

A large, jagged iceberg floats in the ocean, its surface textured with cracks and ridges. The sky is a pale blue. A teal semi-transparent banner covers the upper portion of the image, containing the title and author information.

Climate Governance Commission

Financing Instruments for Climate Change Mitigation and Adaptation

AUGUSTO LOPEZ-CLAROS





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Executive Summary

There is broad recognition that the national emission reduction targets put forth by the Parties to the 2015 Paris Agreement to date are not consistent with limiting global temperature rise to 2°C above pre-industrial levels, let alone achieving a 1.5°C temperature limitation target, underlined by the IPCC as vital. Indeed, it is estimated that annual global emissions need to drop by about 3 percent annually between now and 2030 to limit warming to this two-degree threshold. Absent mitigation of GHG emissions, global temperatures will be on a rapidly ascending trajectory and rise some 3-4°C by the end of this century. Given the associated damage to the global economy and its supporting ecosystems, and to the natural world more generally, there has been increasing emphasis in recent years on identifying policies that might facilitate climate change mitigation and adaptation.

One particular area of focus has been on the financing needs associated with significant investments in various forms of infrastructure, including investments in energy efficiency and renewable energy. Such investments – in the tens of trillions of dollars over the next decade – would have to prioritize building low-carbon resilient infrastructures, with nearly two thirds of these outlays taking place in emerging markets and developing countries. The aim is to find fiscal tools and regulatory policies that might make it costlier to emit GHGs and, thus, provide the types of incentives for businesses and individuals to choose to conserve energy and/or to switch to more environmentally friendly (greener) sources. Furthermore, some of these tools should also raise enough revenues which could be deployed to offset the impact of any undesirable distributional side effects and to fund other efforts aimed at mitigation and adaptation. This question has moved centerstage against the background of COVID-19, the responses to which have greatly stretched budget resources virtually everywhere.

Some of the instruments discussed in this paper are fundamentally aimed at altering incentives as a way of encouraging a shift to a low-carbon economy (e.g., carbon taxes, green financial instruments), while others are mainly intended to raise revenue (e.g., taxing financial transactions, debt relief, improving/modernizing tax systems), which governments could then use, at least in part, to finance climate change mitigation. Financial resources will also be needed for adaptation and to boost resilience in areas such as food security and agricultural productivity, emerging water scarcity, and disaster risk management. Without the types of interventions that improve adaptation and resilience, climate change will severely put the attainment of many of the SDGs out of reach, including on the elimination of extreme poverty. It could also make the world more vulnerable to the kind of pandemic that devastated the global economy in 2020.

The following instruments are analyzed in this paper.

Carbon taxes – The IMF has unambiguously made the case that “of the various mitigation strategies to reduce fossil fuel CO₂ emissions, carbon taxes are the most powerful and efficient.”¹ By increasing the price of carbon, carbon taxes precipitate a shift in incentives by encouraging energy efficiency and enhancing the potential profitability of greener sources of energy. Although more countries have adopted carbon pricing mechanisms in recent years, four-fifths of global emissions remain unpriced. The primary obstacle to carbon taxes is often political, not technical, as carbon taxes tend to be received poorly by the public. However, public opinion surveys find that carbon taxes are unpopular in the abstract, but gain public acceptance once they are actually implemented and the public is able to see evidence that they are an effective instrument to curb emissions. Carbon taxes can also raise substantial revenues which can be deployed to manage the



political economy ramifications of higher taxes – for instance by returning much of the revenue raised to vulnerable groups in the population which are adversely affected by the higher taxes – and to achieve other socially desirable ends, such as poverty alleviation or investments in human capital. Without doubt, carbon taxes will be a vital tool to address the damaging consequences of climate change.

Green finance – While carbon taxes directly generate revenue, green financial instruments (which refer to the set of financial activities that are aimed at creating positive and sustainable environmental outcomes) meet a separate, crucial, and defined need by effectively channeling resources into sustainable projects. Achieving the scale of investment needed to meet the needs of the environment will require significantly increased levels of private and institutional capital to augment public funds and break open new investment channels. So-called green bonds and equities have emerged as the investment tools most fit for this challenge and have blossomed – from a small base – and now attract a growing contingent of institutional and retail investors, as well as sovereign wealth funds globally. It has been estimated that the value of green bonds traded globally could hit some US\$2½ trillion by 2023.

Multilateral Development Bank (MDB) lending programs – MDBs can play a critical role in providing funds for nations to address crises and to ensure sustainable economic growth and poverty alleviation. Additionally, they can mobilize vital private sector resources through financial innovations and one growing area of activity for them pertains to financing projects that facilitate the transition to a low carbon economy. This paper puts forward a proposal for a sponsored loans program in which a private sector investor acts as a guarantor for a particular development project and provides funds to the MDB which are then used to guarantee the MDB's loans that finance the project. Because the guarantor takes on the risk of the loan, the MDB has a lower capital reserve, allowing it to further expand its balance sheet. In turn, the guarantor maintains his cash position in the long run, while supporting development goals in the short to medium-term. Similarly, blended finance helps induce private investment by leveraging public funds to de-risk and legitimize a given investment project.

IMF Special Drawing Rights (SDRs) – SDR allocations are an unconditional form of liquidity made available to IMF members. They can be deployed for a variety of purposes at the sole discretion of the recipient country. Moreover, they do not raise the concerns and sensitivities sometimes associated with other IMF resources that are typically disbursed in the midst of a crisis as part of adjustment programs that carry the conditionality of policy reform. Our paper provides a strong endorsement for the largest ever SDR allocation, in the amount of US\$650 billion, which was approved by the IMF Board of Governors in early August, in which it is envisaged that, for the first time, high income countries would be asked to deploy at least some of their SDR entitlements to developing countries, many of which do not have the resources to easily finance the transition to a low carbon economy and have struggled to respond effectively to the financial requirements resulting from COVID-19. While many of the details of this initiative are still being worked out, it would be a potentially important tool to deliver resources to the developing world and allow the high-income countries to fulfill their pledges to deliver US\$100 billion annually in climate finance over the next several years.

Taxation financial transactions – While taxes on financial transactions primarily aim to reduce the adverse effects of speculative attacks and to curb market volatility, they also have the potential to generate substantial revenue, reflecting the rapid growth of financial markets in recent decades linked to the expansion of the global economy and the emergence of a whole range of financial innova-



tions affecting markets and instruments. Given the needs associated with climate change mitigation and adaptation, and multiple other fiscal pressures which are quickly emerging – such as those associated, for instance, with aging populations – it is evident that governments virtually everywhere will have to consider additional sources of funding if public debt levels are to be brought back to sustainable levels consistent with financial stability and orderly financial markets. This paper takes the view that a tax on financial sector transactions would be an extremely important tool to deploy and discusses a range of considerations in their implementation; a 0.05 percent tax on the US\$6.6 trillion traded daily in currency markets could generate several hundred billion dollars in revenue annually.

In addition to the more substantial policies and instruments described above, the paper evaluates and proposes the following tools that could play a supplemental role in strengthening the architecture of global climate change mitigation efforts:

- **Debt relief** can promote green growth in developing countries by allowing nations to allocate their resources toward climate change mitigation projects and strategies rather than debt service. Debt relief could also allow countries to support initiatives aimed at fulfilment of the SDGs more proactively, including those aimed at reducing the incidence of extreme poverty and strengthening the human capital base.
- **Improving inefficient tax systems and addressing issues of corruption** – According to the IMF “tax havens collectively cost governments between US\$500 to US\$600 billion a year in lost corporate tax revenue”² and notes that US\$200 billion of this is lost to low-income countries, substantially higher than the total of official development assistance and a proportionately much higher share of GDP than in the case of the advanced economies. But there is also the more general opportunity to improve the efficiency of tax administration by closing loopholes, tapping into the latest technologies to facilitate tax payments, and to curtail tax avoidance and evasion. At the same time, there is abundant empirical literature that speaks to the deleterious effects of corruption on government revenue, on economic growth and investment, on private sector development, among others, all of which have a bearing on the ability of governments to deploy resources in productivity-enhancing areas, such as social protection, education, infrastructure, strengthening health systems, and climate change mitigation and adaptation. The annual cost of bribery is estimated to be in the neighborhood of US\$1.5-2.0 trillion dollars – about 2 percent of GDP – a vast sum that would go a long way toward funding the financing needs of low-carbon infrastructure investments. This paper argues that these are two major sources of potential resources for climate finance.
- **The World Bank’s Stolen Asset Recovery program** supports international efforts to recover stolen assets. The returned funds can finance climate mitigation policies, building on the experience of several successful cases of asset recovery in several countries.
- **Taxing aviation and maritime fuel use** could capture revenue from two sectors which comprise a large share of global carbon emissions but are generally not subject to national tax regimes.
- **Taxing mineral resource extraction** could serve a dual purpose by raising revenues and preserving geologically scarce resources for future generations.

The imperative of enhanced international cooperation – In contrast to the flawed architecture within which governments have sought to tackle climate



change, the above mechanisms explored in the paper are specifically intended to avoid the pitfalls of the past – namely, the lack of policy coordination, voluntary nature of commitments, and proneness to free riding.

One important conclusion from this paper is that the success of virtually all of the instruments suggested will involve some degree of international cooperation, whether it is in the gradual introduction of carbon taxes, or to agree on universally accepted standards and certification for green bonds. Without strengthened cooperation, new climate-oriented financial innovations such as a financial transactions tax, new forms of debt relief targeted towards developing countries, and taxing aviation and maritime fuel use will be more difficult. The time to rally around the cause of climate change is long overdue, but with a global system of tools and policies that also hold individual countries responsible for upholding their commitments, the strategies outlined in this paper could tangibly alter the financing landscape for climate change mitigation.

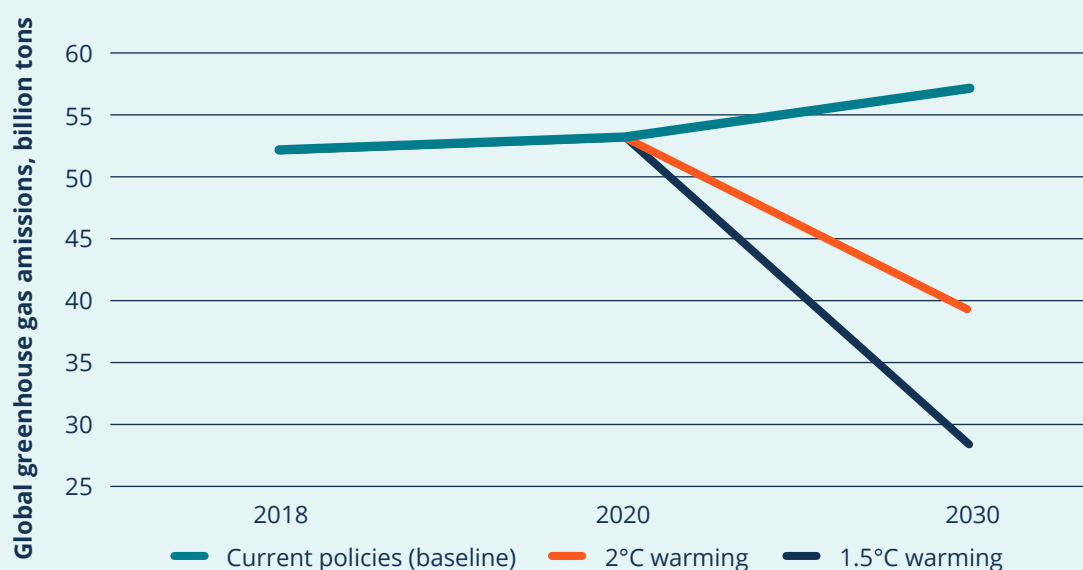


I. The Problem

In a recent article in the journal *Foreign Affairs*, Nobel-laureate William Nordhaus argues that although there is broad recognition that climate change is the most important environmental challenge facing the world today, governments have continued to tackle the problem with a deeply flawed architecture that relies on uncoordinated, voluntary arrangements which encourage free-riding, under international climate change agreements such as the Kyoto Protocol and the 2015 Paris Accords.³ With a perverse incentive structure embedded in such treaties “the global effort to curb climate change is sure to fail,” Nordhaus suggests.

Since the national targets committed to date under the Paris accord are inconsistent with a two-degree or one-point-five-degree temperature rise – save in the most optimistic of scenarios – and because studies⁴ have shown that annual global emissions would need to drop by about 3 percent between now and 2030 to limit warming to reach the less ambitious two-degree threshold, there is growing recognition that without major mitigation of greenhouse gas (GHG) emissions global temperatures will be on a rapidly ascending trajectory and rise some 3-4°C above pre-industrial levels by the end of this century.⁵ Given the associated damage to the global economy and its supporting ecosystems and to the natural world more generally as a result of rising sea levels, biodiversity loss and extreme weather events, there has been increasing focus in recent years in identifying the most effective policies that might facilitate climate change mitigation. Is there a

Figure 1. Emission Pathways and Warming Goals, 2018-2030



Source: IMF. 2019., CAT. 2018. (based on scientific studies of the relationship between emissions atmospheric greenhouse gas concentrations, and temperature summarized in IPCC. 2018.)



mixture of fiscal tools and regulatory policies that might make it costlier to emit GHGs and thus provide the types of incentives for businesses and individuals to choose to conserve energy and/or to switch to more environmentally friendly (greener) sources? Additionally, could such tools also raise enough revenues which could be deployed to offset the impact of any undesirable distributional side effects and to fund other efforts aimed at mitigation and adaptation?

This last question is the primary focus of this paper. At the time of the adoption of the Paris Agreement in 2015, it was estimated that over the next 15 years the world would need to spend some US\$75-90 trillion in various forms of infrastructure, including investments in energy efficiency and renewable primary energy.⁶ (For some of the details see [Table 1](#), though the estimates provided are somewhat more conservative than those in Meltzer). It was estimated that about 70 percent of these outlays would take place in emerging markets and developing countries. Because there was broad recognition that many of the existing infrastructures – coal-fired power stations, buildings low in energy efficiency – were themselves a source of GHGs, investments in new infrastructures would have to prioritize building low-carbon resilient (LCR) infrastructures, including in energy efficiency, to meet the Paris Agreement temperature targets.

