

Chapter 2 at a Glance

- Emerging market and developing economies account for two-thirds of global greenhouse gas emissions, and many are highly vulnerable to climate hazards. These economies will need significant climate financing in the coming years to reduce their emissions and to adapt to the physical effects of climate change.
- Private finance is key to achieving these objectives. Public budgets are strained in the wake of the COVID-19 crisis, and borrowing conditions for emerging market sovereigns have tightened (see Chapter 1).
- Establishing the right climate policies, including carbon pricing, remains crucial. Climate policies and finance are complementary—better policies incentivize private investment, which helps achieve policy objectives.
- The market for sustainable finance in emerging market and developing economies is advancing fast, particularly in Asia, as private investors increasingly look for investments with a positive climate impact.
- Significant challenges complicate efforts to scale up private climate finance in a decisive and timely manner, including a shortage of investable green projects. At the same time, fossil fuel investment remains high. Effective carbon pricing and a strong climate information architecture (data, disclosures, and taxonomies) are often lacking.
- Environmental, social, and governance (ESG) investments have grown rapidly, but their climate impact is unclear. Emerging market and developing economies are at a disadvantage from such investments because of systematically lower ESG scores and low investment allocations from ESG funds.
- Despite these challenges, there are various opportunities to scale up private climate finance. Harnessing them will require improvements on various fronts, as well as public support within overall budget constraints.
- Innovative financing instruments, such as emerging market green bond funds, can attract the necessary private institutional investors. Outcome-based debt instruments, such as sustainability-linked bonds, can also benefit emerging market issuers—if the key contractual aspects are set appropriately.
- Multilateral development banks and development finance institutions are crucial to help set up climate projects in low-income countries. They can also help design and implement innovative financial instruments to leverage private investment and provide risk absorption capacity. A larger share of equity finance by these institutions, combined with greater risk appetite and additional resources, would help achieve these objectives.
- Sovereign issuers have been latecomers to sustainable debt markets, but they can provide an important impetus for the development of private markets.
- Beyond shared principles for sustainable finance alignment approaches, the development of transition taxonomies allows emerging market issuers to send a clear signal of climate benefits to private investors—including in industries whose emissions are hard to abate. These are complementary to a stronger climate information architecture.
- The IMF supports its members through policy advice, identification of financial stability risks, capacity development, addressing data gaps, and advocacy for disclosure. Financing from the new Resilience and Sustainability Trust can help members address longer-term structural challenges, including climate change.

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Introduction

Emerging market and developing economies will need significant climate financing in coming years to reduce greenhouse gas emissions (mitigation finance) and adapt to the current and predicted physical effects of climate change (adaptation finance). The investment needs of these economies solely in renewable energy could reach \$1 trillion a year by 2030 if they are to stay on track to achieve net-zero greenhouse gas emissions by 2050 (IEA 2021a).

Developing economies alone will require up to \$300 billion a year by 2030 to adapt agriculture, infrastructure, water supply, and other parts of their economies to counterbalance the physical effects of climate change (UNEP 2021). If efforts to reduce emissions fall short of global temperature objectives set by the Paris Agreement, the need for adaptation financing will rise sharply for emerging market and developing economies. Estimates range from \$520 billion to \$1.75 trillion annually after 2050 depending on the emission pathway (Chapagain and others 2020).

The magnitude of emerging market and developing economy climate finance needs will require significant scaling up of private sources of finance. The public sector response to the COVID-19 pandemic has placed a burden on public finances in many of these economies, and borrowing costs are rising as central banks worldwide tighten policy to tackle high inflation (see Chapter 1). The issuance of private sustainable finance instruments in emerging market and developing economies thus far has held up relatively well, reflecting continued strong investor appetite. Yet private investment must at least double within this decade to cover the investment needs (Bhattacharya and others 2022).

Underinvestment in climate change mitigation and adaptation in emerging market and developing economies may lead to global financial stability risks through greater exposure to systemic climate-related financial risks. These economies already account for two-thirds of global emissions (IEA 2021b). Yet greater use of and investment in fossil-fuel-based energy systems from delayed decarbonization (carbon lock-in) may lead to cross-border and global spillover effects as a result of the negative externalities on global climate change and contagion effects along

value chains.¹ In addition, because emerging market and developing economies include the majority of megadiverse countries, the loss of ecosystems strongly contributes to the impairment of carbon sinks, necessary to achieve global temperature objectives (NGFS 2022a). Many of these economies are also very vulnerable to climate hazards, with global hot spots in Africa, South Asia, Central and South America, and small island developing states. These vulnerabilities are amplified by poverty, governance challenges, violent conflicts, and a high share of livelihoods sensitive to climate change.

Scaling up private climate finance raises other fundamental challenges beyond the difficulties emerging market and developing economies already face in raising private finance more generally. These economies face a complex set of interwoven challenges to raise financing that have become more difficult to tackle since the COVID-19 pandemic—including the rise in government debt burdens, higher costs of capital, and underdeveloped banking sectors and capital markets (Prasad and others 2022). Climate finance, in particular adaptation finance, faces an even more fundamental problem: despite its significant benefits for society, it often does not generate sufficient private financial returns. Even if investors are comfortable with a higher level of credit risk, they often face an information asymmetry problem: ascertaining the potential climate benefits of their investments may not be possible with sufficient precision without robust climate data and disclosures. As a result, the risks associated with investing in emerging market and developing economy assets are often deemed too high, deterring otherwise reportedly strong investor interest in sustainable assets. It is unclear whether the very large and quickly growing environmental, social, and governance (ESG) investment flows could play a significant role in scaling up private climate finance. In addition to the still uncertain climate benefits of ESG investing, emerging market and developing economy firms' ESG scores are systematically lower than those for firms from advanced markets, and investment funds with an ESG

¹Carbon lock-in is a specific type of path dependence that occurs when fossil-fuel-intensive systems delay or prevent the low-carbon transition. It is driven by a complex interaction of persistent institutional, market, and policy failures that inhibit the diffusion of low-carbon technologies despite their apparent climate, environmental, and economic advantages.

focus allocate significantly fewer funds to emerging market assets.

At the same time, there are various opportunities to scale up private climate finance beyond generally improving the investment environment in emerging market and developing economies. Harnessing these opportunities will require improvements on several fronts. Innovative types of structured finance and outcome-based financial instruments that can overcome some of the challenges will need to be deployed on a larger scale and improved where necessary. Transition finance taxonomies, which determine whether and how assets are aligned with emission-reduction goals, would benefit emerging market and developing economy issuers by better signaling current and future climate benefits—even for industries with currently high emissions. The climate information architecture—comprising data, disclosures, and taxonomies to align investments with climate goals—requires strengthening (IMF 2021b; NGFS 2022b). The public sector, including multilateral development banks (MDBs), development finance institutions (DFIs), and other international financial institutions—such as the IMF—must play a key role in crowding in private climate financing in emerging market and developing economies, including by placing more emphasis on equity rather than debt financing. Sovereign issuers have been latecomers—and even absent—from sustainable finance markets, but they can boost market development. The United Nations Framework Convention on Climate Change (UNFCCC) carbon markets could generate significant investment flows to emerging market and developing economies for mitigation purposes, if they are fully implemented. At the same time, specialized vehicles, such as the Green Climate Fund, will need sufficient funding to support adaptation finance.²

The International Monetary Fund (IMF) can also play an important role, including through its new Resilience and Sustainability Trust (RST). The IMF can help strengthen the climate information architecture and support emerging market and developing economies with the design and implementation of supportive climate policies, including carbon pricing.

²The Green Climate Fund was established in 2010 under the UNFCCC framework to limit or reduce greenhouse gas emissions in developing economies. The fund maintains a 50/50 balance between mitigation and adaptation finance.

RST financing could help eligible and qualifying emerging market and developing economies tackle longer-term structural challenges from climate change by providing affordable long-term financing and helping catalyze (public and) private financing. The RST could also be tapped to develop a conducive investment climate by promoting reform measures to improve the regulatory environment and increase the resilience of the infrastructure needed to address climate change.

Although this chapter focuses on financial markets and instruments as ways to overcome existing challenges for climate finance in emerging market and developing economies, implementing the necessary and appropriate climate policies remains crucial. Climate policies and finance are complementary—climate policies are a prerequisite for enabling private finance, which in turn contributes to the achievement of climate policy goals.³ Carbon pricing is an effective tool to make high emitters pay for the climate costs they cause and thereby channel investment toward projects that emit less.⁴ More generally, climate policies and commitments, such as the Nationally Determined Contributions under the Paris Agreement, send a strong signal to investors. This can help direct investment flows to support the transition to a low-carbon economy.

The Market for Private Climate Finance in Emerging Market and Developing Economies: Moving toward the Mainstream

Sustainable finance markets in emerging market and developing economies, particularly in Asia, have become progressively more mainstream, and 2021 was a breakout year. Although green bonds are still the main instrument in the sustainable finance ecosystem in emerging market and developing economies (59 percent in 2022 to date), other sustainable

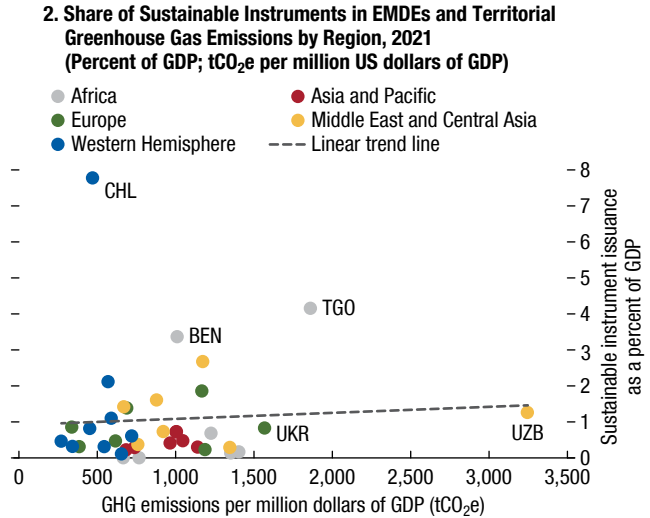
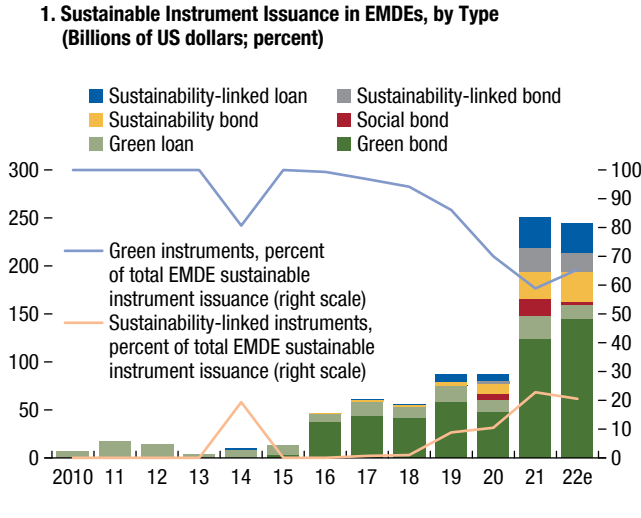
³The recently legislated US Inflation Reduction Act is an example of a policy that incentivizes private investments in carbon-neutral energy production through tax credits.

