021g) ↑
16. <https://climatedata.imf.org/> ↑
17. Collaboration with Organization for Economic Co-operation and Development (OECD), the World Bank Group (WBG), the United Nations (UN), the European Commission, the

European Statistical Office (Eurostat), the Food and Agriculture Organization (FAO), the International Energy Agency (IEA) and the National Oceanic and Atmospheric Administration (NOAA). †

18. <https://www.imf.org/en/About/Factsheets/IMF-Lending> †
19. More information on the SDR allocation from Special Drawing Rights (SDR) (imf.org) †
20. IMF (2021c) †
21. IMF (2021d) †
22. IMF Finance and Development (2021) †
23. United Nations Framework Convention on Climate Change †
24. UNFCCC (2021b) †
25. Introduction to Climate Finance | UNFCCC †
26. OECD (2021) †
27. UNFCCC (2021a) †
28. While there is no official internationally agreed definition for climate financing, the OECD's Development Assistance Committee (DAC) has set up the "Rio markers system", consisting of policy makers to monitor and statistically report on the development finance flows targeting the themes of the Rio Conventions[1]. The four markers set up are desertification, biodiversity, climate change mitigation (i.e. reductions in or absorption of greenhouse gas emissions) and climate change adaptation (including climate risk mitigation and vulnerability reduction). †
29. IMF Managing Director Kristalina Georgieva's Statement at the Paris Peace Forum on Increasing Support for Vulnerable Countries via SDR Rechanneling †

The opinions expressed in this article are those of the authors and do not necessarily represent the views of the Bank of Finland.

Key words

climate change, climate policies, IMF, international climate finance