This was necessary to encourage countries to better adapt to climate change and to preserve the development gains of the past several decades, given that climate change was expected to be particularly disruptive in the developing world. If anything, this message has become even stronger in the aftermath of COVID-19. In 2020, the pandemic, for the first since 1990, reversed the gains made in reducing the incidence of extreme poverty, with well over 100 million people falling below the World Bank's (austere) poverty line, significantly endangering the achievement of Sustainable Development Goal (SDG) 1 on the eradication of extreme poverty.

The scale of these investments was expected to put pressure on public sector finances and, therefore, most scenarios envisaged a significant role for private sources of funding. COVID-19 has only heightened the importance of the role of private capital in financing the transition to low-carbon resilient infrastructures given that, according to the IMF, the fiscal impact of the pandemic during 2020 has amounted to an increase of close to 20 percentage points of GDP in public debt levels across the world, or roughly twice the increase seen during 2009, at the time of the global financial crisis. Beyond the reduced fiscal space now precipitated by the pandemic it would also be necessary to address other potential difficulties in mobilizing the resources to fund LCR investments, such as uncertainties in the differential impact of climate change across the planet, the higher risk associated with investments in low carbon technologies and the presence of continued (and vast in scale) fossil fuel subsidies ([see below](#)), which are a powerful deterrent for investment in renewable energy and changes in consumer and producer behaviors.

Given these obstacles, it is expected that public concessional finance will continue to play a role in de-risking LCR infrastructure projects. Risks associated with LCR infrastructure projects tend to be highest in the early stages of implementation; once projects start operations and begin to deliver returns, they can be securitized and sold to institutional investors looking for lower-risk and stable returns. The proceeds from these sales can then be recycled into other projects. At the moment, the bulk of concessional official climate finance is being provided within the context of pledges made in the Paris Agreement by developed countries to provide US\$100 billion annually to the developing world (a commitment which has yet to be fully realized), at least through 2025. Instruments such as the Green Climate Fund (GCF) and the Global Environmental Facility (GEF), together



with the multilateral development banks, have been the primary vehicles to deliver climate change finance.

Founded in 2010, the Green Climate Fund provides resources to developing countries in order to fund climate change mitigation and adaptation projects. Although funding has fallen far short of the GCF's US\$100 billion a year target, hope remains that the GCF can truly become the cornerstone of the United Nations Framework Convention on Climate Change's climate finance efforts.⁷ The Global Environmental Facility, on the other hand, was established in 1992 and has provided US\$20.5 billion in grants and mobilized US\$112 billion in co-financing to date.⁸ From its nexus as a small pilot program in the World Bank, the GEF has largely succeeded in becoming an important player in development finance.

Table 1: Investments for Green Recovery and Transformational growth

Investment Area	Investment Rationale	Public/Private	Investment Estimate (\$ tn p.a.)
Energy Transition			
Electricity generation, storage, and networks	<ul style="list-style-type: none"> Solar/wind costs expected to decline by 30-60% by 2030 Solar/wind deliver 3x more jobs vs. fossil fuels 	Mostly private	1.5-1.6
Energy efficiency in buildings and industry	<ul style="list-style-type: none"> Up to 50% building energy savings 10-20% reduction in heavy industry energy usage 9-30 jobs created per \$1m invested in buildings energy efficiency 	Private and public	0.6-0.8
Transport	<ul style="list-style-type: none"> Electric vehicles (EV) offer 3-4x cheaper fuel 6m new jobs in EV charging by 2030 Short-haul electric flights expected to be cost-competitive with jet-fueled planes by mid 2030s 	Private and public	0.1
Innovation (Hydrogen production, carbon capture)	<ul style="list-style-type: none"> Hydrogen costs expected to decline by 50% or more by 2030 \$6-12bn green hydrogen export market by 2030 	Private and public	0.06-0.07
Adaptation and Resilience			
Adaptation and resilience	<ul style="list-style-type: none"> \$7.1tn potential returns on \$1.8tn investment Reduce losses: flood damage costs \$12tn p.a. in 2°C pathway 	Private and public	>0.1-0.3
Nature, Agriculture, and Food			
Nature protection and restoration	<ul style="list-style-type: none"> 45m jobs in sustainable land and ocean management by 2030 Reduce \$1.7tn in deforestation/degradation losses p.a. Reduce zoonotic disease risk 	Mostly public	0.1-0.25
Productive, sustainable, efficient agriculture	<ul style="list-style-type: none"> \$225bn p.a. opportunity in reducing food loss and waste Alternative protein industry to grow to \$85bn by 2030 Soil degradation costs the EU \$100bn p.a. Enhance food security and improve nutrition Help to reduce \$3tn p.a. air pollution healthcare costs 	Private and public	0.15
Total			2.6-3.2
Source: Stern. 2021.			



However, such pledges, even if fulfilled, are insufficient to provide the resources needed to ensure compliance with the temperature ceiling commitments made in the Paris Agreement. For this reason, in this paper we will explicitly use a definition of “climate finance”, which is broader than that used in official circles, where the term is usually understood in respect of the US\$100 billion aid pledges made by high-income countries to developing countries in 2009. We will also explore a number of alternative or complementary funding mechanisms, over and above existing instruments. Some of the instruments discussed are fundamentally aimed at altering incentives as a way of encouraging a shift to a low-carbon economy (e.g., carbon taxes, green financial instruments), while others are mainly intended to raise revenue (e.g., taxing financial transactions, debt relief, improving/modernizing tax systems), which governments could then use, at least in part, to finance climate change mitigation and adaptation investments. So, to the extent that better carbon pricing results in growing revenues ([see below](#)), we very much see it as an integral component of any discussion about climate finance.

Furthermore, we also recognize that part of the needs for finance over the next several decades will be for adaptation and to boost resilience, in such areas as food security and agricultural productivity, water systems to build levees, to better manage water scarcity, flood protection and, more generally, disaster risk management. Without the types of interventions that improve adaptation and resilience, climate change will severely put out of reach the attainment of many of the SDGs, including on the elimination of extreme poverty. It could also make the world more vulnerable to the kind of pandemic that devastated the global economy in 2020, and to other global shocks.



II. The Most Powerful and Efficient Tool

The IMF's Fiscal Monitor published in late 2019 unambiguously makes the case that “of the various mitigation strategies to reduce fossil fuel CO₂ emissions, carbon taxes are the most powerful and efficient.”⁹ These taxes are charges on the carbon content of fossil fuels and they lead to rises in the price of coal and other fossil fuels, which in many countries are lower than desirable, such as when fuel and electricity prices are set below cost recovery for instance. The latest IMF estimates on the combined value of post-tax energy subsidies (for coal, oil, electricity, natural gas in 2017, reflecting also the environmental damage associated with global warming, pollution, traffic congestion, premature mortality) puts them at US\$5.2 trillion (over 6 percent of world GDP), a full 85 percent of which are accounted for by coal and oil.¹⁰ The IMF suggests that limiting global warming to 2°C would require a global carbon tax that would rise from the current global average of US\$2-3 per ton of CO₂ to US\$75 per ton of CO₂ by 2030. This is an ambitious proposal given the extremely low starting point. Indeed, an overview of all countries in the world shows that only two countries – Switzerland and Sweden – currently have carbon taxes in excess of US\$75 per ton, set at US\$96 and US\$127 respectively, in 2019 prices. In contrast, Japan's tax is set at about US\$3/ton and Mexico's is somewhere in the neighborhood of US\$1-3/ton. (**Table 2** shows carbon tax levels for a number of other countries).



Table 2. Carbon Taxes, 2019

Country or Region	Year Introduced	2019 Price (\$/Ton CO ₂)	Coverage of GHGs, 2018	
			Million Tons	Percent
Argentina	2018	10	441	20
Chile	2017	5	47	39
Colombia	2017	5	42	40
Denmark	1992	26	22	40
Estonia	2000	2	28	3
Finland	1990	65	25	38
France	2014	50	176	37
Ireland	2010	22	31	48
Japan	2012	3	999	68
Latvia	2004	10	18	15
Mexico	2014	2	307	47
Norway	1991	59	40	63
Poland	1990	0	429	4
Portugal	2015	14	21	29
Singapore	2019	4	56	80
South Africa	2019	10	360	10
Spain	2014	18	367	3
Sweden	1991	127	25	40
Switzerland	2008	96	18	35
Ukraine	2011	0	312	71

Sources: Stavins. 2019; World Bank. 2019a.; and IMF staff calculations. Note: CO₂ = carbon dioxide; GHG = greenhouse gas. See: IMF. 2019b.

A carbon tax is effective because it makes it costlier to emit GHGs and provides incentives for energy users to shift to greener sources and to avail themselves of other opportunities, ranging from reducing the energy intensity of power generation by switching from coal to natural gas or renewables, to curbing electricity use through the acquisition of more energy efficient appliances, encouraging higher fuel efficiency standards for vehicles and/or switching to electric cars, among others. It is also likely to encourage green innovation and entrepreneurship. According to the IMF, a uniform carbon price of US\$25, US\$50, and US\$75 a ton is estimated to reduce CO₂ emissions by 19, 29, and 35 percent, respectively, for the G20 countries by 2030.¹¹ Anchored in the operations of the price system, carbon taxes tend to have an immediate impact on energy use; as the price of coal and other fossil fuels rise the burden of the tax is largely passed on to energy users. In practice this means that policymakers and tax authorities can adjust the level of the carbon tax in line with whatever fuel consumption levels are seen to be consistent with prevailing mitigation objectives. Furthermore, carbon taxes create the opportunity for a more predictable energy pricing regime, which is important



for creating a more stable system of incentives for the development of alternative non-fossil fuel sources of energy. Carbon taxes also tend to be relatively easy to implement since they can be integrated into existing fossil fuel taxation systems or other fiscal regimes for extractive industries.

Beyond the immediate effects of discouraging excessive fossil fuel use and incentivizing the transition to cleaner energy alternatives, the IMF estimates that the revenue collected from such a tax would be substantial, some 1.6 percent of GDP on an annual basis by 2030, on average, for the G20 countries. In some countries – Russia, Saudi Arabia, South Africa, India, China – the revenue impact would be much larger, ranging between 2.5 to 4.5 percent of GDP, thereby releasing potentially vast resources for promoting other socially and economically desirable objectives.¹²

The substantial revenues collected through a carbon tax could be redeployed to improve economic efficiency, enhance political acceptability of mitigation measures ([see below](#)), and promote other socially and economically desirable objectives. Several potential uses come to mind. First, revenue resources could be deployed to accelerate environmental investments in clean energy infrastructure, with potentially important job-creation implications—a crucial consideration given the scale of the job losses associated with COVID-19. In his recent contribution to the climate change debate, Bill Gates highlights the role of technological and scientific innovation as a vital component of climate change mitigation and, hence, the need to substantially boost investment in R & D on energy, to match levels seen in other industries, such as the electronics and pharmaceutical industries. Government support may be necessary to supplement private sector resources, given the risk profile of green technology investments.¹³

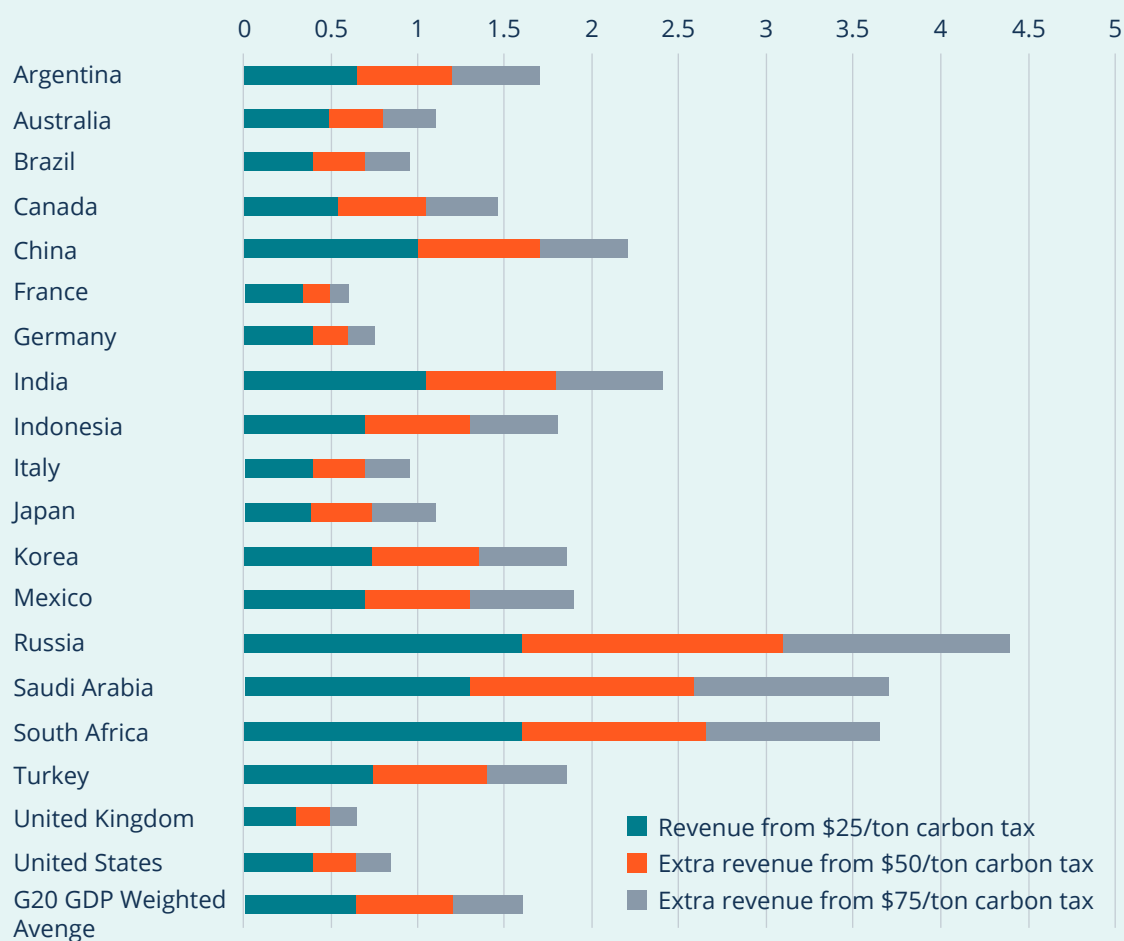
Indeed, Ingram and Schutz (2019) highlight the extent to which the transition to a low-carbon economy will necessitate “much more efficient generation and storage technologies than those that are being used today” and that “the accelerated pace of warming is leaving existing technologies behind, and the normal pace of private-sector technology development is too slow to provide solutions on its own.”