⁴The IMF's October 2019 *Fiscal Monitor* emphasizes the importance of carbon taxes and pricing to the implementation of carbon mitigation strategies. The IMF's October 2020 *World Economic Outlook* argues that steadily rising carbon prices in combination with a green investment push can deliver the needed emission reductions at reasonable cost. See also www.imf.org/en/Topics/climate-change/climate-mitigation.

Figure 2.1. The Momentum for Sustainable Finance Remains Strong in Emerging Market and Developing Economies, with Notable Differences in Instruments and Regional Composition

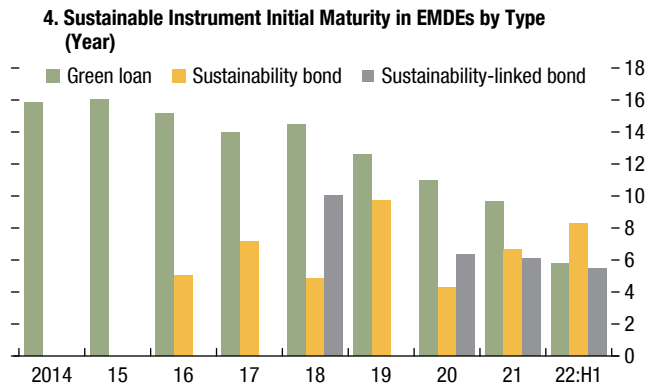
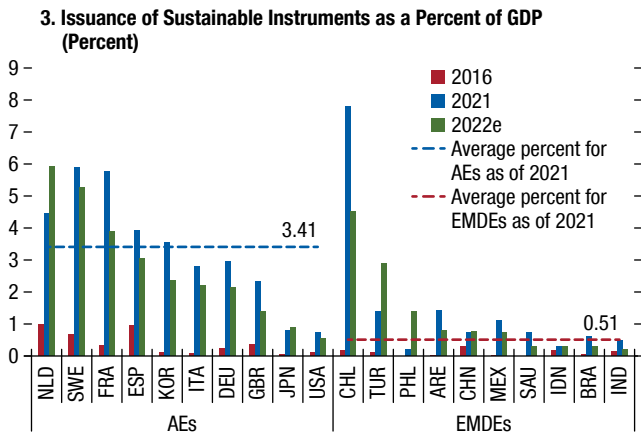
Sustainable debt issuance in EMDEs grew strongly in 2021, with a notable rise in sustainability-linked instruments.

Much of this growth has been driven by issuance in the Asia-Pacific region.



Despite recent increases, sustainable debt issuance remains limited in EMDEs, with some exceptions.

Maturities vary substantially across instruments.



Sources: Bloomberg Finance L.P.; Emissions Database for Paris Reality Check; Eora Global Supply Chain Database; IMF, World Economic Outlook database; and IMF staff calculations.
 Note: Data for 2022 in panels 1 and 3 are annualized based on the first half of 2022 (2022e). Panel 3 shows countries filtered by sustainable instrument issuance amounts in 2022 among AEs and EMDEs separately. Panels 2 and 3 use International Organization for Standardization (ISO) country codes. AE = advanced economy; e = estimate; EMDE = emerging market and developing economy; GHG = greenhouse gas; tCO₂e = metric tons of carbon dioxide equivalent.

finance debt instruments (social, sustainability, and sustainability-linked loans and bonds) have gained prominence since 2018, especially outside of China (Figure 2.1, panel 1).⁵ Variation is notable across

regions (Figure 2.1, panel 2). The Asia-Pacific region has dominated emerging market and developing economy debt issuance, with 60 percent of sustainable issuance in 2021 and 72 percent in 2022 to date, in line with the region's large share of

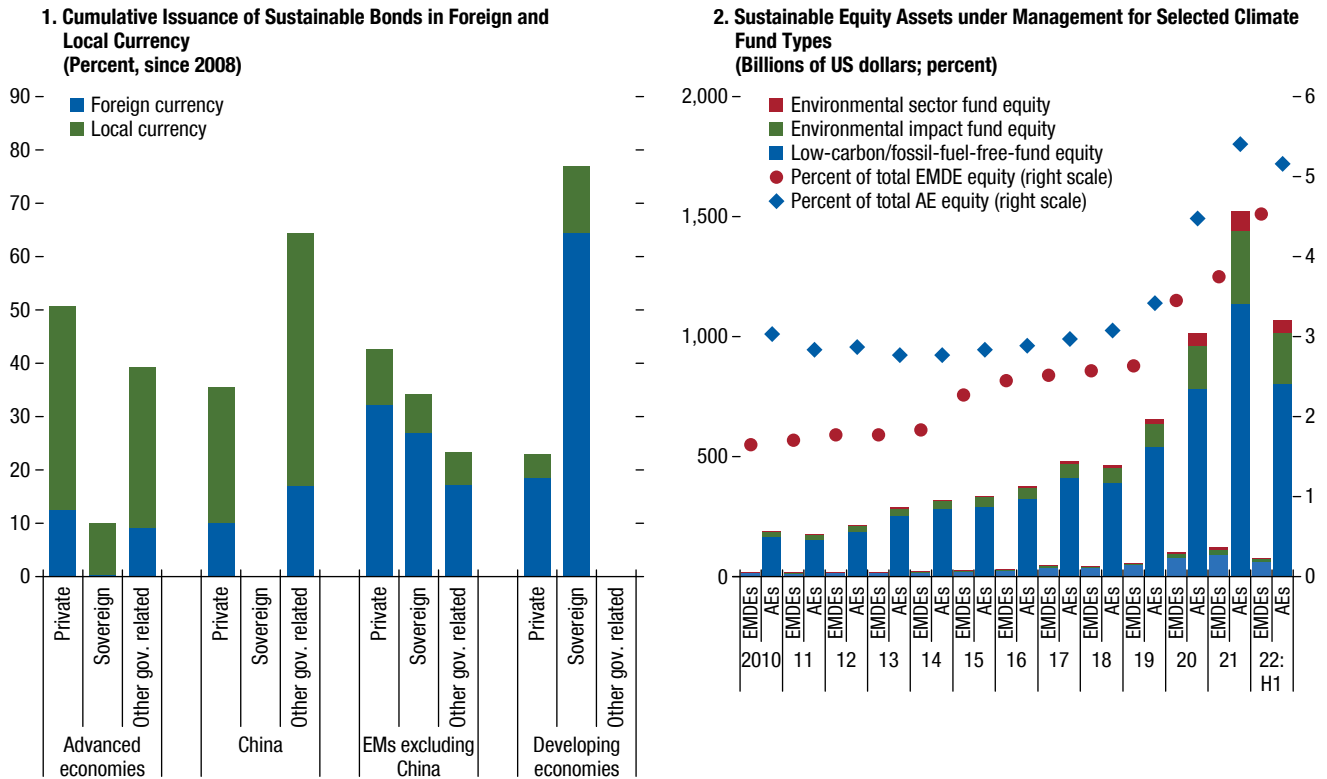
⁵Green bond instruments are regular financial instruments whose proceeds are used to finance projects that benefit the environment (such as solar energy projects). Social bonds must be used to finance social projects (such as affordable housing), while sustainability bonds finance a combination of green and

social projects. All three are “use-of-proceeds” instruments. For sustainability-linked instruments, the issuer sets a contractual target for the borrower to achieve sustainability goals (such as reducing greenhouse gas emissions), with free use of proceeds.

Figure 2.2. The Development of Private Climate Finance Comes with a Series of Challenges

China, emerging markets excluding China, and developing economies have followed very different patterns in sustainable bond issuance.

Despite recent increases, sustainable equity investments remain small.



Sources: Bloomberg Finance L.P.; Morningstar Direct; and IMF staff calculations.

Note: Data for 2022 in panel 1 are annualized based on the first half of 2022. Panel 1 includes only sustainable bonds (excluding US municipal bonds). “Private” includes bonds issued by financial institutions as well as industrial, renewable energy, and utilities bonds. “Sovereign” includes bonds issued by central governments. “Other gov. related” includes bonds issued by agencies and local authorities, as well as covered bonds (debt instruments secured by a cover pool of mortgage loans or public sector debt on which investors have a preferential claim in the event of default). Country classifications in panel 1 are mutually exclusive. Data in panel 2 are as of the first half of 2022. Detailed definitions of variables in panel 2 can be found in Online Annex 2.1. AE = advanced economy; EM = emerging market; EMDE = emerging market and developing economy.

emissions—about 60 percent of emerging market and developing economies’ total territorial emissions. While China remains a significant player, other emerging market and developing economies—especially Chile, India, Mexico, and Türkiye—have seen a sharp pickup in the issuance of sustainable debt as a share of GDP since 2016.

However, the issuance of sustainable debt in emerging market and developing economies remains a small share of GDP and lower than that of advanced economies (Figure 2.1, panel 3). Maturities vary across instrument types and have shrunk as issuance has grown—except for sustainability bonds (Figure 2.1, panel 4)—due to headwinds in emerging market debt markets more generally.

Issuance of sustainable bonds follows very different issuer patterns across regions. Sovereign issuance has been absent in China and accounted for only 10 percent of all issuances (since 2008) in advanced economies (Figure 2.2, panel 1). The share has been much larger in emerging markets excluding China (34 percent) and developing economies (77 percent). Issuance by other entities—mainly government agencies and local authorities—has totaled 64 percent in China and 39 percent in advanced economies. These high shares reflect greater reliance on public institutions at the local level in the financing of green infrastructure projects in China and the United States. While the share of private sector issuance in other emerging markets, at 43 percent, is

comparable to the share in advanced economies and China, it is much lower in developing economies at 23 percent.