Some of the revenues collected could be deployed to strengthen health systems, which COVID-19 has shown to be in a general state of disrepair in much of the developing world (and many high-income countries as well) and improving the quality of education (including the promotion of concepts of sustainable development, consistent with SDG 4.7), given the needs for upgrading skills in the labor force as a result of the increasing complexity of the systems underpinning the global economy, and concerns about the impact on the future of work of rapid technological change, among others.

Furthermore, these additional revenues could be deployed in ways that address yet another important and vital concern of our time: rising levels of income inequality. Resources could be deployed to strengthen antiquated systems of social protection, including expanding coverage which in many countries is spotty at best and, as suggested by the IMF, paying “an equal dividend to the whole population”¹⁴ which is a slightly euphemistic way of referring to Universal Basic Income. And there would be scope, as well, for some deficit reduction, given the vulnerable state of public finances in the aftermath of the coronavirus, virtually in every country in the world. Yet another option might be cutting certain taxes that may discourage work effort and promote informality.



Figure 2: Revenue from Comprehensive Carbon Taxation in 2030, Selected Countries (Percent of GDP)



Source: IMF Staff Calculations, 2019



Since a carbon tax would be expected to affect countries in different ways, resources would also need to be allocated to support workers and households in regions and/or areas likely to be more affected by rises in the cost of energy. According to the IMF with a gradual increase in the carbon tax to US\$75 a ton by 2030 coal prices in G20 countries would rise on average by some 214 percent above baseline levels; natural gas prices would also rise by 68 percent on average; retail electricity and gasoline prices would rise by 43 and 14 percent on average, respectively (**[see below on the political economy of carbon taxes](#)**). But there would be employment effects as well.

Displaced workers working in coal- and “brown energy-” related industries may be vulnerable to unemployment. The IMF estimates that a US\$50 a ton carbon tax in 2030 would increase the job losses in the coal sector by some 55 percent in the United States and up to 42-45 percent in China and India. The estimated cost of assistance programs in providing comprehensive benefits is less than 2 percent of carbon tax revenues for most countries. Assistance, including unemployment benefits, training and reemployment services, and financial assistance related to job search, relocation, and healthcare, will be crucial in helping the displaced worker to transition to a better future and to enhance the political viability of carbon pricing. Potential useful features include outreach to increase awareness and take-up of the program, tailoring of job training to the needs of fossil fuel and coal-related sector workers, and wage insurance or tax credits, especially for older workers.¹⁵

For affected regions, assistance for reclaiming abandoned mining and drilling sites and temporary budget support for local governments could help to create jobs and to bridge the transition for adversely affected communities, since fossil and coal-related industries are highly geographically concentrated, and the emerging new jobs are likely to be available in other regions. For energy-intensive trade-exposed firms and industries, several options can be considered by policymakers. For example, imposing international carbon price floors, border carbon adjustments, levying charges on the unpriced carbon emissions embodied in imports, might all be judged compatible with WTO rules if they are viewed as meeting environmental objectives. However, a significant level of administrative capacity might be needed in these approaches.

Beyond the various ends to which carbon tax revenues could be deployed – likely to change from country to country in light of differing national priorities – the balance of benefits and costs is sharply positive for the world as a whole. The IMF estimates that the economic efficiency costs of a US\$50/ton tax – linked, for instance, to the shift to “cleaner but costlier technologies and equipment” – are equivalent to less than 0.5 percent of GDP on average for the G20 countries. The domestic environmental benefits for most countries are much larger than the costs; in the case of China, in particular, – a country that would account for some 56 percent of the total CO₂ reductions by 2030 in the US\$50/ton tax scenario – they are some 7 times larger (e.g. 3.5 percent of GDP) than the costs. It is estimated, for instance, that in 2030 there would be some 600,000 fewer premature deaths as a result of a US\$50/ton tax for G20 countries, which translates, on a cumulative basis over the next decade, into millions of lives saved, or considerably more than the total number of deaths associated, as of June 2021, with COVID-19.¹⁶



Table 3. Impact of Carbon Taxes on Energy Prices, 2030

Country	Coal		Natural Gas		Electricity		Gasoline	
	Baseline Price (\$/GJ)	Price Increase (%)	Baseline Price (\$/GJ)	Price Increase (%)	Base-line Price (\$/ kWh)	Price Increase (%)	Base-line Price (\$/liter)	Price Increase (%)
\$75/Ton Carbon Tax								
Argentina	3.0	297	3.0	133	0.10	48	1.4	13
Australia	3.0	263	9.6	44	0.11	75	1.3	15
Brazil	3.0	224	3.0	131	0.12	7	1.4	13
Canada	3.0	251	3.0	128	0.10	11	1.1	17
China	3.0	238	9.6	41	0.09	64	1.2	13
France	5.0	123	8.3	49	0.12	2	1.8	9
Germany	5.2	132	8.4	52	0.12	18	1.8	8
India	3.0	230	9.6	25	0.09	83	1.3	13
Indonesia	3.0	239	9.6	36	0.12	63	0.6	32
Italy	5.3	134	8.3	50	0.14	18	2	9
Japan	3.0	230	9.6	48	0.13	42	1.4	11
Korea	3.0	220	9.6	47	0.16	42	1.5	6
Mexico	3.0	226	3.0	132	0.10	74	1	18
Russia	3.0	169	7.0	54	0.14	25	0.9	12
Saudi Arabia	3.0	234	7.0	56	0.22	40	0.6	28
South Africa	3.0	205	7.0	23	0.08	89	1.2	16
Turkey	3.0	232	7.0	59	0.09	40	1.5	9
United Kingdom	6.1	157	8.3	51	0.13	16	1.7	8
United States	3.0	254	3.0	135	0.08	53	0.8	20
Simple Average	3.5	214	7.0	68	0.12	43	1.3	14
\$50/Ton Carbon Tax								
Simple Average	3.5	142	7.0	45	0.10	32	1.3	9
\$25/Ton Carbon Tax								
Simple Average	3.5	71	7.0	23	0.10	19	1.3	5

Source: IMF. 2019b.

Note: Baseline prices are retail prices estimated in Coady and others (2019) and include pre-existing energy taxes. Baseline prices for coal and natural gas are based on regional reference prices. Baseline prices for electricity and gasoline are from cross-country databases. Impacts of carbon taxes on electricity prices depend on the emission intensity of power generation. Carbon tax prices are per ton. GJ = gigajoule; kWh = kilowatt-hour.



Furthermore, a carbon tax as described above would address the main flaw identified by Nordhaus (2020) in the current international architecture to curb climate change. Instead of negotiations aimed at setting (voluntary) limits on emissions on a country-by-country basis in which countries seek to obtain high limits for themselves and low limits for others, the focus would shift to a single figure: dollars per ton of CO₂. Nordhaus also suggests, as a vital complementary mechanism, the imposition of penalties for nonparticipants, such as the imposition of a uniform tariff on all imports from non-participating countries into those countries which agreed to implement the carbon tax.¹⁷

Of course, while a carbon tax may be the most effective mechanism to mitigate climate change, there will also be a role for more effective regulation, particularly in the area of standards for emission rates and creating incentives for energy efficiency – e.g., accelerating the shift away from the internal combustion engine towards electric vehicles, for instance, or phasing out coal-powered plants around the world¹⁸ – as well as minimum requirements for the use of renewable sources in power generation.¹⁹ Beyond this, a carbon tax could be supported by other revenue collection initiatives, which could generate potentially large resources for climate change mitigation and adaptation, as discussed in the sections that follow.

The Political Economy of Carbon Taxes

Despite how effective carbon taxes are, both in reducing emissions and in raising revenue, they are not yet very widely used. The momentum for pricing schemes has accelerated in recent years, with some 60 countries pledging to attain emissions neutrality by 2050, but it remains the case that no less than four-fifths of global emissions remain unpriced and, as noted earlier, the global average emissions price is no higher than US\$3 per ton.²⁰ The UK government has committed to reduce emissions by 68 percent by 2030 and 78 percent by 2035 below 1995 levels but “it has failed to announce a credible levy on emissions.”²¹ At President Biden’s 2021 Leaders’ Summit on Climate the US announced emissions reduction targets of 50-52 percent (compared to 2005 levels) by 2030, including a range of measures on domestic investments, green finance, transport and security but no mention was made of a carbon tax.

The primary obstacle to a carbon tax is political, not technical. Carbon taxes tend to be received poorly by the public, for a variety of reasons. Some believe the burden of such a tax is too high, predicting it will depress personal incomes and damage the wider economy. Indeed, as noted earlier, subsidization of carbon, gasoline, natural gas and electricity is widespread and large in magnitude across the world and there is widespread resistance in many countries to the phasing out of such subsidies. Even in countries, where such subsidies are no longer in place, there is resistance to a tax hike that might lead to higher electricity and gasoline prices. Others are opposed because they are concerned about the regressive nature of carbon taxes or are skeptical that a tax will be effective in reducing emissions. If transportation expenses are a larger share of expenditures for urban workers, taxes on gasoline will affect them disproportionately more than workers at the top end of the income distribution.

Still more distrust their governments and believe a carbon tax to be a backdoor way to swell government coffers rather than a meaningful environmental strategy. On the matter of trust, in many countries widespread corruption will create a powerful constituency against higher taxes as individuals and businesses will believe that the added revenue will be misused and/or misappropriated. Some governments are concerned about potential adverse consequences for overall international competitiveness since carbon taxes could raise costs. However, such



fears may be exaggerated in a medium-term context, as highlighted by the fact that Switzerland and Sweden, the two countries with the highest carbon taxes in the world are two of the most competitive economies in the world, with ranks of 5 and 8, respectively, in the Global Competitiveness Index published by the World Economic Forum.²²

Based on an extensive public opinion survey in 6 different countries, Carattini et al. have developed a strategy to build public support for a carbon tax.²³ They found that carbon taxes are unpopular in the abstract but gain public support once they are actually implemented. This is because most people underestimate the benefits of lower emissions and overestimate drawbacks of a tax. The example of British Columbia in Canada, which introduced a carbon tax in 2008, exemplifies this phenomenon. British Columbia rebated income tax to residents in order to offset the burden of the carbon tax, allaying concerns that the carbon price would shrink personal incomes. Furthermore, the carbon tax was successful in lowering emissions, proving its efficacy. Now the carbon tax in British Columbia is quite popular, and Canada has since implemented a nationwide carbon pricing strategy. According to Vitor Gaspar and Ian Parry “the federal government requires provinces and territories to implement a minimum carbon price rising progressively from C\$10 per ton in 2018 to C\$50 in 2022 and C\$170 in 2030.”²⁴

Canada’s experience is far removed from that of France. In 2018, President Macron implemented a fuel tax that was wildly unpopular, sparking massive nationwide protests until it was finally scrapped. The fuel tax was high, so the public experienced sharp price rises. Furthermore, the French government did not return revenue to its citizens, as British Columbia had done with an income tax rebate, so the tax was perceived as regressive and harmful to low-income and rural households.

The main recommendation that Carattini et al. make is to start small.²⁵ A government that wishes to implement a carbon tax should begin with a small tax and slowly increase it over time as public opinion warms to it. A tax schedule can help keep the growth on track. British Columbia’s initial carbon tax in 2008 was C\$10 per ton and was increased by C\$5 per ton each year to reach the final tax of C\$30 per ton in 2012.²⁶

To assuage concerns about carbon tax revenues swelling government coffers and being used unproductively, Carattini and his co-authors suggest that these revenues be earmarked to finance additional climate change mitigation.²⁷ Surveys have found that the public is supportive of investment in environmental technologies and strategies. In addition, this doubling down on climate mitigation would reassure those who felt that a carbon tax would not be successful at reducing emissions.

Carattini et al. also recommend that governments redistribute revenue raised to achieve fairness and ease the impact on low-income households.²⁸ Governments can either make lump sum transfers to low-income households or cut other taxes to achieve full or partial revenue neutrality.²⁹ Public opinion favors the former approach. Finally, the authors encourage governments to communicate well with their public both before and after implementing a carbon tax. The government should disclose expected and actual emissions reductions; co-benefits such as reduced traffic, air pollution, and health costs; variation in prices for goods that are affected by the tax; and impacts on average household income.³⁰ Indeed, for countries still hooked on energy subsidies, governments could better explain the opportunity costs of such expenditures. Bolivia spends about US\$1 billion per year (2% of GDP) subsidizing natural gas. No government in recent memory has tried to explain how many schools could be built with this sum or what improvements could be made to the country’s dilapidated public health infrastructure.



Carattini, Kallbekken, and Orlov argue that a system of harmonized carbon taxes is more politically feasible than a global tax. This approach would also allow countries to use the revenues as they best see fit.³¹ The authors suggest building a coalition of countries that already have high carbon tax rates, above US\$30 a ton, as a starting point. Other countries would be invited to join, so long as they implemented a strong enough carbon pricing mechanism. Participating countries would receive economic and trade benefits – going further, the authors propose amending WTO rules to permit tariffs on countries that refuse to join.

There is no shortage of alternative proposals that build on the idea of a carbon tax and do so in a way that addresses some of the problems which have stalled progress in its introduction, including possible freeriding by developing countries and the very different annual per capita emission levels across the world, from well under half a ton in many Sub-Saharan African countries to 16 tons in the US, 19 tons in Saudi Arabia, and much higher levels throughout the Gulf region.

Rajan proposes a “global carbon reduction incentive” (GCRI) consisting of a per-ton carbon levy for countries that emit more than the annual per capita world average of approximately 5 tons.³² The annual payment for the United States, for instance, would be the result of multiplying the excess per capita by the country’s population and the GCRI.

A GCRI of US\$10 per ton would translate into US payments of US\$36.4 billion, which could then be allocated to a fund that would be distributed to countries with emissions below the global average. “Every country faces a loss of US\$10 for every ton by which they increase per capita emissions, whether they are at a high, low or average level today. So, Uganda has the same incentives to economise on emissions as the US.”³³ Raising the GCRI over time could generate substantial sums for the developing world that could be allocated for climate change mitigation and adaptation and allow the high-income countries to fulfill their funding pledges made in the context of the Paris Agreement. Countries would apply the GCRI through a domestic carbon tax, which, were it set at levels consistent with the IMF proposals discussed above (reaching US\$75/ton by 2030), would generate additional resources which could be deployed in the various ways described earlier.

So, managing the transition to a renewable energy future will require sound management of the political economy factors underpinning the phasing out, in some cases, of entire industries. The difficulties notwithstanding, it can be done as the recent experience of Germany clearly shows. When Germany closed its last black coal mine in 2018, miners were offered a new job or early retirement. The industry that had once fueled Germany’s industrial engine was successfully phased out without having to fire a single worker. It is now working to do the same with brown coal, which is cheaper and emits more carbon emissions when burned. Germany successfully managed to generate national buy-in to this plan by including all parties at the negotiating table, clearly and transparently defining its plan, and by taking a holistic approach to easing the transition away from coal.

Germany’s plan to close all carbon-emitting power plants that burn coal by 2038 was led by a purpose-built panel that was convened by Prime Minister Angela Merkel to discuss the issue. The panel, which included representatives from coal regions, industry, and environmental groups, issued a report that was used by Germany’s parliament as a basis for the law that codified both the timeline of coal’s phase-out and the funding that would be allocated to ease the transition.

Rather than simply subsidizing those companies who would be impacted by the end of German coal, the plan allocates resources to those regions which will be most impacted by coal’s demise and to the coal miners and plant workers themselves. This funding specifically provides for up to €26 billion in highway



and rail infrastructure improvement and the creation of 5,000 jobs in federal agencies operating in the coal-producing regions. By creating a dialogue in which workers and enterprises could engage with environmentalists and political representatives, an effective compromise was achieved.³⁴

One final point worth making in respect to the political dimensions of introducing carbon taxes, is that China, India, the United States and the EU are projected to account for close to two-thirds of global CO₂ emissions by 2030 in the absence of mitigation measures. For the G20, this share rises to 85 percent. The IMF has more recently estimated that supplementing the pledges made in the Paris Agreement by the introduction of a three-tier carbon price floor among six participants (the above four plus Canada and the United Kingdom) at US\$75, US\$50, and US\$25 with higher floors applying to the higher income countries would likely be sufficient to reduce emissions to be consistent to the two-degree centigrade limit.³⁵ Political leadership among five countries plus the EU could make a huge difference in global efforts to mitigate the deleterious effects of climate change.



III. Green Financial Instruments

Financial Innovation

Green finance refers to the set of financial activities that are aimed at creating positive and sustainable environmental outcomes. Its manifestations range from banking and insurance to other common investment vehicles, and can enable projects in areas including renewable energy, pollution control, biodiversity conservation, and resource stewardship.³⁶

Green finance meets a crucial and defined need. According to the Global Environment Facility, each year, some US\$400-600 billion is needed to finance conservation of land, forest, and water resources. In addition, some US\$350 billion of incremental capital is needed to fund renewable energy and energy efficiency projects.³⁷ Currently, these needs are far from being met, as philanthropic, charitable, and public funds still comprise the majority of capital applied toward these objectives. What is needed are significantly increased levels of private and institutional capital to augment these flows and break open new investment channels. The United Nations, for instance, has recognized green finance to be a crucial tool for the organization to achieve its Sustainable Development Goals (SDGs), a set of benchmark targets representing progress toward a better and more sustainable future.

Beyond the United Nation's advocacy, green finance has blossomed in its own right. It is no longer the pet project of environmentalists and eco-conscious intellectuals – rather it is the subject of significant interest by sovereign and other funds around the world. For instance, the European Central Bank (ECB) has invested heavily in green financial vehicles – currently holding 20% of all Euro-denominated green debt.³⁸ It is not alone. Other central banks in Europe and beyond are prioritizing green investment, recognizing it as a unique opportunity to achieve investment objectives while affecting positive change and reaping the rewards of its positive externalities. This nascent sector of the financial world is already seeing second-level effects as innovation in green technologies has started to expand, from a relatively low base, in response to the increased availability of capital. The green bug has proven to be infectious among the general public as well – research shows a growing “green premium” to exist across a range of global markets and currencies.³⁹

This is not to say that green finance is without hurdles still to clear. Achieving the scale of investment needed to meet the needs of the environment and green tech innovators will require a regulatory overhaul, broadening of access, and diversity of opportunities in order to meet private and institutional investment risk/return needs, while also keeping in mind fundamental “green” objectives. Debt and equity have emerged in the past five years as the investment tools most fit for this challenge. As green finance continues to build a track record and develop a regulatory framework that inspires the confidence of investors, green bonds hold particular promise as they afford greater security and liquidity for investors.

Green Bonds

Green bonds are defined as bond instruments whose proceeds will be exclusively applied to financing green projects. The breadth of this definition, as will be discussed later, has been a source of difficulty rather than an advantage for bonds



intended to fall under the “green” label. For its part, the World Bank defines green bonds as “fixed income, liquid financial instruments that are used to raise funds dedicated to climate-mitigation, adaptation, and other environment-friendly projects.”⁴⁰ However defined, the green bond market’s fundamental intent is to capitalize on the power of debt markets to fund environmental projects that may include renewable energy, pollution control, resource stewardship, biodiversity conservation, clean transportation, or the development of eco-friendly products.

Green bonds, as we have come to know them, originated in 2008 when the World Bank issued the first labelled “green bond” in response to demand from Swedish pension funds wanting to invest in projects that would help mitigate climate change.⁴¹ Since this first issuance, the World Bank has been at the forefront of green debt innovation and has created a diversity of projects that may assist in financing the future of sustainable and environmentally-conscious projects. For instance, the World Bank has issued earmarked bonds to finance projects ranging from air pollution control in China to water resource management in Indonesia.⁴² Nevertheless, more recently, the private sector has also emerged as a key driver of innovation in the green bonds space.

In 2020, sustainable debt issuance hit a record high of US\$732.1 billion – an increase of 29% from the year prior despite the COVID-19 pandemic.⁴³ As **Figure 4** shows, the green bond market has grown from less than US\$40 billion in 2014 to over US\$250 billion in 2019. 2020 also saw the attainment of a significant milestone – the US\$1 trillion mark of cumulative green bonds issued.⁴⁴ The Inter-American Development Bank (IDB) continued to support the green growth and green finance agendas in its borrowing member countries. In 2020, the IDB launched the Green Bond Transparency Platform (GBTP), which is an innovative digital tool that brings greater transparency to the green bond market in Latin America and the Caribbean. Through GBTP, the IDB has worked with Chile and Colombia to develop sovereign green bonds, and with Mexico on subnational green bonds.⁴⁵

This meteoric rise is likely to continue. It has been estimated that the value of green bonds traded globally could hit US\$2.36 trillion by 2023.⁴⁶ Although the market still pales in comparison to the global bond market (which is worth around US\$93 trillion annually), this only underscores the potential for growth.

Green bonds can be issued by public and private entities alike. In 2020, the largest green bond issuers were Fannie Mae (US\$13 billion), the Federal Republic of Germany (US\$12.8 billion), and the Societe du Grand Paris (US\$12.2 billion).⁴⁷ Recent years have seen a sharp increase in the demand for green bonds from a range of investors – from institutions such as investment banks, corporate treasuries, and specialized “social” investors, to sovereign funds and retail investors. Historically, however, the bulk of green bonds have been purchased by institutional investors. The proceeds of these funds are allocated to diverse projects as can be seen in Figure 2, with green energy, buildings, and transport projects together receiving 85% of the total in 2020. Water, waste, and land use trailed, comprising 14% collectively.

The green bond market is one of considerable upside and opportunity for all involved. Consumer markets have shown a “green premium” – meaning that consumers are willing to pay more for a clean technology than a higher polluting one. This has been reflected in financial markets as well, with investors paying premiums to hold green bonds and equities relative to other options. At the corporate level, green investment – and corporate social responsibility more generally – has come to be an important signal for shareholders. Firms can reap tangible benefits from signaling their efforts to incorporate environmental considerations into their investment calculus. At a more practical level, firms also benefit from the tax



exemptions and credits that can be found for investing in some environmentally-friendly projects.

Perhaps debt financing's greatest allure, however, is that it gives investors greater security than many other investment vehicles. For instance, and in comparison to green equity, in the event that a project fails, debt has higher priority in the liquidation of assets than equity. In short, those who lent money to the company get paid before those who bought shares in the company. This additional security holds particular appeal to institutional investors, such as pension funds, whose necessarily low risk tolerance often leads them to the bond market.

With these opportunities in mind, it must also be considered that green bonds face challenges that must be overcome in order to reach the scale necessary to truly address the environmental challenges facing the world. One of the main hurdles is the continued absence of universal standards defining the labelling of green bonds. Where they do exist, such principles are voluntary or easily misappropriated. Although a range of entities have stepped into the role of "Green Market Verifier", certifying bonds and the projects to which their proceeds will be applied, the validity of their certifications is far from universally understood or recognized. Several NGOs have also been established in recent years to address this issue, including the Sustainable Bond Market Advisory Group (SBMAG), which was established to serve as a forum for bond market stakeholders, the Climate Bonds Standard Board, which introduced the Climate Bonds Standard and Certification Scheme as a Fairtrade-like labeling scheme for bonds.

In addition to a universal definition or certification, institutional investors typically will require that green bonds hold a credit rating. As with other asset classes, these ratings are dependent on both the rating of the issuing entity and the composition of the underlying assets. The World Bank, for instance, has long been a primary issuer of green bonds. This has allowed the Bank's AAA rating to be applied to these bonds. However, in 2019 for example, over half of the green bonds were issued by the private sector – between corporate entities and asset-backed securities.

Looking toward the future, a universally accepted and respected green bond certification must be established in order for investors to have the necessary assurances to inspire their confidence. In addition, the oversight and accountability stemming from such a certification scheme would lend credibility and validity to issuers and end-use projects. Uncertainty in definition and certification will continue to handicap the green bond market from reaching its full potential, particularly among risk-averse investors.

The necessary progress on green bonds standards will likely require more government involvement as well in developing green bond standards. Fortunately, per figure 6, there is strong momentum for sovereign green bonds – with their own money at play, governments are likely to push for greater structure in the green bond market more broadly. In 2020, Mexico issued the first sovereign green bond in Latin America and Egypt became the first country to issue a green bond in the Middle East / North Africa region. Sixteen sovereigns have now issued green bonds to finance green projects in governments' budgets, exceeding US\$80 billion in total.⁴⁸

Within the market itself, green bond indices have also been created to help determine what bonds should truly qualify as "green." These indices lend credibility to the underlying bonds and allow investors to rely on the due diligence done by the issuing institutions. Indices such as the Bloomberg MSCI Barclays Index, the Bank of America Merrill Lynch Green Bond Index, and S&P Green Bond Index demonstrate that the market's biggest institutional players are taking note of the opportunity that green bonds represent.



Green Equities

The counterpart to green bonds, green equities, are also at the forefront of green investment vehicles. While bonds typically offer greater security, equities can in turn entice investors with the prospect of greater returns enabling investors to diversify their portfolios with green investments without having to sacrifice return and dividend potential.

Interest in green equities may only increase as millennials enter their prime earning years, accrue greater capital, and seek new, appealing investment opportunities. According to a survey conducted by Morgan Stanley's Institute for Sustainable Investing, almost 95% of millennials are interested in sustainable investing, while 75% believe that their investment decisions could impact climate change policy.⁴⁹ Similar to other green investment vehicles, however, green equity is still in an early stage of development. The set of such equities available to investors will need to increase substantially in order to provide investors with the diversity of investment opportunities they seek and to meet the scale of investment needed by green projects.

Financial innovations have further bolstered the case for green equities. For example, the introduction of "YieldCos" – publicly traded companies focused on returning cash flows generated from renewable energy assets to shareholders – can be seen as the new face of utility equities, which have historically shown resilience in the face of market downturns.⁵⁰ Compared with standard utilities however, YieldCos have the benefit of being geared toward promoting a low-carbon future while also being able to offer higher than normal returns to investors by leveraging renewable energy tax incentives to mitigate tax liabilities leveraged on non-renewable peers.

The development of green index funds has also proved crucial to bolstering investors' feelings of security in green equities. According to a report issued by Morningstar, as of the end of the second quarter of 2020, there were 534 sustainability-focused index funds and exchange-traded funds listed globally, with US\$250 billion in assets under management. Europe is the largest market for such funds, accounting for some three quarters of global assets.⁵¹ A significant milestone was reached in 2020 when investment in sustainability-focused index funds reached US\$71.1 billion during the second quarter, pushing global sustainable assets under management above the US\$1 trillion mark for the first time.⁵²

Exciting as green finance has already proven to be, it is just one example of "social finance" – a growing subset of financial activity that leverages private capital to achieve altruistic outcomes, whether social, environmental, or otherwise. While these subjects are ubiquitous in daily media coverage the world over, it has previously been less evident how individual and institutional investors can contribute beyond their local community and in ways beyond charity. The true innovation of social finance is the way in which it has allowed investors to utilize familiar investment vehicles in service of a greater local, regional, or global good. In addition to green finance, another crucial example of social finance are the multilateral development banks' lending programs.