The low share of private sector issuance in developing economies and the high share of foreign currency issuance in emerging market and developing economies may be explained by a lack of depth in domestic capital markets, including the small scale of local currency bond markets, and high credit risk. The high share of foreign currency issuance in emerging market and developing economies appears to reflect demand for sustainable bonds driven largely by investors based in advanced economies who prefer hard currency over local currency debt. For developing economies, another significant factor is the relative lack of corporations large enough to issue bonds, especially in the global markets.

Sustainable equity allocations of investment funds to emerging market and developing economies remain small despite recent increases. As a share of total equity assets under management, however, the difference between advanced and emerging market and developing economies is much smaller (Figure 2.2, panel 2, blue diamonds and red circles).

Challenges for Scaling Up Private Climate Finance in Emerging Market and Developing Economies

Despite the increasing momentum behind private climate finance in emerging market and developing economies, several challenges remain when it comes to significantly scaling up financing. These include the complexities of matching the supply and demand of financing, various institutional and informational constraints holding back projects and financing, a lack of effective carbon pricing, still-strong fossil fuel investment, an underdeveloped climate information architecture, and features of ESG scores and funds that put these economies at a disadvantage.

The Climate Financing Gap Remains Large, and Matching the Sources of Supply with Demand Is Complex

The mismatch between emerging market and developing economies' climate financing needs and current investment flows has produced a large financing gap. For purposes of climate mitigation, infrastructure

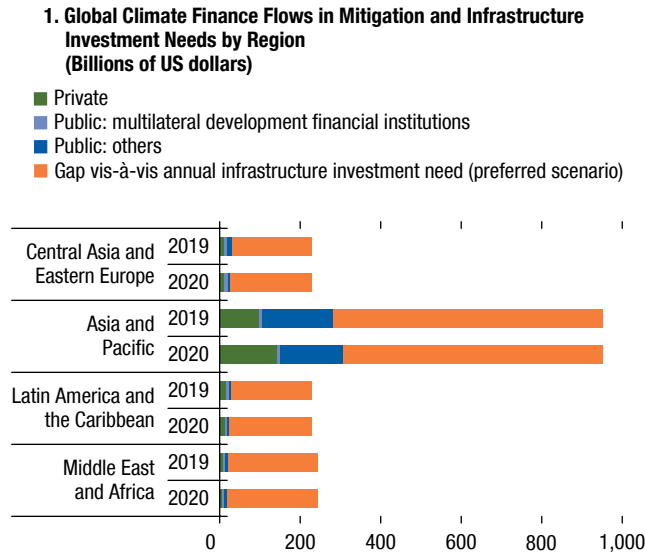
financing—mainly in the transport and energy sectors—falls short of needs across all regions (Figure 2.3, panel 1). The relative financing gap is even greater for adaptation purposes, particularly for water and sanitation, irrigation, and flood protection, where investment is almost nonexistent (Figure 2.3, panel 2). It is even more concerning that the more important a region's aggregated vulnerability to climate change (measured by its exposure, sensitivity, and ability to adapt), the greater the financing gap. Financing needs for mitigation and adaptation purposes are also large relative to GDP across all regions (Figure 2.3, panel 3). It is therefore critical for the international community to meet or even exceed the goal of providing \$100 billion in climate finance to developing economies each year and to make sure a sizable amount of the climate finance goes to adaptation. At the same time, carbon pricing initiatives, still nascent in those economies, offer only limited price signals to support climate financing (Figure 2.3, panel 4).

Addressing this mismatch is challenging given the current structure of climate finance markets. In terms of instruments, sustainable finance markets remain largely dominated by debt, which has about twice as large a share as equity financing (60 percent versus 32 percent of total climate finance; see Online Annex 2.2). With respect to sources of financing and types of intermediaries, the private sector—commercial financial institutions, funds, households, and corporations—accounts for about half of the flows. All types of financing instruments and investors, with different investment horizons, needs for scale, risk profiles, and funding sources, need to be mobilized for mitigation and adaptation purposes. For instance, renewable energy infrastructure and low-carbon technologies (such as carbon capture and storage, batteries, low-carbon hydrogen) will largely require equity finance (IEA 2021a).

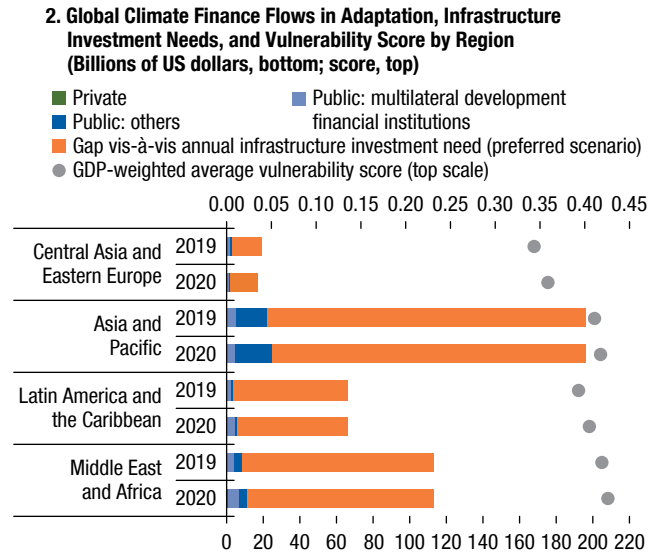
At the same time, several constraints hold back projects and financing on the supply and demand sides. Investors have noted various reasons for gaps in financing needs related to lack of investable projects (Ehlers 2014; Fouad and others 2021). They point to bottlenecks in project preparation and development. Deficiencies in policy and regulatory frameworks and weaker institutional capacity (related to contract enforcement, property rights, and management of fiscal risks and public investment) make it hard to manage the long-term investments needed in sustainable infrastructure. In addition, investors point to a need for high-quality, reliable, and comparable data.

Figure 2.3. A Deep-Seated Financing Gap for Climate Change Mitigation and Adaptation, Limited Fiscal Capacity, and Carbon Pricing Strategies in Emerging Market and Developing Economies

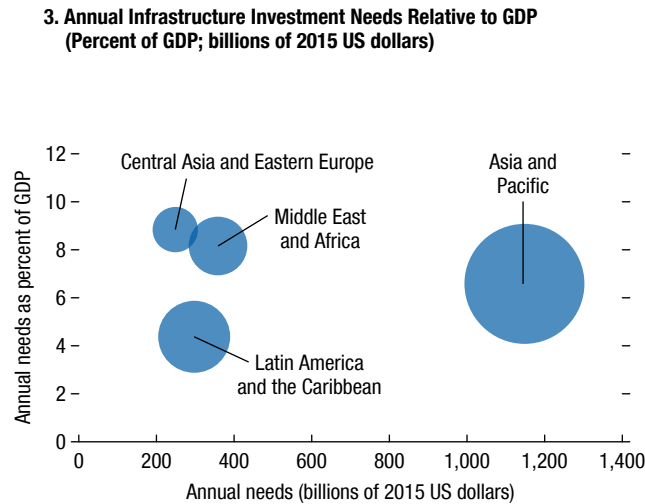
The overall gap vis-à-vis mitigation needs is high across regions ...



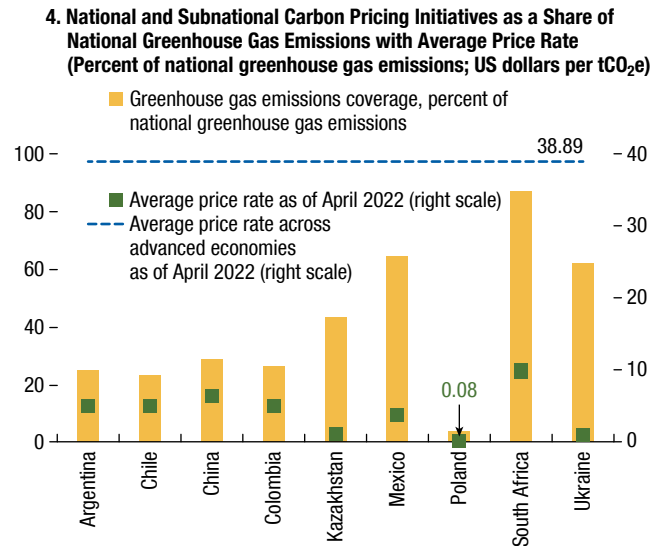
... and even more so for adaptation finance, despite the high level of vulnerabilities to climate change.



Needs relative to GDP are significant across regions, specifically in Central Asia and Eastern Europe and in Middle East and Africa.



However, carbon pricing initiatives remain nascent in those economies, with insufficiencies in coverage and rates.



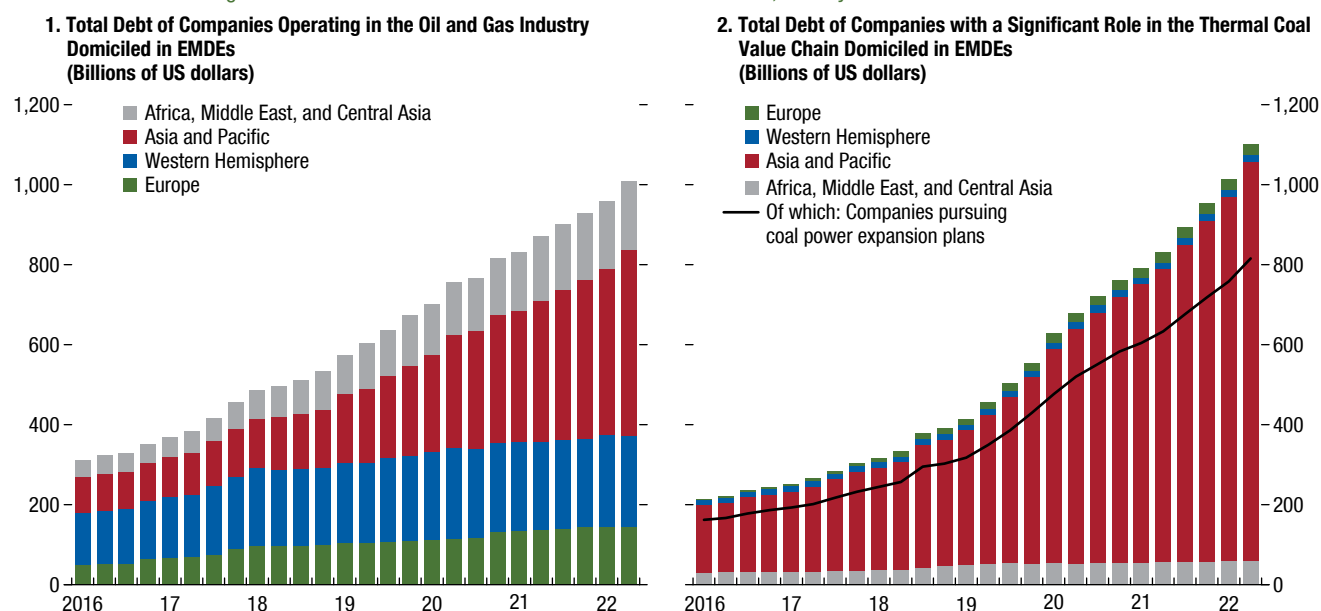
Sources: Climate Policy Initiative (2021); Emissions Database for Global Atmospheric Research; Emissions Database for Paris Reality Check; Eora Global Supply Chain Database; Notre Dame Global Adaptation Index; World Bank (2019); World Bank Carbon Pricing database; World Economic Outlook database; and IMF staff calculations.