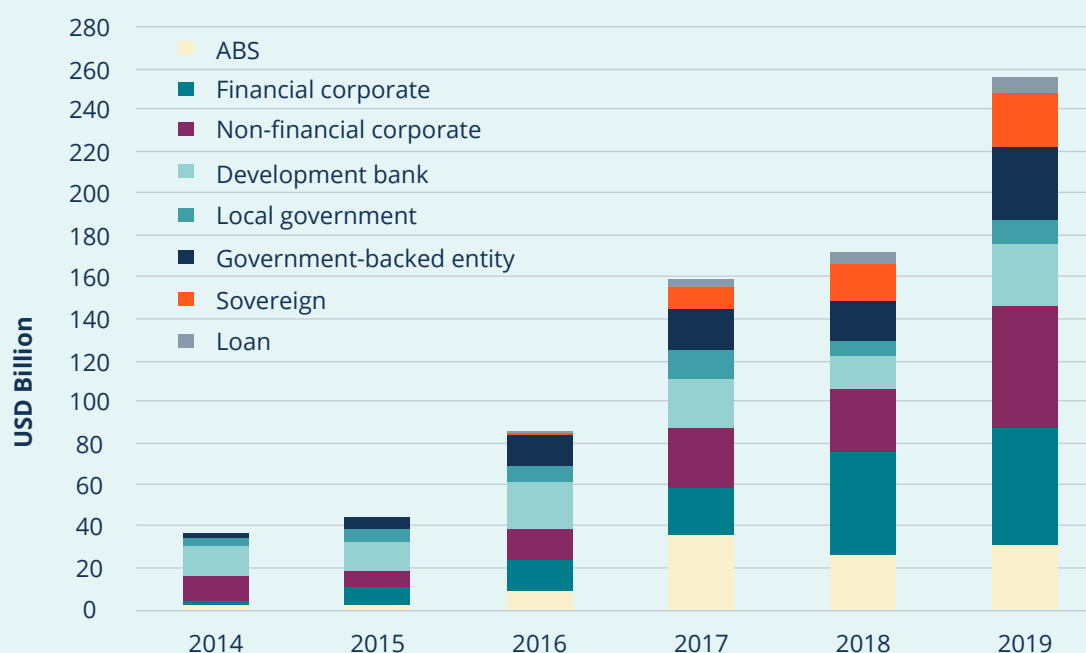


China's Green Bond Market

China's central bank, the People's Bank of China, established a green bond market in December 2015 to complement green bank lending. Since its inception, this market has flourished and achieved sales totaling US\$164.9 billion as of November 2020. The cumulative impact of these green bonds is estimated to be a reduction of more than 52.6 million tons of CO₂ and at least 11.2 GW of additional clean energy capacity.⁵³ The trend is set to continue as China's green investment is set to total between US\$424 and US\$566 billion annually by 2030.⁵⁴

China has also proved a forerunner with respect to its official guidelines on green bond issuance, as it was the first country to publish such guidelines. In service of its environmental objective to achieve carbon-neutrality by 2060, Chinese policymakers have continued to improve the regulatory environment relating to green bonds. In 2020, for example, the People's Bank of China defined the eligible uses of green bond proceeds. In addition, five ministries of the Chinese government set a target to apply financial tools to contain climate change. Six "green finance pilot zones" have been established to trial policies such as the subsidization of green bond issuers by the governments of Jiangsu and Shenzhen provinces.⁵⁵

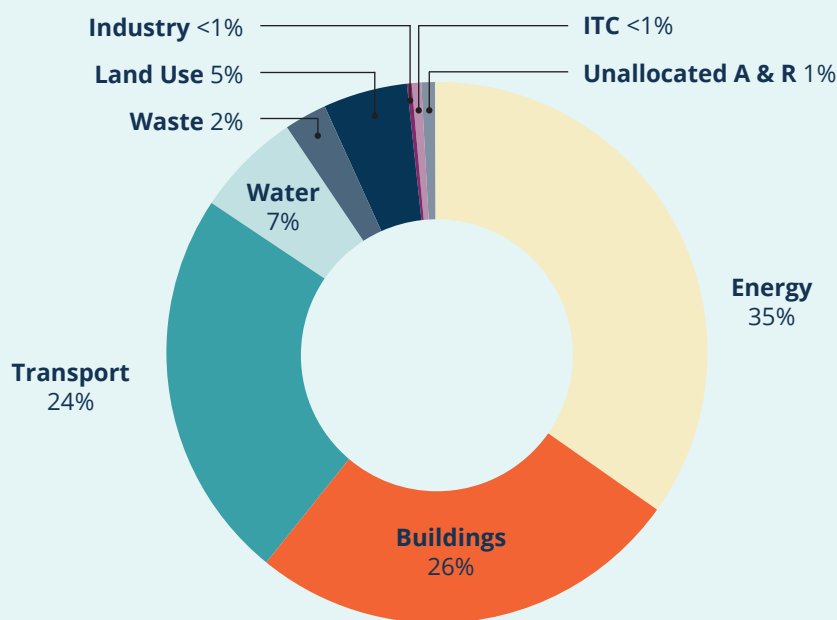
Figure 3 | Green Bonds and Green Loans Issuance 2014-2019



Source: Climate Bonds Initiative. Data as of 31 December, 2019.



Figure 4 | Application of Proceeds for Green Bonds Issued in 2020



Source: Climate Bonds Initiative. 2021.

Figure 5 | Cumulative Green Bond Issuance by Country



Source: Climate Bonds Initiative



IV. Multilateral Development Bank Lending Programs and IFIs

COVID-19 has shown, particularly in the emerging markets and developing world, a whole range of vulnerabilities in the economies of these countries. Public health systems have come under enormous strains, reflecting many decades of neglect. Budgets have been stretched, with very few countries having the fiscal space needed to respond to the crisis in a vigorous way, without imperiling the long-term health of public finances and/or without turning to immediate help from the international financial institutions.

We have known for a long time that fiscal policies in the great majority of countries in the world have exhibited a “deficit bias,” that is, a tendency, regardless of the business cycle or whether the economy in question is in a phase of expansion or downturn, to register a budget deficit. Looking at the data for 191 countries over the 41-year period 1980 – 2020, countries have run deficits 75 percent of the years (with many advanced economies registering deficits in every single year over this period) and this tendency has intensified over the past decade, following the 2008 global financial crisis. This deficit bias has contributed to the rapid build-up of public debt, a process that has picked up speed in 2020 as a result of the fiscal interventions necessitated by the pandemic. All of this matters a great deal for financing the transition to a low-carbon economy; to the extent that public resources are under pressure, it may be necessary for private finance to fill the gap and it will also require public resources to be used in more imaginative ways, that boost the effectiveness of a given level of funding.

Against this background, the role of the international financial institutions and multilateral development banks has acquired renewed relevance. Starting with the IMF, as of March 16, 2021 some 85 countries had received support, mainly from the IMF’s Rapid Credit Facility and Rapid Financing Instrument (RFI), the latter a facility providing fast-disbursing support to countries experiencing commodity price shocks, natural disasters, and other fragility-related emergencies, such as COVID-19. Thus far, as of this writing, the IMF has approved some US\$107.4 billion under the RCF and RFI and other facilities, against financing needs (conservatively estimated) in these countries likely in excess of US\$2.5 trillion.⁵⁶ Other official lenders such as the World Bank and the regional development banks such as the IDB have also stepped in with emergency funding.⁵⁷ For instance, in 2020, the World Bank Group’s lending increased from US\$59.5 billion in 2019 to US\$74.1 billion in 2020 as countries battled crises including the COVID-19 pandemic.⁵⁸ In FY 2020, the Group allocated US\$21.4 billion to climate-related investments⁵⁹ and US\$21 billion in COVID-related support.⁶⁰

Given the volume of interventions announced thus far in the more advanced economies and given the present and prospective needs for financial support in coming years in the developing world, one can legitimately raise the question of whether the collective “firepower” of the international financial institutions and the multilateral development banks – meaning, the aggregate amount of financial resources available for assistance to their members – is adequate to the task at hand. And the task is not simply meeting the needs arising out of the dislocations provoked by COVID-19, enormous as they are, but also those that will emerge in coming years from multiple climate change-related disruptions, as well as the whole range of other development needs which remain, such as persistently high



levels of poverty, widening income disparities, the need to rebuild dilapidated physical infrastructure which is also climate resilient, to improve the quality of educational systems as we rise to meet the challenges of technological change for the future of work and the job markets, among others. Our answer to this question is a resounding “no.”

In this paper we are mainly concerned with the needs that arise out of climate change mitigation and adaptation which, as noted earlier, are immense. In the next section we address the issue of boosting the lending capacity of multilateral lenders. The first part of what follows is focused on the development banks. A separate (shorter) section deals with the adequacy of IMF resources. The proposals presented here are offered in a spirit of constructive dialogue, mindful of something that Winston Churchill said in 1940 in the middle of World War II: “in this crisis we must not let ourselves be accused of lack of imagination.”

Mobilizing the Private Sector for Development: A Sponsored Loans Program

The intent of this proposal is to look beyond the conventional funding mechanisms of the multilateral development banks, which have historically consisted of periodic capital increases funded by member countries. This mechanism may continue to be used in the period ahead, but it has its own limitations, including narrowing fiscal space in the larger countries providing the bulk of the funding. For example, the World Bank passed a US\$13 billion capital increase package in April 2018 that included US\$7.5 billion paid-in capital for the International Bank for Reconstruction and Development (IBRD) and US\$5.5 billion paid-in capital for the International Finance Corporation (IFC), more than tripling the capital base of the World Bank’s private-sector lending institution. Notably, this capital increase also included US\$52.6 billion of so-called “callable” capital for the IBRD.⁶¹ All told, the package enabled the Bank’s provision of nearly US\$100 billion in annual development support.⁶²

Budgets everywhere are under pressure and there is every reason to expect that member countries will see such capital contributions competing with other urgent claims on scarce budgetary resources, against the background of rapidly rising public debt levels. According to the IMF, the deterioration of the fiscal accounts in 2020 was much larger than that seen in 2009, in the aftermath of the global financial crisis. At the global level, whereas the fiscal deficit in 2009 averaged 4.9 percent of GDP, in 2020 it was twice as large, at 10 percent of GDP. The increase in government debt averaged 10.5 percent of GDP in 2009, but was close to 19 percent of GDP in 2020. The need to return the public finances to a more sustainable path could well lead to calls for exploring alternatives to the current funding model for the MDBs.

One possible approach is for the multilateral development banks to explore innovative mechanisms to mobilize private sector resources in support of social and economic development programs, including climate change mitigation and adaptation. The unusual low-interest-rate environment, which has been a chief feature of the post-global financial crisis world, has created a situation today where upwards of US\$18 trillion of private sector wealth (equivalent to about 20 percent of world GDP) is earning negative yields. A broad range of institutional investors and some 2,800 billionaires keep, on average, some 22 percent of their asset holdings in cash. Many of the holders of private sector wealth might want to deploy some of their assets to finance promising development projects aimed at addressing some of the most urgent needs of our time, from the mitigation of climate change, to



the persistence of poverty, widening income disparities which risks undermining social and political stability and other problems, which, if allowed to fester, could pose substantial risks to sustainable economic growth and undermine the social and institutional foundations for continued wealth creation.

The sponsored loans program is a scheme where a private sector investor expresses an interest in a particular development project, reflecting her/his own sense of social and economic priorities. We will call this investor the Guarantor. For example, the World Bank could receive from the Guarantor an amount – say US\$100 million – as an equity-like instrument, and these funds would be used exclusively to guarantee World Bank loans for the duration of the time horizon. The Bank would raise money in the capital markets using its AAA rating and on-lend the resources to its members to finance the project in question under the traditional state guarantee. Because the Guarantor takes on the risk of the loan the Bank would have a lower capital reserve allowing it to further expand its balance sheet. The investor maintains its cash position in the long run (assured of a non-negative yield) while supporting development goals in the short to medium-term.

By sponsoring the loans, the Guarantor would make available resources to tackle a range of development challenges around the world, many of them intended to facilitate the transition to a low-carbon world. The Guarantor's money would be used only in the event of a government default, a highly unlikely occurrence given the Bank's distinguished loan repayment historical track record. Multinational corporations could become guarantors as part of their corporate social responsibility strategy. Loan sponsorships could be split between several Guarantors who might share a common interest in a particular project – viz. the promotion of climate change mitigation. [Appendix II](#) lays out a simple graphical representation of the sponsored loans program proposal.⁶³

In [Appendix III \(Supporting the Environmental Transition in Agriculture\)](#), we present an example of the sorts of projects that might be funded under this program. The sponsored loans program could substantially enhance the lending capacity of the multilateral development banks. Indeed, in theory, the binding constraint would no longer be internal debt-to-equity ratios in lending operations or the fiscal situation of its official shareholders, but rather identifying worthy projects that might excite the imagination of private investors. This, in turn, might lead the financial institutions to modernize internal procedures and structures, so as to be able to take on a potentially much larger volume of projects, but also to examine whether they are appropriately staffed with respect to experience, talent and skills.⁶⁴

Mobilizing the Private Sector for Development: Blended Finance

Global efforts to reduce poverty and hunger, increase access to education, address migration, combat climate change, and reduce inequality require immense resources – as much as US\$4.5 trillion per year according to some estimates. As noted previously, public resources alone are insufficient and private investment is vital to supporting the efforts of multilateral development banks (MDBs) and philanthropic funders. One way to incentivize private investment is through blended finance structures, which tap into official sources of development finance and philanthropic funds to catalyze private capital flows to emerging markets and developing countries. Blended finance helps to facilitate private investor risk-taking at acceptable levels to incentivize investment and finance without distorting



functioning markets. This augments the lending firepower of MDBs and allows them to effectively scale their work and get the world closer to achieving the SDGs. In developing countries such as India, rapidly growing low-income consumer bases are leading to increased demand for basic services such as health-care, education, and food. Local businesses that can provide these services can offer attractive returns to private investors. Perhaps more relevant, low-carbon infrastructure projects involving high risks in the early stages but with potentially good investment returns over the longer term would be another possible growth area, since generally high capital costs and long investment horizons mean there are limited sources of affordable early-stage capital for these enterprises. In these situations, blended finance can effectively “de-risk” these early-stage investments and enable larger capital investments.