Note: In panels 1 and 2, the infrastructure needs for mitigation include the energy and transport sectors, and infrastructure needs for adaptation include the water and sanitation, irrigation, and flood protection sectors. The climate finance flow includes both emerging market and developing economies and advanced economies in selected regions; the infrastructure investment needs are calculated for all low- and middle-income countries. Therefore, the infrastructure needs gap is underestimated. In panel 2, the GDP-weighted average vulnerability score measures a country's exposure, sensitivity, and capacity to adapt to negative effects of climate change. "Private" category is too small to be displayed (always below 1 billion US dollars). In panel 3, the size of the bubble represents the GDP. In panel 4, "price rate" is the cost per tCO₂e emissions from both the carbon tax and emission trading system. The coverage of each carbon pricing initiative is presented as a share of annual national greenhouse gas emissions for 2021. Detailed variable definitions can be found in Online Annex 2.1. tCO₂e = metric ton of carbon dioxide equivalent.

Figure 2.4. Debt Levels of Emerging Market and Developing Economy Companies Operating in Fossil Fuel Industries Continue to Increase

Debt levels of companies headquartered in Asia and the Middle East have increased at the highest rate ...

... while debt levels of companies pursuing expansion plans have also increased, notably in Asia.



Sources: Bloomberg Finance L.P.; Urgewald; and IMF staff calculations.

Note: Companies in panel 1 include those with expansion activities in the upstream and midstream sectors. Total debt includes bonds and loans. Data are based on a sample of roughly 80 companies for which debt statistics are available from 2016 onward, out of 250 identified companies headquartered in EMDEs. Companies in panel 2 include those meeting criteria set out by Urgewald. Total debt includes bonds and loans. Data are based on a sample of 106 parent companies and subsidiaries for which debt statistics are available from 2016 onward, out of roughly 2,200 identified that are headquartered in EMDEs. The sample represents roughly 25 percent of the installed coal power capacity of companies headquartered in EMDEs. Companies with expansion plans are those planning to develop new coal-fired power capacity of at least 100 megawatts. EMDE = emerging market and developing economy.

The Triple Challenge: The Lack of Carbon Pricing and Fossil Fuel Investment and an Underdeveloped Climate Information Architecture

Currently, emerging market and developing economies lag advanced economies in their implementation of carbon pricing. Nascent initiatives—mainly carbon taxes—fall short of targets both in emission coverage and prices when compared with advanced economies (Figure 2.3, panel 4). Consumption subsidies for fossil fuels in some emerging market and developing economies are essentially a persistent form of negative carbon pricing, which makes for an uneven playing field for investments in low-carbon technologies.

Investment in emerging market and developing economies is still tilted toward the fossil fuel sector, which has experienced a substantial rebound in debt issuance since the Paris Agreement. In the coal

sector, the growth of outstanding debt (bonds and loans) was more than 400 percent between the first quarter of 2016 and the second quarter of 2022, with a nearly 500 percent increase in the Asia-Pacific region (Figure 2.4). The ability to raise debt financing has also been high in the oil and gas sector, where outstanding debt grew 225 percent, with a more than 400 percent increase in the Asia-Pacific region over the same period (primarily via bank loans). Moreover, debt of companies in emerging market and developing economies with coal power expansion plans increased about 350 percent between 2016 and 2022; annual growth in the second quarter of 2022 was nearly 30 percent. This increase occurred despite caution that an achievement of net-zero emission targets requires halting new oil and gas field development, new coal mines, and extensions beyond projects

already committed to as of 2021 (IEA 2021a). Against this backdrop, Russia's war in Ukraine and the move away from Russian energy in Europe could result in a significant setback, incentivizing further fossil fuel exploration in emerging market and developing economies.

Further, the climate information architecture in emerging market and developing economies remains underdeveloped despite recent advances. There is a lack of granular, quality climate data in these economies, and there are challenges in terms of both availability and accessibility. Data sets on climate variables (for example, temperature and precipitation) and carbon intensity are sparse, especially for Africa, small island developing states, and regions in high-mountain Asia (NGFS 2022b). While climate-related corporate disclosures have recently improved—mostly across Asia, Chile, Peru, South Africa, and Türkiye—disclosures remain voluntary in most countries and lack standardization, consistency, and reliability because of an absence of auditing requirements. Current disclosures cannot give a consistent picture of financial sector exposure to climate-related risks and opportunities because of the lack of high-quality, consistent, and comparable climate data.

The Chinese and European taxonomies have propelled several emerging market and developing economies—primarily in Asia and Latin America—to develop their own regional or national taxonomies. The taxonomies of the Association of Southeast Asian Nations (ASEAN), as well as Indonesia, Malaysia, and Singapore (via a “traffic light” approach),⁶ are notable examples of transition taxonomies. They aim to identify improvements in emissions over time and across sectors, including within the most carbon-intensive sectors, to support the transition to a low-carbon economy. Nonetheless, most existing taxonomy projects have still not been tested for robustness to meet long-term temperature goals and for their impact on financial markets, including by potentially diverting investment from carbon-intensive activities or companies facing complex transitions. As for global initiatives such as the International Platform

⁶A traffic light approach means that an economic activity may be characterized as green, amber, or red, depending on its contribution to climate change mitigation, according to a series of technology- and emission-related criteria.

on Sustainable Finance's Common Ground Taxonomy and regulations and policies in advanced economies (primarily Europe and the United States), the impact on emerging market and developing economies is unclear at this point; these initiatives could, however, serve as benchmarks for capital market development in these economies.

Environmental, Social, and Governance Scores and Investment Funds Put Emerging Market and Developing Economy Firms at a Disadvantage

ESG investing is a major and growing investment trend, but its impact on climate finance in emerging market and developing economies may be limited. The Global Sustainable Investment Alliance estimates that the assets under management of funds with an ESG-related investment mandate have reached \$35.3 trillion, or about 36 percent of global assets under management (GSIA 2020). About half of ESG funds' assets are allocated to equities (52 percent at the end of the second quarter of 2022). A small increase in the share of ESG fund allocations to emerging market and developing economies could in principle result in significant investment flows.

A general challenge for ESG scores and investing, however, is the lack of focus on ESG impact, including climate change. ESG scores are based on a large number (usually more than 100) of ESG-related data points, such as whether a firm has a carbon transition plan (an E component). Typically, a higher ESG score indicates better ESG “performance” of a firm.⁷ Recent IMF research, however, finds that there is limited scope for investment strategies based on ESG indicators to meaningfully help mitigate climate change (Elmalt, Kirti, and Igan 2021). Historically, ESG ratings evolved as a means to manage non-financial risks, rather than to assess the ESG benefits of firms.⁸ Recent scrutiny around the labeling of

⁷For some providers the opposite is the case. One prominent example is Sustainalytics (owned by Morningstar), for which a higher score represents a higher ESG risk and therefore lower ESG “performance.” See www.sustainalytics.com/esg-data.

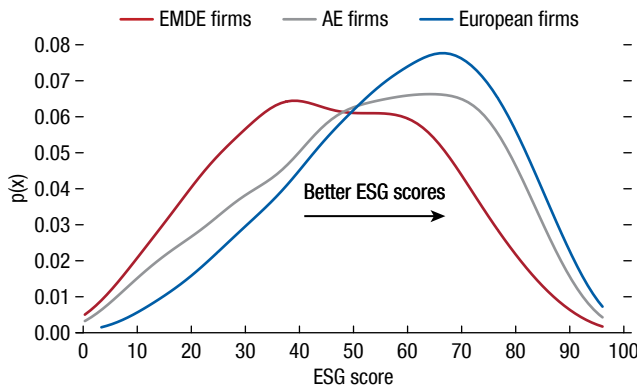
⁸Indeed, the most prominent ESG rating providers clearly state that their scores are risk ratings. For MSCI, the largest ESG rating provider by market share, see www.msci.com/our-solutions/esg-investing/esg-ratings/what-esg-ratings-are-and-are-not. For Sustainalytics, the second largest, see www.sustainalytics.com/esg-data.

Figure 2.5. ESG Scores and Fund Allocations Are Systematically Lower for Firms in Emerging Market and Developing Economies

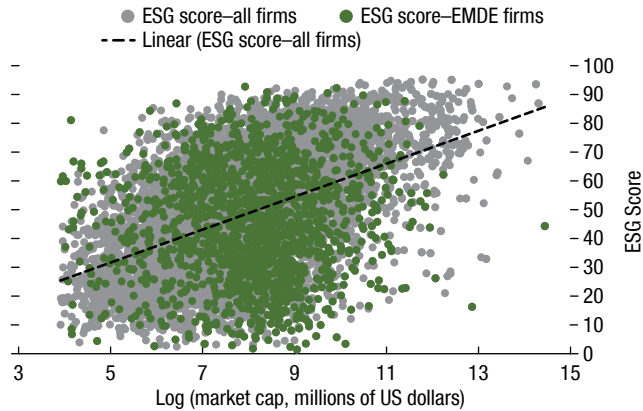
The distribution of ESG scores of firms is dominated by scores for firms listed in advanced economies.

This skewing cannot be explained by the size of EMDE firms, which on average does not differ from advanced economy firms in the sample.