V. A Role for the IMF

As noted earlier, the IMF is playing an important role in providing financial support to countries currently trying to manage the fiscal pressures arising out of COVID-19. In this pandemic emergency, as well as other periods in the past characterized by widespread global disruptions to economic activity, the amount of support the IMF can provide has traditionally been limited by the size of the country's membership quota; and there is obviously an upper limit on total available resources. As of end-April 2021, the IMF's "lending capacity" was equivalent to around US\$1,012 billion) consisting primarily of IMF quotas (US\$452 billion) and multilateral and bilateral arrangements, which the IMF has negotiated with member countries and institutions amounting to some US\$560 billion, to provide so-called second and third lines of defense, and supplement quota resources. While this sum may seem large, in April of 2021 it is equivalent to slightly less than 3 percent of cross-border claims of Bank of International Settlements (BIS) reporting banks, 0.35 percent of total global debt and 1.1 percent of world GDP. It is, hence, a relatively modest sum, adequate to deal with a handful of crises in a few middle-income countries, but insufficient in a major crisis such as that brought about by COVID-19 or, looking ahead, an acceleration of climate change.⁶⁵

In 2020, a number of analysts and public officials made a case for a Special Drawing Rights (SDR) allocation, the IMF's only form of universal unconditional liquidity. The SDR came into being in 1969, as an attempt to bolster countries' official reserves. The second amendment to the IMF's Articles of Agreement actually envisages that IMF members will make the SDR "the principal reserve asset in the international monetary system."⁶⁶ And Article XVIII, on the principles governing the allocation of SDRs, states that "the Fund shall seek to meet the long-term global need, as and when it arises, to supplement existing reserve assets in such a manner as will promote the attainment of its purposes and will avoid economic stagnation..." There have been three SDR issues over the past 51 years, by far the largest of which took place in 2009 (equivalent to US\$250 billion), as a response to the financing needs of the global financial crisis.⁶⁷

That last SDR issue was agreed upon at a G20 summit in London and there is no doubt that it made an important contribution to boosting confidence and was seen as a strong signal of international cooperation in the midst of a systemic shock to the global financial system. The case for an SDR issue today on the basis of need would appear to be compelling, given that this crisis is tangibly more intense and costly in terms of human welfare than the global financial crisis a decade ago, when global GDP contracted by 0.1 percent in 2009, before recovering quickly in 2010 and thereafter. In a February 25, 2021 letter to her G20 peers, US Treasury Secretary Janet Yellen made her opinion on the issue clear, stating "if there was ever a time to go big, this is the moment."⁶⁸ Yellen went on to describe her support for a new SDR allocation to boost liquidity for poor countries which have been hit particularly hard by COVID-19. This support comes as other G20 members had already voiced support for a US\$500 billion SDR issue that, prior to Yellen's letter, had received little comment from the United States.

More recently, during the IMF/World Bank Spring 2021 meetings, the International Monetary and Financial Committee (IMFC), the policy advisory committee of the Board of Governors of the IMF, issued a communique which partly states: "We call on the IMF to make a comprehensive proposal on a new Special Drawing Rights (SDR) general allocation of US\$650 billion to help meet the long-term global need to supplement reserves, while enhancing transparency and accountability in the reporting and the use of SDRs," adding that "The IMF has an important role



in responding to members' diverse needs for guidance on the macroeconomic and financial implications of climate change issues. We, therefore, support the IMF in stepping up work to help its members identify and manage the macro-critical implications of climate change, digitalization, inequality, and fragility, in close collaboration with partners, and to further integrate these issues into its surveillance, lending, and capacity development in line with its mandate."⁶⁹

One can also be sympathetic to the concerns raised in some high income countries that because countries' SDR allocations would be linked to the size of their IMF quotas, much of the benefit would be concentrated in the larger countries. Indeed, it is not difficult to calculate that if G20 countries made a mere 10 percent of their SDR allocations available, it would double the funding flow for low-income countries.⁷⁰ In any case, this asymmetry in the benefits of an SDR allocation was not a concern in 2009, given the fairly generalized nature of the shock, which put countries' finances – including in the advanced economies – under huge stress. Likewise, there is little likelihood that, in the middle of an economic calamity without precedent, an SDR issue of, say, about US\$650 billion would be inflationary. Indeed, most of the advanced economies have responded to COVID-19 with large packages of financial support under the overall heading of “whatever it takes,” which recognized explicitly that inflation was not a primary concern. Indeed, one characteristic of the response to the pandemic has been the extent to which developed countries have not hesitated to invest trillions of dollars to address the repercussions of the pandemic at a time when they were largely unable to fulfill their pledges to provide US\$100 billion of support to the developing countries for climate finance.

By their very definition, SDR allocations are an unconditional form of liquidity: they can be deployed for a variety of purposes at the sole discretion of the recipient country. Moreover, they do not raise the concerns and sensitivities sometimes associated with other IMF resources that are typically disbursed in the midst of a crisis as part of adjustment programs, carry the conditionality of policy reform, and are viewed as a last resort and admission that a state lacks the capacity to resolve its crisis on its own.

On August 2, 2021, the Board of Governors of the IMF approved an SDR allocation equivalent to US\$650 billion (about SDR 456 billion), to “boost global liquidity.”⁷¹ While indicating that US\$275 billion of this allocation would be made to emerging economies and developing countries, the IMF suggested that it would continue to give attention to the question of how to deploy this windfall for the benefit of developing countries and to do so in a way that would respect IMF governance standards. The starting point of this debate is that lower-income countries have been hit in a major way by COVID-19 and have had difficulties in confronting the challenges of vulnerable health systems, limited fiscal space and, in the majority of these countries, unsustainable debt burdens. However, there seems to be agreement that substantial financial support over the next several years – amounting to perhaps some US\$500 billion in pandemic funding and other spending in the case of low-income countries – it would be possible to get these countries back onto a more sustainable growth path involving catching up with the higher income countries.

Under existing proposals, the plan would be to make available SDR issue funding via the IMF's Poverty Reduction and Growth Trust (PRGT) that provides highly subsidized loans to low-income countries. It is beyond the scope of this paper to go into a detailed description of the operational characteristics of PRGT operations and its loan account, its subsidy account (to pay for the subsidies associated with the IMF concessional loans) and its reserve account (to cover creditors in the case of late payments from debtors). As noted by Wolf (2021), the IMF's idea “is



that some of such lending might go to other developing countries and for specific purposes, such as climate, digital transformation or health” adding that “whatever the precise modalities, the aim should be to use as much of this windfall as possible to support governments that have credible plans to recover lost development ground.” He also makes the very valid point that “low-income countries should not be asked to borrow, even on concessional terms, for this purpose, thereby diverting resources from their long-term development goals.”⁷²

Beyond the immediate issue of the uses to be made of this SDR allocation, more generally, there would appear to be an urgent need to overhaul and simplify the system under which the Fund may issue SDRs under exceptional circumstances, such as times of crises. At present, the system is unduly slow. Although an Executive Board decision is sufficient, US law mandates a 90-day period of Congressional notification. It also requires an 85 percent majority vote which effectively gives veto power to the US and the EU. When this idea was first put forward in the early 1980s, concerns were raised about the possibly inflationary implications of such liquidity injections, but international inflation was a serious problem then in ways that it is clearly not today, and measures could be introduced to safeguard against this. Furthermore, the size, integration and complexity of financial markets today dwarfs what we had in the 1980s, and the costs of an unresolved systemic crisis today are potentially extremely high. In any case, reforms in this area should also introduce protections to limit moral hazard. The idea is to put in place well-funded crisis financing mechanisms available to all IMF members, as an alternative to precautionary reserve accumulation, which is what countries have done in recent decades in a big way. There are enormous inefficiencies in the accumulation of war chests denominated in hard currencies as a way of providing a protective barrier during periods of market volatility. As part of its efforts to improve global liquidity management, the IMF should be allowed to mobilize additional resources by doing the following: tapping capital markets and issuing bonds denominated in SDRs (something that would not require amending the Articles), making emergency SDR allocations under considerably more streamlined procedures, and, as noted previously, allocating SDRs regularly to supplement the demand for “own reserves.”

One possible concern which has not been addressed in official public commentaries, but which is surely an issue worth debating, is that SDR allocations are made to all IMF members. This would include countries that are currently failed states, or which may be run by politicians involved in the drug trade, financing global terrorism and sponsoring generalized mayhem in various parts of the world, or countries that have otherwise not fulfilled vital obligations of membership (e.g., Venezuela has not had an Article IV consultation with the IMF since 2004). The financial boost provided by an SDR allocation could thus, in some cases, have adverse collateral effects and not in any way be of benefit to citizens. Corruption and bad governance are serious enough problems to make this a real and legitimate concern, but the solution to this lies elsewhere, not in depriving all IMF members of the financial lifeline that an SDR issue would provide during times of financial stress.⁷³ This, in turn, raises questions about IMF governance and the future role of the SDR, which are beyond the scope of this paper; suffice it to say that we all have a vested interest – governments, the private sector, citizens everywhere who often pay a high price during periods of global economic dislocation – in having an IMF that is able to respond quickly, effectively and generously in times of crisis.



VI. Taxing Financial Transactions – From the Tobin Tax to the Present⁷⁴

Another possibility for novel revenue generation – theoretically at a large scale – for the international community is the tax proposed by James Tobin on spot currency transactions or its successor, a tax on financial transactions. Tobin made his initial proposals in the immediate aftermath of the collapse of the Bretton Woods system of fixed exchange rates in 1971, and its primary motivation was less to generate tax revenue and more to dampen the speculation that was contributing to heightened exchange rate volatility in foreign exchange markets, delinked from broader economic fundamentals, and placing a particularly heavy burden on producers and consumers of traded goods. Tobin's proposals have generated considerable debate, controversy and confusion over the years. It is worthwhile, therefore, to briefly summarize his thinking, particularly as it evolved over the 25 years, following his Janeway Lectures at Princeton University in 1972 when the proposal was first made. By the mid-1990s, and against the background of multiple financial crises in various parts of the world, Tobin expressed particular concern about speculative attacks against countries that were undergoing some financial turmoil and were forced to increase interest rates sharply to defend their currencies, with deleterious effects on economic activity and employment.

Since he was skeptical that the world would quickly move to the full coordination of monetary and fiscal policies and the introduction of a common currency, he opted for throwing “some sand in the well-greased wheels” of international money markets. Tobin (1978) lamented the exchange rate volatility that had emerged in the wake of the collapse of the fixed exchange rate regime in the early 1970s and noted that “in these markets, as in other markets for financial instruments, speculation on future prices is the dominating preoccupation of the participants . . . In the absence of any consensus on fundamentals, the markets are dominated – like those for gold, rare paintings, and – yes, often equities – by traders in the game of guessing what other traders are going to think.” While he recognized that financial markets often imposed a degree of discipline on countries' monetary and fiscal policies, he thought that the punishment delivered by speculation often far exceeded the policy mistakes or misalignments brought about by the authorities, as had been the case in Mexico in 1994, and as would become clear during the 1997 Asian financial crises and other emerging market crises precipitated in its wake.⁷⁵

Tobin's essential point was to “penalize short-horizon round trips” in foreign currency transactions while not affecting in any significant way the incentives for trade in commodities and longer-term capital investments. He thought that a tax administered with some flexibility would be a better instrument to combat runaway speculation than bureaucratic controls and/or burdensome financial regulations. In his 1996 contribution to *The Tobin Tax – Coping with Financial Volatility*, he observed that 80 percent of foreign exchange transactions involved round trips of seven days or less, with the majority of these being of one-day duration. By 1995, daily foreign exchange trading amounted to US\$1.3 trillion, or US\$312 trillion on an annual basis, dwarfing trade in equities and nearly 67 times larger than the total value of annual world exports.

Tobin commented that part of the opposition to the tax proposal was philosoph-



ical: it was “rejected on the same general grounds that incline economists to dismiss out of hand any interference with market competition, including, of course, tariffs and other barriers to international trade in goods and services.”⁷⁶ The belief that expectations of economic actors are rational and that financial markets are efficient and that ultimately “financial markets know best” is widespread among market participants, even though, Tobin argued, it was not clear to him that trade in financial assets and trade in goods and services were one and the same thing, subject to the same insights from economic theory that had long been in favor of free trade.⁷⁷

By the time of the global financial crisis in 2008, James Tobin was no longer with us, but one can safely assume that he may have agreed with another Nobel laureate, Robert Shiller (2009), and his statement that our “economies, left to their own devices, without the balancing of governments, are essentially unstable.” Such a tax, it was also argued, would also damage liquidity in currency markets, drive these markets to tax-free havens if it were not a universal tax, and so on.⁷⁸

John Maynard Keynes had already advocated a general financial transaction tax in 1936 to discourage the emergence of a class of speculators whose activities would be primarily motivated by the search for short-term profit linked to asset price changes and which, in his view, would needlessly add to market volatility. Keynes had warned that “it makes a vast difference to an investment market whether or not they (meaning serious investors who purchase investments on best long-term expectations of value) predominate in their influence over the game-players.” Tobin returned to and elaborated on his original proposal in 1978 in his presidential address to the Eastern Economic Association. He said:

“It would be an internationally agreed uniform tax, administered by each government over its own jurisdiction. Britain, for example, would be responsible for taxing all inter-currency transactions in Eurocurrency banks and brokers located in London, even when sterling was not involved. The tax would apply to all purchases of financial instruments denominated in another currency—from currency and coin to equity securities. It would have to apply, I think, to all payments in one currency for goods, services, and real assets sold by a resident of another currency area. I don’t intend to add even a small barrier to trade. But I see offhand no other way to prevent financial transactions disguised as trade . . . Doubtless there would be difficulties of administration and enforcement. Doubtless there would be ingenious patterns of evasion. But since these will not be costless either, the main purpose of the plan will not be lost.”⁷⁹

Supporters of the so-called Tobin tax have noted that with more than US\$6.6 trillion traded daily on the currency markets by 2020, a 0.05 percent tax could generate some US\$3.3 billion per day in revenue (about US\$825 billion on an annual basis),⁸⁰ which could then be directed to multiple ends, from climate change mitigation and adaptation to worthy projects aimed at poverty alleviation, inclusive economic growth, global public goods and so on. Indeed, one could make the argument that the case for the tax has become stronger in the wake of the 2008–2009 global financial crisis and the subsequent COVID-19 crisis. As a result of the multiple government interventions to mitigate the impact of these crises, levels of public indebtedness in rich countries – the providers of the bulk of development aid – are sky high, higher, in fact, than at any time since the end of World War II, and this has sharply curtailed their appetite for substantially boosting development aid. Tobin, using the figures for trade volumes in foreign exchange for 1995 (US\$1.3 trillion per day), thought that the revenue collected would be less than suggested by the volumes of trade and the assumed tax rate because the introduc-



tion of the tax would dampen the volumes traded, particularly for trades with a very short horizon for which even a small tax, on an annualized basis, applied to multiple transactions would raise transaction costs significantly. He also noted that the lion's share of trading in the foreign exchange market took place among financial intermediaries, and were not customer-bank transactions, as were those supporting international trade in goods, for instance, or linked in some fashion to some real economic activity.

The Tobin tax proposals have generated a lively debate in policy-making circles and the academic community. Some have argued that a tax levied on currency transactions could, through creative financial engineering, be evaded. Moreover, not all foreign exchange purchases have a speculative dimension. There is a difference, it is argued, between hedging and speculation. Hedging is intended to protect the investor against unpredictable price changes; it is a way to limit price risk and can be seen as a form of insurance. Speculation, on the other hand, has the investor assuming greater risk in the expectation of a higher profit linked to price volatility and is, thus, no different than gambling. To avoid being fooled by the emergence of derivative financial instruments that would disguise a foreign currency transaction (on which a tax would be due) in a different product (to which the tax would not apply), it might be better to shift the original Tobin tax idea, some argue, to a generalized transaction tax that would be broad enough to capture a wide spectrum of financial instruments. Indeed in 2011, around 1,000 economists called for a modified Tobin tax called the Robin Hood Tax to address world poverty and disease. It affected a wider range of asset classes including bonds, commodities, mutual funds, stocks, unit trusts and derivatives.⁸¹

In other words, one would wish to create a tax that would sharply limit the incentives for substitution across financial instruments or jurisdictions. Such a tax would have added benefits with respect to the original Tobin proposals. It could, in principle, generate more revenue, it would not disadvantage one type of financial transaction (i.e., foreign exchange trading) vis-à-vis others, and by discouraging speculation, it might actually steer financial resources to other more productive, value-creating ends, with a higher social return. Obviously, the level of the tax would be important. There is ample evidence from tax regimes across the developed and developing world that tax rates that are too high can unleash all sorts of perverse incentives (e.g., growth in the informal economy, tax evasion) that ultimately have totally counterproductive effects. On the one hand, according to the World Bank, countries in sub-Saharan Africa have the highest total tax rates in the world and also the narrowest tax bases and lowest levels of revenue collection. On the other hand, the United Kingdom assesses a Stamp Duty on transactions on shares and securities without, it would appear, having hindered the growth of a robust financial sector. The Netherlands, France, Japan, Korea and other countries have introduced similar taxes as well.⁸²

There is also an interesting debate on the issue of how the tax would be collected. Here, the debate has evolved over the past several decades because of advances in technology and the concentration of financial transactions in a relatively small number of markets. In 1993, Brazil introduced a tax on bank transactions to widespread skepticism that the tax would actually work from a tax administration point of view, with many arguing that evasion would sabotage the effectiveness of the tax. However, digital technologies empowered the tax authorities and the tax proved to be fairly evasion-proof. Indeed, more generally, the arrival of online tax payments has reached even low-income countries by now and authorities are far more adept today at plugging revenue leakages that, in the past, were also associated with a high incidence of corruption. London, New York and Tokyo account for close to 60 percent of all foreign exchange trading; seven financial centers ac-



count for more than 80 percent of all transactions and, increasingly, transactions are cleared and settled in a centralized fashion, greatly facilitating tax collection. Tobin thought that the problem of tax evasion – which applies to all taxes and is hardly ever used as an excuse not to assess a particular tax – could be addressed in a number of ways. First, he thought that the tax could be collected by the countries themselves, and that developing countries in particular could be allowed to keep a significant share of the amounts collected to fund national development needs.⁸³

Second, tapping into a new revenue stream, countries could opt to lower other taxes, to reduce deficits, to ensure a more sustainable debt-servicing profile or to redress the effects of revenue losses linked to the globalized nature of the economy, with production and plant capacity much more mobile than had been the case at the turn of the twentieth century. This could create positive incentives for countries to voluntarily agree to the introduction of the tax. Given the international nature of the tax, Tobin thought that the IMF's Articles of Agreement could be amended to make the introduction of the tax an obligation of IMF membership. This would imply that IMF members would not have access to its various financing windows and other benefits if they opted not to introduce the tax. Since a large share of foreign exchange transactions are concentrated in a relatively small number of markets, some general agreement among a handful of financial centers would most likely suffice to capture a large share of the revenue.

A clearly important issue pertains to the impact of a financial transactions tax on the economy. Would it reduce employment, not just in the financial sector but in other sectors of the economy that play a supporting role to finance, and by how much? Would it reduce liquidity in the markets? Would it lead to cross-border arbitrage as other jurisdictions (i.e., tax havens) sought advantage from the absence of the tax, if serious efforts are not made to ensure it is a universal tax? Critics of the tax point to the experience of Sweden, which in the 1980s introduced a tax on the trading of equities and, several years later, on fixed income securities.⁸⁴ Because a significant share of trading in the Swedish market moved to London and New York, tax revenues were smaller than anticipated and the authorities ultimately opted for reducing the taxes and finally eliminating them altogether.

Other countries, however, have had much better experiences, including Japan, Korea and Switzerland, where a variety of taxes have been in place for many years and have not prevented the emergence of strong, deep financial sectors. Obviously, consideration of the tax would require the balancing of several objectives, from the desirability of generating additional revenue to promote economic development objectives (and addressing intensifying global catastrophic risks such as accelerating climate change) to ensuring that implementation of the tax is feasible, and that it involves appropriate levels of international coordination and cooperation to ensure its success. In any case, given the size of today's financial needs for climate change mitigation and the potential revenue to be collected through a Tobin-like tax, we think there is merit in Tobin's idea that countries could be presented with a menu of choices as to how to allocate the proceeds of the tax.

Indeed, in the longer term, a Tobin tax or something similar, taking advantage of the substantial opportunities generated by economic globalization for government revenue generation, could be a promising avenue to provide additional funding for development, perhaps through the various UN agencies which currently channel a large share of financial support to the developing world. However, political opposition could be strong, given powerful anti-tax sentiments in many countries such as the United States, where even a carbon tax remains a distant prospect. Financial sector interests in many countries are powerful and it is not difficult to imagine armies of lobbyists pressuring (or intimidating)



lawmakers not to support the tax. Eichengreen makes the important observation that one would have to address in some way the issue of the mismatch between the volume of the tax that would be collected in particular jurisdictions and the ability or willingness of those countries to provide the concomitant levels of aid and investment linked to the tax. London accounts for a large share of foreign exchange transactions worldwide but the United Kingdom, though a generous donor, accounts for a much smaller share of total donor funding to the United Nations and other development initiatives. The point is a valid one, but it simply highlights that one would have to implement the tax in the context of international agreements that addressed the issue of burden-sharing through the balancing of multiple national and global objectives.⁸⁵



VII. Other Potential Sources of Funding

Debt Relief

Debt suspension, restructuring, and relief can be tools to promote greener growth in developing countries. As noted earlier, the amounts of external finance needed by developing countries to cope with the impact of climate change and to manage the transition to renewable energy and low-carbon resilient infrastructures will be large. Moreover, low-income countries spend US\$40 billion servicing external debt annually. By allowing developing countries to use their domestic resources for climate crisis response and poverty alleviation programs rather than debt service, the international community can work towards a greener future. One such popular lever is the “debt to climate-adaptation swap” through which lenders cancel debt under the condition that the indebted country must commit to spending their freed-up resources on the climate response. Alternatively, conservation groups or (inter)governmental agencies like the Green Climate Fund can purchase the debt of developing countries in order to free up funds to be used for climate mitigation. Debt swaps have been used productively in the past. For instance, in 2017 Spain cancelled €36 million in outstanding debts owed by Cameroon, the DRC, and Ethiopia in exchange for these countries investing €15.5 million in health care.⁸⁶

Debt swaps are easier to organize for bilateral debt than multilateral debt, placing some limitations on their usage. For this reason, some have suggested that it would be beneficial to undertake major debt architecture reforms such as the creation of a Sovereign Debt Forum and/or a Sovereign Debt Authority.⁸⁷ The Forum would be a platform for discussions between creditors and debtors over decisions such as debt swaps, and the Authority would provide expert advice to debtors and create a sovereign debt workout mechanism. These two reforms would support the use of debt suspension and restructuring to finance climate adaptation.

Improving Tax Systems

Developing countries can also raise funds for climate change mitigation by improving their tax systems. OECD countries collect about 33 percent of their GDP in taxes on average, while low-income countries collect just 12 percent.⁸⁸ Evidently, there is room for improvement. Digital technology such as secure electronic cash registers can simplify and strengthen tax administration in developing countries by closing loopholes and ensuring compliance.⁸⁹ However, the predominance of corporations that cross borders means that developing countries cannot improve taxation alone. Aggressive tax avoidance by multinational enterprises is estimated to cost as much as US\$240 billion annually.⁹⁰ At least 44% of African financial wealth is held offshore in tax havens.⁹¹ Developing countries are disproportionately affected because they are more reliant on corporate tax revenues than developed countries.⁹² For this reason, Ellmers (2020) suggests a UN Tax Convention to comprehensively address tax havens, tax abuse by multinational corporations, and other illicit financial flows. Such a convention would need to be adopted by the UN General Assembly.



Freezing Assets from Corruption

Lloyd Axworthy, former Canadian Minister of Foreign Affairs, has advocated, along with the World Refugee & Migration Council, in favor of raising revenue for refugees by confiscating assets gleaned from corruption. The World Bank estimates that corrupt officials siphon between US\$20 to US\$40 billion each year off of development assistance funding. Axworthy notes that the “risk of misuse is even more acute” given the additional funds that have been earmarked for COVID-19 related support in developing countries.⁹³ As such, a strategy for channeling this stolen cash into more productive and worthwhile causes is urgent.

The process that Axworthy envisions is this: a corrupt official, for instance in the administration of Venezuelan president Nicolás Maduro, deposits stolen assets in a bank account in Canada. Canada enacts a law permitting the government to freeze and then confiscate these assets. The Canadian government could then return the funds to the people of Venezuela by using them to support refugees of Maduro’s regime. Axworthy also recommends setting up an International Anti-Corruption Court to investigate where these sums are deposited on a global scale.

While Axworthy believes the confiscated funds should be spent on refugee aid, there are many different ways this revenue could be earmarked. One such possibility is for global climate mitigation projects.

Emissions Trading Schemes

Emissions trading schemes (ETS) are a method of carbon pricing that, like a carbon tax, raise government revenues while reducing nations’ greenhouse gas emissions. Under an ETS, a governing body sets a cap for emissions and auctions off emissions allowances amounting to the cap. Since companies can freely buy and trade allowances, emissions trading schemes ensure that pollution is cut where it costs least to do so. Over time, the cap is reduced, thereby shrinking the total emissions.

Dozens of national and subnational jurisdictions have implemented such schemes successfully, including Canada, China, Japan, New Zealand, South Korea, Switzerland, and the US. Established in 2005, the European Union ETS was the world’s first major carbon market and remains the largest, covering emissions from the power, heavy industry, and airline sectors within all EU countries plus Iceland, Liechtenstein, and Norway. Under the EU ETS, emissions from the covered sectors fell by 35 percent between 2005 and 2019. From 2013 to 2015, allowance auctions raised €11.7 billion in revenues, 80 percent of which were in turn spent on climate change mitigation efforts.⁹⁴

The World Bank’s Stolen Asset Recovery Program

Established in 2007, the Stolen Asset Recovery Initiative (StAR) is a partnership between the World Bank Group and the United Nations Office on Drugs and Crime that supports international efforts to end safe havens for stolen assets and facilitate systematic and timely asset recovery.⁹⁵ StAR has provided knowledge and practical guidance to thousands of practitioners in nearly 70 countries across the Middle East, Latin America, Africa, Asia, and Europe.

StAR works to accomplish its mission through capacity building and practical assistance to countries undertaking asset recovery initiatives. Capacity building



often involves training for local practitioners on topics ranging from conducting financial investigations, leveraging open source information, and fostering international cooperation. StAR also assists countries in implementing the policies and institutions necessary for a successful asset recovery regime. These elements include passing laws and regulations on anti-money laundering, augmenting transparency, bolstering the integrity of the civil service and setting up preventive measures in the financial sector. Lastly, StAR assists in asset recovery cases by acting as an honest broker between countries to facilitate cooperation.