1. Smoothed Distribution Function of ESG Scores (Probability)



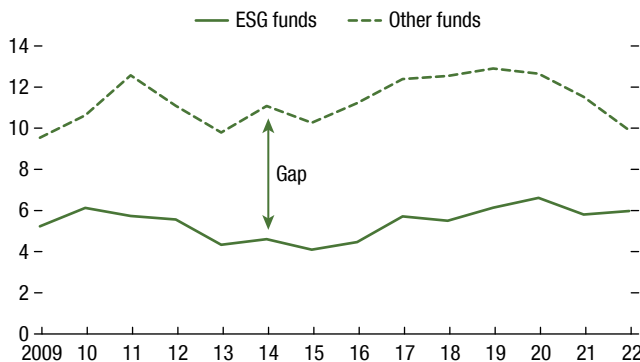
2. ESG Scores and Firm Size



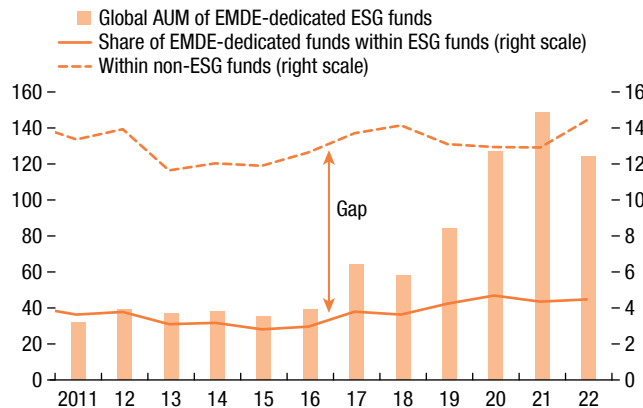
Allocations of ESG funds to EMDEs are lower than those of other funds ...

... which is driven partly by the relatively small size of ESG funds dedicated to EMDEs.

3. Share of EMDE Allocations of ESG vs. Other Funds (Percent)



4. EMDE-Dedicated ESG Funds vs. EMDE Non-ESG Funds (Billions of US dollars; percent)



Sources: Morningstar; Refinitiv; and IMF staff calculations.

Note: Panels 1 and 2 are based on listed firms only—more than 6,200 in total, of which more than 1,300 are from EMDEs. Panel 1 excludes US firms for the Refinitiv ESG scores because the data have a bias toward covering small US firms and penalize these firms for not reporting E data. This is not the case for most other ESG rating providers. Panel 1 shows a smoothed distribution function of the ESG scores. A higher score implies better ESG performance. Panels 3 and 4 include data up to the end of second quarter of 2022. AE = advanced economy; AUM = assets under management; EM = emerging market; EMDE = emerging market and developing economy; ESG = environmental, social, and governance.

ESG funds further suggests that not all ESG funds sufficiently incorporate ESG factors into their investment strategies.

ESG scores appear to be systematically lower for emerging market and developing economy firms than for advanced economy firms. While the distribution of ESG scores from different providers can differ significantly (Berg, Kölbel, and Rigobon 2022), listed emerging market and developing economy firms tend

to have, on average, lower scores than their advanced economy counterparts (Figure 2.5, panel 1). This is true also for the individual E, S, and G scores (see Online Annex 2.6 for a more detailed analysis of ESG scores). One determinant of ESG scores appears to be firm size (Drempetic, Klein, and Zwergel 2020). In the data sample of listed firms, however, emerging market and developing economy firms, on average, are not significantly smaller than advanced economy

firms (Figure 2.5, panel 2). Online Annex 2.6 contains a more formal regression analysis, showing that in addition to size, industry composition, firms' financial performance, and other unobserved firm characteristics cannot fully account for the lower ESG scores of these economies' firms.⁹ These results also hold true for E scores only. Which ESG characteristics can account for the systematically lower scores of emerging market and developing economy firms is difficult to pinpoint. A large number of data points are used to construct ESG scores, and these data points differ depending on the industry. Further, the individual ESG characteristics that feed into the scores, and the weight they receive, are at the discretion of ESG scoring providers and vary substantially across providers.

Allocations to emerging market and developing economies (equities and bonds) by ESG investment funds are also lower than those by non-ESG funds (Figure 2.5, panel 3).¹⁰ One reason for the significant and persistent difference is the lack of ESG funds dedicated to these economies (Figure 2.5, panel 4). But emerging market and developing economy allocations between ESG funds and other funds also differ for global funds that invest in both advanced and emerging market and developing economies (see Online Annex 2.7).¹¹

Harnessing the Opportunities to Scale Up Private Climate Finance in Emerging Market and Developing Economies

Given the scale and variety of climate investment needs, a single instrument or approach is unlikely to be sufficient or advisable. The opportunities discussed in this chapter present a set of feasible and complementary tools for different use cases and country circumstances.

⁹Another potential explanation is the lack of reporting of ESG data, which induces a penalty in the analyzed ESG data. This is, however, not the case for all ESG scoring providers.

¹⁰The difference in allocations to emerging market and developing economies between ESG and non-ESG funds holds true separately for equities and bonds. See Online Annex 2.7. All online annexes are available at www.imf.org/en/Publications/GFSR.

¹¹A link between systematically lower scores of emerging market firms and low ESG fund allocations to these economies' assets is suggestive, but it is difficult to establish it formally. To what extent ESG funds use ESG scores (and from which providers) in determining their investment allocations is typically not publicized. Further, ESG funds often combine the use of ESG scores with other criteria to determine their asset allocations.

Innovative Financing Instruments and the Role of Multilateral Development Banks

Innovation in climate finance has proceeded rapidly, including four distinct types of instruments and approaches that address different fundamental challenges and therefore have different use cases (Table 2.1 and Online Annex 2.4). *Structured finance vehicles* purchase green bonds from emerging market banks and target large institutional investors. MDBs purchase equity or provide a credit risk guarantee to these structures to reduce the risks such that pension funds or insurance companies can invest. *Blended finance* more broadly combines public and donor capital to de-risk infrastructure investments for private capital, thereby helping to mobilize and scale up climate private finance. *Outcome-based sustainable debt instruments*, such as sustainability-linked bonds, include an incentive mechanism to address information asymmetries between issuers and investors (called “green-washing,” when sustainability benefits of investments are not as high as issuers claim). In “*pay-for-success*” private financing for public sector projects, third-party investors, including private investors, provide the initial investment and develop a project. The public sector then purchases the project for an amount linked to the project's sustainability performance—investors receive higher compensation with higher performance measured by indicators agreed on in advance.

The public sector, including MDBs and DFIs, has an important role to play in employing some of these instruments.¹² To attract private capital, the various risks associated with emerging market and developing economy financial assets (ranging from credit, foreign exchange, and macroeconomic risks to governance and political risks) must be reduced. National development banks, MDBs, and DFIs can efficiently employ their resources and expertise to crowd in private finance. By absorbing a portion of these risks, providing technical assistance and capacity development, and lending their reputation and expertise, these institutions can play an important role in attracting private investors that would not otherwise have provided funding for climate-beneficial

¹²Unlike MDBs, which provide financial assistance to promote economic and social development, DFIs are specialized development banks or subsidiaries set up specifically to support private sector development. These are usually majority-owned institutions of national governments and source their capital from national or international development funds or benefit from government guarantees.

Table 2.1. Selected Innovative Financial Instruments for Climate Finance

Type of Instrument	Structured Finance and EMDE (Closed-End) Fixed-Income Funds	Blended Finance for Infrastructure and Other Complex Projects	Outcome-Based Sustainable Debt Instruments	Private Finance for Public Sector Projects (“Pay for Success”)
Examples	Green bond funds: IFC-Amundi; Axa’s Blue Like an Orange (in progress)	Equity, mezzanine/first-loss finance for infrastructure projects	Sustainability-linked instruments (bonds, loans, commercial paper, etc.)	Environmental impact “bonds”
Description	Green bonds issued by EMDE banks (against green loans) are securitized into green bonds with the public sector providing credit risk reduction	MDBs or the public sector make an equity or mezzanine investment, or provide a guarantee to de-risk and crowd in private investors	Issuer receives a bonus (pays a penalty) if sustainability target agreed on in advance (based on clearly defined indicators) is met (missed)	Contract with a public sector authority that pays if predefined environmental outcomes are achieved
Use case	Emerging markets with existing bank loans to green projects	New infrastructure projects (for example, in the energy sector); use of new types of technologies with potentially higher risks; agriculture	Support firm-level or government-level alignment with sustainability targets (such as greenhouse-gas-emission reductions)	Adaptation finance, nonbankable transition finance
Fundamental challenges addressed	Reduction in credit risk (through elevation to investment-grade finance), scaling, diversification, potential currency risk reduction through pooling	Mitigation of credit and political risks; mitigation of information asymmetry problems	Information asymmetry (“greenwashing”)	Capacity limits in developing complex green projects (such as in infrastructure); potential inefficiencies in public sector investment
Targeted private investors	Institutional investors, including pension funds and insurance companies	Specialist investors and investment funds; local investors	All	Specialized funds, donor funds, MDBs
Mechanism to ensure climate benefits	Selection of eligible bank loans; usual green bond certification	Project selection and technical assistance	Bonus (or penalty) provides incentive to fulfill sustainability target	Project selection; due diligence
Public sector/ MDB involvement	De-risking (purchase equity tranche/provide first-loss guarantee); technical assistance	Own resources for equity/mezzanine investment and guarantees; provide specialized expertise for project design	None. Sovereigns could issue to support market development and set standards	Direct investment; technical assistance
Design/incentive issues	Requires existing bank loans and technical assistance for banks to issue green bonds	Complex contractual agreements; extensive equity/mezzanine investment and guarantees can create moral hazard; limits returns for other equity investors	Sustainability targets may not be sufficiently ambitious; penalties need to be high enough to motivate issuer to achieve target	High financial and political risks for private investors
Potential to scale up finance	High	Limited by public sector MDB resources	Limited by issuer characteristics	Limited by fiscal resources

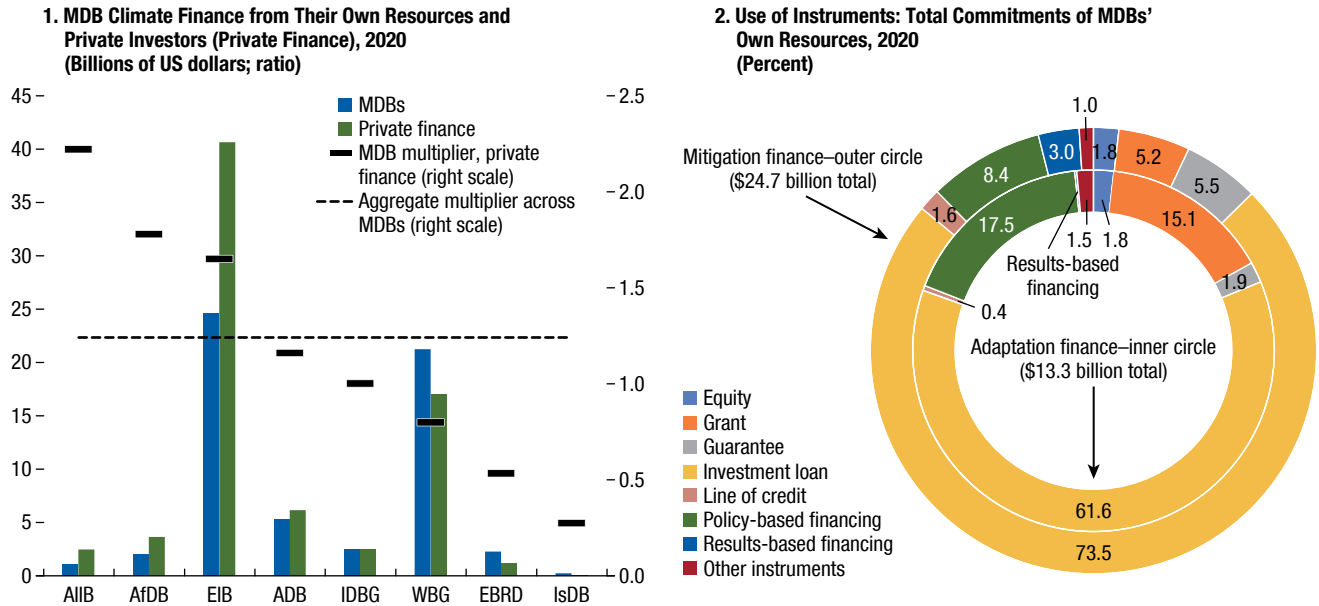
Source: IMF staff illustration.

Note: EMDE = emerging market and developing economy; MDB = multilateral development bank.

Figure 2.6. Multilateral Development Banks Have Scope to Draw in More Private Climate Finance for Emerging Market and Developing Economies

MDBs crowd in private finance on average of only about 1.2 times the resources they commit themselves ...

... in part because they invest a small share in equity instruments or guarantees.



Sources: World Bank, 2020 *Joint Report on Multilateral Development Banks' Climate Finance*; and IMF staff calculations.
 Note: Commitments include the nominal value of guarantees, which may or may not lead to use of a multilateral development bank's own resources. ADB = Asian Development Bank; AfDB = African Development Bank; AIIB = Asian Infrastructure Investment Bank; EBRD = European Bank for Reconstruction and Development; EIB = European Investment Bank; IDBG = Inter-American Development Bank Group; IsDB = Islamic Development Bank; MDB = multilateral development bank; WBG = World Bank Group.

investments in emerging market and developing economies. Naturally, this entails risks for the public sector, which need to be managed appropriately (Prasad and others 2022).

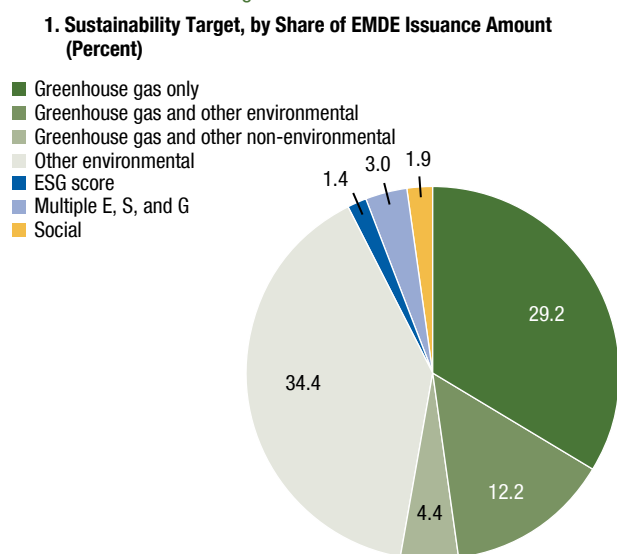
The emerging market green bond fund established by the International Finance Corporation (IFC) and asset manager Amundi exemplifies efficient use of MDB resources to attract private finance. The fund (AP EGO) set up by Amundi pooled green bonds issued by banks in various emerging market and developing economies. It thereby leveraged on the expertise of local banks and their critical role as a source of financing in these economies. The IFC, part of the World Bank Group, purchased a first-loss/equity tranche of the green bond fund. This reduced the credit risk for other investors to what is called “investment-grade level,” allowing pension funds to invest (see Online Annex 2.5). IFC’s equity investment of \$125 million enabled a fund totaling \$2 billion, a multiple of 16 (Bolton, Musca, and Samama 2020).

MDB resources could be targeted more to attracting private sector climate finance. On average, MDBs attracted only 1.2 times the amount of private finance (equity and debt) relative to commitments of their own resources in 2020 (Figure 2.6, panel 1). There is an ongoing and long-standing discussion about how to leverage the resources of MDBs most efficiently for climate finance (Basu and others 2011). The use of equity has the greatest potential to maximize co-financing because it enables a potentially high multiple of additional debt finance. The use of equity, however, remains very limited, at about 1.8 percent of total MDB commitments to private climate finance in emerging market and developing economies (Figure 2.6, panel 2).

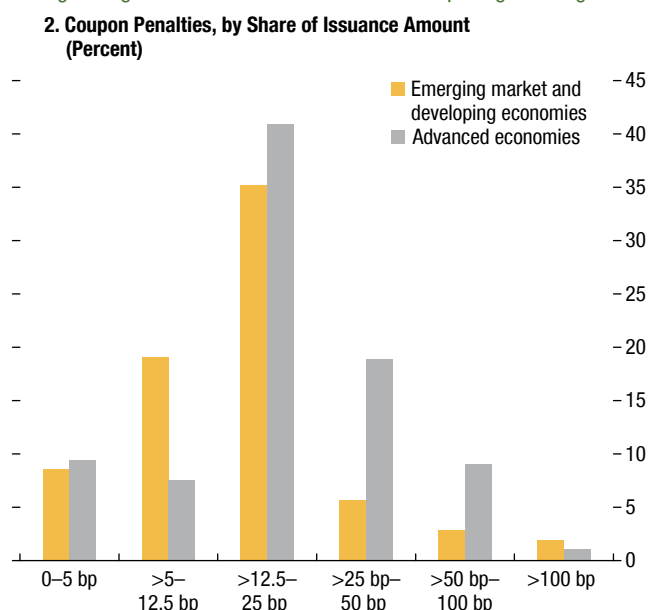
Scaling up MDB commitments significantly would ultimately require an expansion of their own resources for climate finance. Developing climate-resilient and beneficial infrastructure projects is a key component of climate finance for economies at all levels of development. Infrastructure finance faces various well-known

Figure 2.7. Sustainability-Linked Bonds—Conceptually Solid Instruments with Practical Issues

Most sustainability-linked bonds have either a greenhouse gas or another environmental target ...



... but the small penalties are unlikely to be high enough to create strong-enough incentives for issuers to fulfill the pre-agreed target.



Sources: Bloomberg Finance L.P.; and IMF staff calculations.

Note: bp = basis point; EMDE = emerging market and developing economy; ESG = environmental (E), social (S), and governance (G).

challenges, including a lack of investable projects. Supporting the complex development of infrastructure projects, including through technical assistance, and providing financing constitute the core contributions of MDBs.

Sustainability-linked bonds, the main outcome-based debt instrument to date, have been very popular among emerging market issuers and have the potential to be used even more. These bonds feature a contractually agreed sustainability performance target based on a key performance indicator.¹³ Unlike green bonds and other use-of-proceeds instruments, issuers may use the proceeds freely. Emissions and other environmental goals (mainly energy efficiency and water consumption) are the dominant performance indicators among emerging-market-based issuers of sustainability-linked bonds (Figure 2.7, panel 1). These bonds may also be used as a transition financing instrument if a target for reduction of greenhouse gas emissions is in line, say, with a net-zero-emission pathway.

¹³For instance, a sustainability performance target could be a firm's direct (scope 1) and indirect greenhouse gas emissions (scope 2), and the associated key performance indicator could be a specific level that the company pledges to achieve by, say, 2030.

These features can be appealing to emerging market and developing economy issuers. Unlike green bonds, which require firms to engage in projects using highly developed green technologies, sustainability-linked bonds signal an improvement over time, independent of the current level of development.

Apart from operational advantages for emerging market issuers, outcome-based instruments can signal to investors that the issuing firm is committed, for example, to improving its emissions over time. The financial incentive to reach the target, if set sufficiently high, can be a strong incentive for the issuer and alleviate investors' concerns about greenwashing. Sustainability-linked bonds, and other outcome-based instruments, are also very suitable for investors looking to ensure the sustainability impact of their investments.

Current practical challenges for sustainability-linked bonds remain. While sustainability targets are sometimes seen to lack ambition (ING 2021), the penalty for not reaching them is often low—in the case of sustainability-linked bonds, less than 25 basis points for most emerging market issuance (Figure 2.7, panel 2). Typically, the penalty comes in the form of a step-up the issuers must pay on the bonds' coupon

payments if the sustainability performance target is missed.¹⁴ The penalty event date typically occurs several years after issuance to give the issuer time to reach the performance target. This further reduces the dollar value of the penalty and the incentive for the firm to reach the target.

A new instrument is known as “pay-for-success” finance for climate purposes, also dubbed “environmental impact bonds.” While pay-for-success instruments were developed for social projects (social impact bonds), they could also be applied to environmental projects.¹⁵ An important potential use is for adaptation finance. Private sector participation could be particularly effective for adopting less proven but innovative green technologies, where the public sector lacks the necessary expertise. In less developed economies, where capacity to develop such projects is often limited, this financing mechanism could expand the types of potential green and adaptation projects, with the public sector ultimately retaining ownership of the project. It could also incentivize efficient implementation of complex projects if payments to private investors are designed to increase sufficiently with performance. The contractual arrangements are bespoke and complex, however, and require technical assistance as well as assurance against political risks—a potential role for MDBs.

The Role of the IMF and the New Resilience and Sustainability Trust

The IMF can play a catalytic role in climate finance through its policy advice, surveillance, and capacity development by drawing on its track record as a catalyst for official and private finance. The IMF can mitigate macroeconomic risk by providing advice through bilateral and multilateral surveillance, assessing countries’ economic and financial developments during Article IV consultations, performing

¹⁴The large majority of sustainability-linked bonds features a coupon step-up (or penalty) in case the sustainability target is missed. In relatively rare cases, the coupon is reduced if the target is reached. The incentive mechanism, however, is symmetric to the case of a coupon penalty (Berrada and others 2022). Other relatively uncommon types of penalties include a redemption premium or a penalty payment to a third party such as a not-for-profit organization dedicated to combating climate change.

¹⁵To date, environmental impact bonds have been structured only for US municipal projects. The first was issued by DC Water in September 2016 to finance the construction of green infrastructure to manage stormwater runoff in Washington, DC.

risk assessments in Financial Sector Assessment Programs, providing climate macro-financial country assessments, and enhancing countries’ capacity development. The IMF is already playing a leading part in advocating for carbon pricing. Its Climate-Public Investment Management Assessment is a framework that helps governments identify potential improvements in public investment institutions and processes to build low-carbon and climate-resilient infrastructure (IMF 2021a). This can help give higher priority to climate change mitigation and adaptation in infrastructure development.

Together with other large global policy institutions, the IMF can help strengthen the climate information architecture in emerging market and developing economies. The IMF is playing a key role identifying data gaps, promoting corporate climate-related disclosure, and developing a guidance for taxonomies to ensure interoperability (IMF, Bank for International Settlements, Organisation for Economic Co-operation and Development, and World Bank, forthcoming). Global policy institutions such as the IMF can partner with global data providers to supply them with regularly updated macroeconomic and climate-related data and make such data accessible to the public in a well-structured and accessible way. The IMF has started publishing a Climate Change Indicators Dashboard, which includes indicators on climate financing.¹⁶

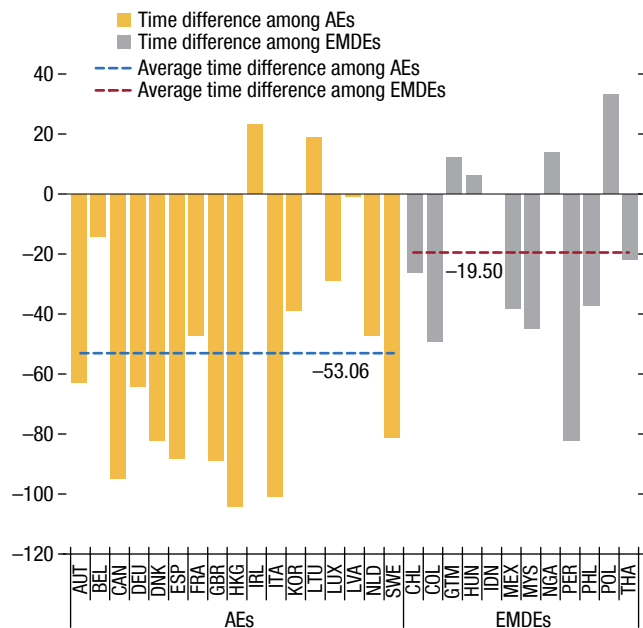
Countries, particularly eligible and qualifying emerging market and developing economies, with limited fiscal space can benefit from IMF Resilience and Sustainability Trust (RST) financing. This new financing facility focuses on longer-term structural changes, including climate change and pandemic preparedness, that entail macroeconomic risk and on policy solutions that have a strong global public good nature (IMF 2022). The RST could play a catalytic role by helping develop a conducive investment climate through reforms that improve the regulatory environment and enhance the quality of data and disclosures, as well as support policies to make infrastructure more resilient.

¹⁶The IMF Climate Change Indicators Dashboard includes a range of distinctive indicators that demonstrate the impact of economic activity on climate change, grouped into five categories: economic activity, cross-border, financial and risks, government policy, and climate change data. See <https://climatedata.imf.org/>.

Figure 2.8. Sovereign Sustainable Debt Issuance

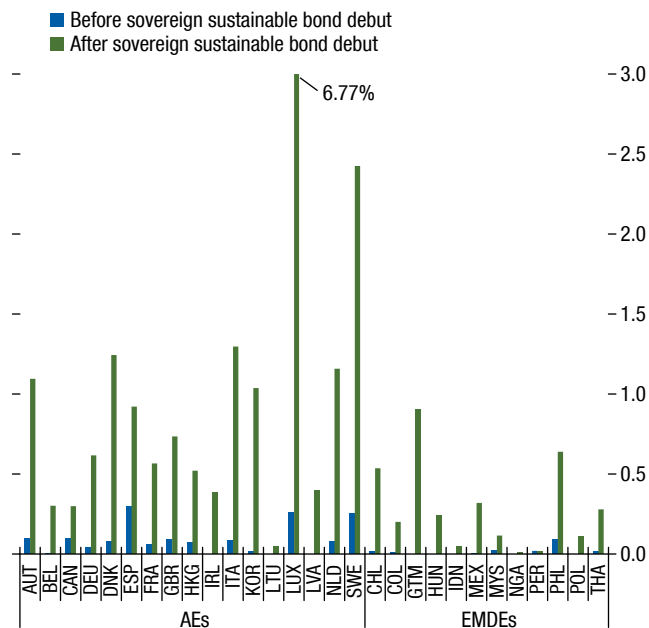
Sovereigns have been latecomers in sustainable debt markets ...

1. Lag between First Corporate Sustainable Bond Issuance and Sovereign Sustainable Bond Issuance (Months)



... but usually have had a positive impact on private issuance.

2. Annualized Average Corporate Sustainable Bond Issuance before and after First Sovereign Sustainable Bond Issuance (Percent of GDP)



Sources: Bloomberg Finance L.P.; IMF, World Economic Outlook database; and IMF staff calculations.

Note: The data sample includes sustainable bond issuance between 2007 (the issuance of the first sustainable bond) and the end of June 2022. Panel 2 displays annualized average corporate sustainable bond issuance as a percent of GDP. Panels 1 and 2 include only countries where both the government and at least one private firm issued a sustainable bond. Nine countries have issued a sovereign sustainable bond but have not seen private sector issuance. The negative numbers in panel 1 imply that the first corporate sustainable bonds were issued earlier than the first sovereign sustainable bonds. Panels use International Organization for Standardization (ISO) country codes. AE = advanced economy; EMDE = emerging market and developing economy.

Transition Taxonomies

Transition taxonomies, such as those developed in Southeast Asia and discussed earlier in this chapter, can yield significant benefits for emerging market and developing economies. These taxonomies can focus on innovative technologies for sectors in which it is difficult to abate emissions because of technological and cost challenges (such as for cement, steel, chemicals, and heavy-duty transport). They also help promote corporate and financial institutions' disclosure of transition plans to meet the Paris Agreement goals and can inform temperature ratings at the company and portfolio levels. By not relegating carbon-intensive industries—those with the greatest potential to reduce greenhouse gas emissions—to the sidelines, transition taxonomies can be an important tool for emerging market

and developing economies and incentivize private investment informed by climate change targets (see Online Annex 2.3).

The Role of Sovereign Bond Issuance

Sovereign issuers have been latecomers to the issuance of sustainable debt, but they can still have a positive effect on private markets. In most cases, sovereigns issued their first sustainable debt instrument after the private sector did so (Figure 2.8, panel 1). Emerging market and developing economy sovereigns have generally been faster to follow the private sector. The time lag of sovereign sustainable bond issuance has been less than 2 years on average for emerging market and developing economies versus close to 4.5 years for advanced economies. Typically, sovereign issuance has

had a positive impact on private issuance, emphasizing the impetus to market development that a sovereign can provide (see Online Annex 2.8 for a formal regression analysis controlling for the momentum in the growth of private debt).¹⁷ In addition, sovereigns can help set sustainability reporting standards. All 39 sovereign issuers to date have detailed issuance frameworks setting high standards. For green bonds, for instance, all sovereign green bond issuance frameworks require at least one second-party opinion (which certifies the use of proceeds for green projects) and impact reports (which document the environmental impact).

The Potential Benefits of the New International Carbon Markets for Emerging Market and Developing Economies

Carbon markets offer substantial opportunities for emerging market and developing economies. The 2021 United Nations Climate Change Conference, known as COP26, has led to completion of the rulebook for implementation of Article 6 of the Paris Agreement, providing a framework to issue carbon credits in a new international carbon market, as well as to trade internationally transferred mitigation outcomes (ITMOs).¹⁸ Advanced economies should be able to buy ITMOs from emerging market and developing economies, opening up a wider market for trade and potentially increasing competition for emission reductions by these economies. Estimates show the potential to generate \$330 billion to \$475 billion in net financial flows to emerging market and developing economies by 2030 and to prevent up to 6 percent of these economies' total energy-related emissions over the same period (IEA 2021a). Since the COP26, countries have initiated engagement strategies and processes to become potential ITMO sellers and buyers.

¹⁷Nine sovereigns (not shown in Figure 2.8) have issued a sustainable bond that has not been followed by any private issuance from firms in the same jurisdiction. The countries and months of issuance are Andorra (May 2021), Benin (July 2021), Ecuador (January 2020), Egypt (October 2020), Fiji (November 2017), Isle of Man (September 2021), Serbia (September 2021), Slovenia (July 2021), and Uzbekistan (July 2021).

¹⁸Under Article 6.2 of the Paris Agreement, a country that is achieving its climate objectives faster than it has pledged to in its nationally determined contribution can transfer ITMOs to countries with slower progress. This allows countries with a broad spectrum of mitigation options available to focus on implementing the lowest-cost abatement measures to meet their climate pledges while selling the more expensive emission reductions to international buyers, thereby financing part or all of their climate action.

Despite the opportunities ITMOs present, there are challenges. They offer limited potential for adaptation purposes and make it difficult to avoid double counting of emission reductions by the buyer and seller of ITMOs. In addition, they can be complicated when it comes to cost-efficient implementation of measurement, reporting, and verification processes.

Conclusion and Policy Implications

Scaling up private climate finance in emerging market and developing economies calls for a multipronged approach with improvements across various dimensions, including support from multilateral development banks (MDBs), the IMF, and the public sector. This reflects both the scale of financing needs and the variety of investments needed to achieve material climate change mitigation and adaptation.

Innovative financing instruments can help overcome some of the challenges faced by the private sector in emerging market and developing economies, such as credit and political risks and lack of scale. In larger emerging markets with functioning bond markets, investment funds (such as the Amundi green bond fund set up with the help of the World Bank Group's IFC) provide a good example of how to draw in institutional investors. Such funds should be replicated and scaled up to incentivize issuers in emerging markets to generate a sufficient supply of green assets to finance green projects. By relying on public markets, these funds can draw in large amounts of private finance with relatively little use of MDB or public sector resources.

New types of outcome-based debt instruments—in particular, sustainability-linked bonds—can help alleviate greenwashing if contractual details of these bonds are set properly. For these bonds to achieve a material climate impact, sustainability targets should be linked to emission-reduction targets in line with the Paris Agreement. This type of instrument would be very suitable for emerging market firms with ample scope to improve their emission intensity. The penalties associated with missing the target, however, need to be set such that private issuers have a sufficient incentive to fulfill the targets.

A set of initiatives focused on bolstering the issuance of sustainable bonds by the private sector, local governments, and government agencies should be considered. If small and medium-sized firms do not have access to the bond market, they may not be able to benefit from

the initiatives that involve structures with risk-mitigating features at their core. However, MDBs and international financial institutions will remain at the center of initiatives that channel climate funds to emerging market and developing economies by (1) undertaking long-term initiatives to build local currency bond markets to create and promote the development of efficient, scalable, and sound markets; (2) providing guarantees, subsidizing issuance costs, and taking first-loss positions in funding vehicles and securitizations; and (3) assisting in the issuance of climate bonds via technical assistance that improves governments' institutional capacity.

For less developed economies, green infrastructure projects will remain a key instrument, and MDBs will naturally play a key and long-standing role in developing such projects. More climate financing resources could be channeled through MDBs to support such projects by increasing their capital base and reconsidering their approaches to risk appetite via partnerships with the private sector supported by governance and management oversight. MDBs could then make greater use of equity finance (currently only about 1.8 percent of their commitments to climate finance in emerging market and developing economies). MDBs' equity can draw in much larger amounts of private finance, which currently is equal to only about 1.2 times MDBs' own resources.¹⁹ This would likely require governments to increase MDB resources. The costs of increasing funding for MDBs would be more than offset by domestic economic benefits as a result of avoided costs of eventually worthless fossil fuel assets and by the benefits from reduced emissions.

The IMF can play a key role in strengthening the climate information architecture and helping emerging market and developing economies set up climate and other policies to promote private climate finance. Capacity building (along the lines of Article 6.8 of the Paris Agreement) will be paramount to foster the climate information architecture. Ensuring internationally interoperable sustainable finance taxonomies and climate disclosures is essential to avoid fragmentation. Together with other international bodies, the IMF can play an important coordination and facilitation role. Continued advocacy and assistance with the design

¹⁹A detailed proposal for MDBs to provide equity financing to replace coal with renewables is presented in a recent IMF working paper (Adrian, Bolton, and Kleijnijenhuis 2022).

and implementation of carbon pricing will remain central: well-calibrated carbon prices can redirect private finance from polluting to “greener” investments.

The IMF's new Resilience and Sustainability Trust (RST) is a catalytic tool to attract climate-related private investment. The RST can provide affordable long-term financing to support countries undertaking macro-critical reforms to reduce risks, including those related to climate change. It provides predictability by improving countries' policy frameworks, with a clear timeline. The additional fiscal space made available by the RST could also be used to co-fund official and private-sector-financed climate-related projects. In doing so, the RST could catalyze (official and) private sector investments for climate-related finance.

Shifting the focus of ESG scores toward sustainability impact and ensuring proper ESG fund labeling practices will likely require external intervention by regulators and supervisors—not only at the national level but coordinated across jurisdictions. ESG scores in their current form are not designed to ensure sustainability impact because they are constructed primarily to reflect ESG-related financial risks. In addition, the labeling practices of ESG funds have come under scrutiny because in some cases the ESG focus of the funds' investment strategies may be less than advertised to investors. Regulators and supervisors could consider introducing clearer and more focused classifications and requirements for ESG funds. The classification systems of the European Union and United Kingdom are prime examples because they set clear and ambitious requirements, including for climate impact.

ESG scores are systematically lower for firms in emerging market and developing economies. This feature and others, such as the high positive correlation between firm size and ESG scores, deserve further investigation. Increased transparency and clarification by ESG rating providers would be welcome.

Substantially strengthening the climate information architecture in emerging market and developing economies is a prerequisite for scaling up private climate finance. Data availability, quality, and comparability in climate-policy-relevant sectors (for example, energy, agriculture, and land use) in these economies should be improved, in conjunction with climate-related corporate disclosure regulations. In addition, methodologies to assess funding gaps should be developed promptly, particularly for the infrastructure gap in climate change mitigation and adaptation. Transition taxonomies are

prime tools to enhance data collection regarding decarbonization options and characteristics in hard-to-abate and carbon-intensive sectors across value chains (see Online Annex 2.3). While such asset-level approaches can inform transition plans at a corporate level, they may also be useful to develop portfolio-level alignment methodologies. They can provide a clear signal by emerging market and developing economy issuers about the climate benefits of their assets, including in sectors with ample scope for emission reductions. Shared common and operationalized principles for such taxonomies and other alignment approaches would avoid fragmentation and misalignment and foster comparability and consistency across jurisdictions while taking into consideration these economies' specific industrial structure, as well as decarbonization and adaptation priorities.

The international carbon market envisioned under Article 6 of the Paris Agreement could foster climate finance in emerging market and developing economies—particularly adaptation finance. The momentum generated by COP26 should be leveraged to fully implement the international carbon market mechanisms, since there is agreement on the key rules and modalities for their implementation. Both implementation of the bilateral trade of carbon

emission reduction among nations (Article 6.2) and global trading of carbon emission reductions (Article 6.4, similar to the Clean Development Mechanism) could significantly reduce the costs of achieving the temperature goals of the Paris Agreement. The global market under Article 6.4 will directly support adaptation finance in emerging market and developing economies by transferring a fixed share of traded carbon to a fund to finance adaptation projects and programs in developing economies (the “Adaptation Fund”). This has the potential to provide a very significant increase in much-needed adaptation finance. Parties to the UNFCCC as well as MDBs should therefore provide as much support as possible toward timely and full implementation of the UNFCCC international carbon markets.

In parallel, specialized public climate funds, such as the Green Climate Fund (also under the auspices of the UNFCCC), should receive sufficient resources to fill the adaptation financing gap. Advanced economies should allocate to such funds a significant share of their annual financing pledges to developing economies under the Paris Agreement. Adaptation finance often cannot generate returns for private investors, but it can yield very large social benefits for the countries most affected by climate change.

References

- Adrian, Tobias, Patrick Bolton, and Alissa M. Kleinnijenhuis. 2022. “The Great Carbon Arbitrage.” IMF Working Paper 22/107, International Monetary Fund, Washington, DC.
- Basu, Priya, Lisa Finneran, Veronique Bishop, and Trichur Sundararaman. 2011. “The Scope for MDB Leverage and Innovation in Climate Finance.” World Bank, Washington, DC.
- Berg, Florian, Julian F. Kölbl, and Roberto Rigobon. 2022. “Aggregate Confusion: The Divergence of ESG Rating.” *Review of Finance* rfac033. <https://doi.org/10.1093/rof/rfac033>
- Berrada, Tony, Leonie Engelhardt, Rajna Gibson, and Philipp Krueger. 2022. “The Economics of Sustainability Linked Bonds.” Swiss Finance Institute Research Paper 22–26, Zurich.
- Bhattacharya, Amar, Meagan Dooley, Homi Kharas, Charlotte Taylor, and Nicholas Stern. 2022. “Financing a Big Investment Push in Emerging Markets and Developing Economies for Sustainable, Resilient and Inclusive Recovery and Growth.” Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, and Brookings Institution, London.
- Bolton, Patrick, Xavier Musca, and Frédéric Samama. 2020. “Global Public-Private Investment Partnerships: A Financing Innovation with Positive Social Impact.” *Journal of Applied Corporate Finance* 32 (2): 31–41.
- Chapagain, Dipesh, Florent Baarsch, Michiel Schaeffer, and Sarah D’haen. 2020. “Climate Change Adaptation Costs in Developing Countries: Insights from Existing Estimates.” *Climate and Development* 12 (10): 934–42.
- Climate Policy Initiative. 2021. “Global Landscape of Climate Finance 2021.”
- Drempetic, Samuel, Christian Klein, and Bernhard Zwergel. 2020. “The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings under Review.” *Journal of Business Ethics* 167 (2): 333–60.
- Ehlers, Torsten. 2014. “Understanding the Challenges of Infrastructure Finance.” BIS Working Paper 454, Bank for International Settlements, Basel.
- Elmalt, Dalya, Divya Kirti, and Deniz Igan. 2021. “Limits to Private Climate Change Mitigation.” IMF Working Paper 21/112, International Monetary Fund, Washington, DC.
- Fouad, Manal, Natalija Novta, Gemma Preston, Todd Schneider, and Sureni Weerathunga. 2021. “Unlocking Access to Climate Finance for Pacific Islands Countries.” IMF Departmental Paper 2021/020, International Monetary Fund, Washington, DC.
- Global Sustainable Investment Alliance (GSIA). 2020. *Global Sustainable Investment Review 2020*. Sydney.
- ING Group (ING). 2021. “The Credibility of the Sustainability-linked Loan and Bond Markets.” Position paper, Amsterdam.
- International Energy Agency (IEA). 2021a. “Financing Clean Energy Transitions in Emerging and Developing Economies.” World Energy Investment 2021 Special Report, Paris.
- International Energy Agency (IEA). 2021b. *Global Energy Review 2021*. Paris.
- International Monetary Fund (IMF). 2021a. “Strengthening Infrastructure Governance for Climate-Responsive Public Investment.” IMF Policy Paper, Washington, DC.
- International Monetary Fund (IMF). 2021b. “Strengthening the Climate Information Architecture.” Staff Climate Note 2021/003, Washington, DC.
- International Monetary Fund (IMF). 2022. “Proposal to Establish a Resilience and Sustainability Trust.” IMF Policy Paper, Washington, DC.
- International Monetary Fund (IMF), Bank for International Settlements (BIS), Organisation for Economic Co-operation and Development (OECD), and World Bank (WB). Forthcoming. “Operationalization of the Principles for Sustainable Finance Alignment Approaches.”
- Network for Greening the Financial System (NGFS). 2022a. “Central Banking and Supervision in the Biosphere: An Agenda for Action on Biodiversity Loss, Financial Risk and System Stability.” Paris.
- Network for Greening the Financial System (NGFS). 2022b. “Final Report on Bridging Data Gaps.” Paris.
- Prasad, Ananthakrishnan, Elena Loukoianova, Alan Xiaochen Feng, and William Oman. 2022. “Mobilizing Private Climate Financing in Emerging Market and Developing Economies.” IMF Staff Climate Note 2022/007, International Monetary Fund, Washington, DC.
- United Nations Environment Programme (UNEP). 2021. “Adaptation Gap Report 2021: The Gathering Storm—Adapting to Climate Change in a Post-Pandemic World.” Nairobi.
- World Bank. 2019. “Beyond the Gap: How Countries Can Afford the Infrastructure They Need while Protecting the Planet.” World Bank Sustainable Infrastructure Series, Washington, DC.