The second phase of StAR's work concerns how the assets are allocated once successfully retrieved. StAR aims to oversee the management of these assets so they can effectively benefit citizens; this normally requires the establishment of strong monitoring systems to ensure transparency. To illustrate the uses of recovered assets, one can point to Switzerland's confiscation of US\$321 million in assets from the Abacha family, which was implicated for corruption in Nigeria. In December 2017, Nigeria, Switzerland, and the World Bank signed a tripartite MoU that stated: "the recovered funds would be used to finance targeted cash transfers", while the World Bank would "monitor the use of the Funds" and Nigeria would engage "civil society organizations (CSOs) to participate in the monitoring" of the project.⁹⁶

The returned funds have financed poverty alleviation under the National Social Safety Net Program (NASSP). The NASSP provides cash transfers to the poorest households in order to smooth consumption, promote savings and allow for start-up capital for small businesses to generate income and improve livelihoods. The NASSP aims to support over 10 million citizens living in extreme poverty across the country. Through June 2020, Nigeria had seen the disbursement of US\$113.3 million to over 800,000 households.⁹⁷

Taxing Aviation and Maritime Fuel Use

International aviation and maritime transport comprise a large and growing share of total carbon emissions, but they are generally excluded from emissions mitigation schemes and are not subject to ordinary taxes. The International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), both UN bodies, have been working to create carbon pricing mechanisms for their respective fields. So far, the European Union ETS is the only carbon market to include emissions from aviation, and they plan to add emissions from maritime shipping in 2022 – nowhere else are airlines or the maritime sector forced to pay for their pollution. Despite their outlier position, finance ministers across the EU have expressed support to double down on the issue and establish a Europe-wide tax on aviation fuel. Even with widespread support, the measure is far from certain as, in the EU, each member state has an effective veto on matters of tax policy.⁹⁸

Together, these sectors make up more than 5 percent of global greenhouse gas emissions. However, this proportion is growing and by 2050 the sectors are expected to reach between 10 to 32 percent of total emissions.⁹⁹ The maritime and aviation industries are difficult to include in climate strategies because they don't fall under any single country's jurisdiction. Furthermore, there is strong international tax competition that incentivizes countries to keep fuel taxes low in order to increase their tax base. The competition is particularly fierce in the maritime sector. Because ships don't have to refuel as often as aircraft, they can be more selective on where they choose to dock, planning their routes to refuel where prices are lowest. To attract ships to their ports, many countries have introduced "tonnage" tax regimes for shipping, exempting the industry from the normal



corporate tax. As a tax provision for maritime shipping, the tonnage tax serves to encourage emissions.¹⁰⁰

These difficulties call for a coordinated international strategy. A uniform, globally applied carbon charge would not distort fueling decisions and so would not impact competitiveness within the aviation or maritime sectors. Keen et al. (2013) assess the economic impact of different levels of fuel taxes. They estimate that a tax on aviation at the corrective level of 6.3 cents per liter of fuel (US\$35 per metric ton of CO₂) would lead to a 3 percent decrease in emissions; a tax at the optimal level of 17.8 cents per liter would decrease emissions by 7.4 percent. The corrective tax would raise US\$12 billion in revenue; the optimal tax would raise between US\$32 and US\$48 billion. Keen and his co-authors posit that a tax on airline tickets, rather than on fuel itself, would be the most practicable mechanism. A ticket tax would be progressive, with the burden of the tax largely falling on travelers from higher-income countries. However, it would reduce emissions largely by reducing demand, rather than by incentivizing improved fuel economy.

For the maritime sector, Keen et al. recommend a corrective fuel tax of 7.5 cents per liter, which would raise US\$25.3 billion in revenue and induce a 3.4 percent reduction in emissions. Because there is a low elasticity of demand for freight services, the authors argue that such a tax would have limited impact on the profitability of the maritime industry.

There are two main strategies for the implementation of a tax on the maritime or aviation sectors. On the one hand, tax collection could be left to national tax administrations that would retain some fraction of the proceeds and dedicate the rest to global climate mitigation strategies. On the other hand, operators could remit the tax directly to a central body like the IMO without the intervention of national tax regimes. Keen et al. predict pushback from countries like the United States and China to the second strategy and so argue that the first approach may be the most politically feasible.

Tax on Mineral Resource Extraction

A tax on mineral resource extraction would serve a dual purpose: to raise revenues and to preserve geologically scarce resources for future generations. Because natural resources are exhaustible, it is necessary that we extract them in a sustainable way to avoid rapid depletion. At the current rate of extraction, there are dozens of highly scarce minerals that will be depleted within 350 years. Antimony, gold, molybdenum, rhenium, and zinc will all be depleted within 100 years. Some minerals are more crucial to preserve than others: molybdenum, for instance, is essential for the production of stainless steel and is not easily substituted. Market prices do not yet reflect the large difference in scarcity of mineral resources, leaving scientists and economists worried that the market will not react with a price increase for scarce minerals until their depletion is inevitable.

Henckens et al. (2016) argue in favor of allocated extraction quotas that are tradable between countries.¹⁰¹ These extraction quotas would be based on the sustainable extraction rate of each mineral, defined as the rate at which a world population of 9 billion can be provided with the resource for at least 1,000 years. Like emissions trading schemes, these extraction trading schemes would fix the amount of each mineral that can be extracted per year and allow companies and governments to trade extraction rights.

Henckens et al. acknowledge that the largest resistance to an extraction tax regime will come from resource-rich countries whose economies are closely tied to mineral resource extraction. Therefore, any viable trading or taxation scheme would need to include a mechanism to compensate resource-rich countries for lost income.



Conclusion

There is broad recognition that the national emission targets put forth to date by the 196 Parties at COP 21 in Paris in 2015 are not consistent with a two-degree temperature change. Indeed, it is estimated that annual global emissions need to drop by about 3 percent between now and 2030 to limit warming to this two-degree threshold. Absent mitigation of GHG emissions global temperatures will be on a rapidly ascending trajectory and rise some 3-4°C above pre-industrial levels by the end of this century. Given the associated damage to the global economy and its supporting ecosystems and, to the natural world more generally, there has been increasing emphasis in recent years in identifying policies that might facilitate climate change mitigation and adaptation.

One particular area of focus has been on the financing needs associated with significant investments in various forms of infrastructure, including investments in energy efficiency and renewable energy. Such investments – in the tens of trillions of dollars over the next decade – would have to prioritize building low-carbon resilient infrastructures, with nearly two thirds of these outlays taking place in emerging markets and developing countries. The aim is to find fiscal tools and regulatory policies that might make it costlier to emit GHGs and thus provide the types of incentives for businesses and individuals to choose to conserve energy and/or to switch to more environmentally friendly (greener) sources. Furthermore, some of these tools should also raise enough revenues which could be deployed to offset the impact of any undesirable distributional side effects and to fund other efforts aimed at mitigation and adaptation. This question has moved centerstage against the background of COVID-19, the responses to which have greatly stretched budget resources virtually everywhere.

Some of the instruments discussed in this paper are fundamentally aimed at altering incentives as a way of encouraging a shift to a low-carbon economy (e.g., carbon taxes, green financial instruments), while others are mainly intended to raise revenue (e.g., taxing financial transactions, debt relief, improving/modernizing tax systems), which then governments could use, at least in part, to finance climate change mitigation. Financial resources will also be needed for adaptation and to boost resilience, in such areas as food security and agricultural productivity, emerging water scarcity, and disaster risk management. Without the types of interventions that improve adaptation and resilience, climate change will severely put out of reach the attainment of many of the SDGs, including on the elimination of extreme poverty. It could also make the world more vulnerable to the kind of pandemic that devastated the global economy in 2020.

One important conclusion from this paper is that the success of virtually all of the instruments suggested will involve some degree of international cooperation, whether it is in the gradual introduction of carbon taxes as arguably the most effective and powerful tool to mitigate climate change, or to agree on universally accepted standards and certification for green bonds. Without strengthened cooperation, new climate-oriented financial innovations such as a financial transactions tax, new forms of debt relief targeted towards developing countries, and taxing aviation and maritime fuel use will be more difficult. The time to rally around the cause of climate change has been long overdue, but with a global system of tools and policies that also hold individual countries responsible for upholding their commitments, the strategies outlined in this paper could tangibly alter the financing landscape for climate change mitigation.

A second insight concerns the urgency for strong climate action and the need for innovations in the wake of the COVID-19 pandemic and its associated econom-



ic crisis. As is evident from this paper, the current lending instruments of international financial institutions and multilateral development banks are insufficient to effectively tackle the economic development and security challenges of accelerating climate change. Building institutional capacity is of utmost importance if climate change mitigation policies are to be sufficiently funded. These capacity building initiatives include a sponsored loan program and blended finance to increase the firepower of MDBs, and the issuance of SDRs through the IMF to improve global liquidity management in this time of crisis.

In contrast to the flawed architecture within which governments have sought to tackle climate change, the mechanisms explored in this paper are specifically intended to avoid the pitfalls of the past – namely, the lack of policy coordination, voluntary nature of commitments, and proneness to free riding. The blend of fiscal and regulatory tools envisioned here would leverage an array of incentives, pushing countries, companies, and consumers toward more environmentally friendly processes, products, and ways of life. In addition to mitigation, this paper also recognizes the importance of adaptation, as the effects of climate change are already being felt globally, with the poorest and most vulnerable populations around the world being the most affected. In any case, the question is not determining which of the mechanisms explored in this paper is best, rather we must understand the strengths of each – and the incentives they create – in order to apply them complementarily, simultaneously, and to the greatest effect.



Appendix I | The Nordic Case: How Governments Can Succeed in Implementing Unpopular But Needed Reforms

In this respect the experience of Finland and Sweden in the 1990s is highly instructive. Both countries faced a sharp deterioration of their public finances in the aftermath of serious banking crises. In Finland, the budget deficit in 1993 rose to over 8 percent of GDP and in Sweden, it rose to 11 percent of GDP, with debt levels rising rapidly in both countries, by some 44 percentage points in Finland (a quadrupling of debt levels within a four-year period!) and by 30 percentage points in Sweden. According to the IMF (2009, p. 30), both countries moved rapidly to restore sustainability through a combination of expenditure restraint and institutional reforms. While moving to formulate fiscal policies in a medium-term framework, both countries also made important changes to entitlement programs, tightening qualification rules, temporarily lifting inflation adjustments to certain benefits, changing the mechanism for the determination of the pensionable wage, and generally imposing a more austere system for the provision of various types of transfers to households (e.g., housing grants, certain types of social benefits). By the latter part of the decade the budgets had moved into surplus, debt levels and interest rates were on a downward trend and the economies had entered a phase of sustained recovery.

The experience of these two countries in the 1990s merits study not only because they succeeded in simultaneously reducing budget deficits and public debt while stimulating a broad-based economic recovery, but also because the authorities managed the political economy of painful reforms in very sensible ways, creating a broad social consensus for the reforms. For instance, the reform measures were comprehensive in scope, ensuring a fairly equitable distribution of the burdens of adjustment. They involved expenditure cuts (the impact of which tends to fall disproportionately on the less well-off) and tax increases, broadly balanced to ensure distributional fairness. In Sweden, in particular, there was an effort to ensure that women did not have to bear an unfair share of the burden, a particularly important consideration given that many of the measures involved cuts in social benefits and transfers.

Governments in both countries went out of their way to explain in detail the reasons for the measures, their content and how these were expected to address the underlying fiscal problem. There was an understanding in both countries that transparency is essential to build up government credibility. Consistent with this, there was no attempt to minimize or trivialize the real pain brought about by many of the measures, since it was seen that this would be counterproductive; as the impact of the measures kicked in, the public would have felt that they were cheated or lied to. Whenever possible governments presented reform measures – say involving retrenchment in benefits – not simply as cuts that were necessary because they were otherwise unaffordable (which run the risk that following economic recovery people would demand their restitution), but rather as structural improvements that would be beneficial from a longer-term perspective. In



this respect, both countries were greatly helped by their accession to the EU on January 1, 1995 which contributed to boost investor confidence, but also allowed governments to present the reforms as part of the overall package of reforms necessary to ensure smooth EU entry.

The ministry of finance in Sweden allocated to a senior official the task of being available at all times to meet with financial sector representatives who wanted to gain a better understanding of the content and the direction of government policy. The authorities recognized the important role played by market participants in buttressing (or derailing) government efforts to deal with the crisis. In his public pronouncements about program implementation and in making forecasts about the evolution of the economy and various underlying aggregates (e.g., interest rates, unemployment) the minister of finance was unfailingly cautious, aiming at all times not to oversell the success of the program, but rather to emphasize that much remained to be done.

In the above paragraphs we have highlighted the experience of Finland and Sweden because it shows that a combination of well-designed policies and political will can make a critical difference in allowing countries to get back to a sustainable debt path. Perhaps the painful lessons of the 1990s and the difficult choices that the crisis forced upon their governments may partly explain the more cautious response adopted by both countries to the latest global financial crisis – the budget deficits in 2009-2010 did not get out of hand and public debt levels – particularly in Sweden – remained broadly stable and are projected to decline further over the medium-term. The Nordic countries have often been taken as examples of the compatibility between extensive safety nets and high levels of productivity and competitiveness. It is often not noticed that they are also fine examples of sound fiscal management.



Appendix II | A Graphic Representation of the Sponsored Loans Program

From Leveraging Equity to Leveraging Goodwill

SPONSORED LOANS

Mobilizing the Private Sector
for Climate Change Mitigation
and Adaptation

THE GOAL:

Engaging the private sector in development projects
By harnessing its available liquidity to de-risk
development loans.



THE CURRENT PROCESS



Pension funds, insurance companies, sovereign wealth funds and retail investors buy Inter-American Development Bank (IDB) bonds.

The IDB invests this cash in development projects across the LAC region.

THE PROBLEM: RISK

The IDB cannot loan out all of the money it receives from investors. For every \$100 the IDB loans, it must maintain at least \$25 in capital reserves: a debt-to-equity ratio of 4.0x. As of 2018, the IDB had a debt-to-equity ratio of 2.73x, well below the limit. This means that for every \$100 loaned out, the IDB maintained nearly \$37 in capital reserves.

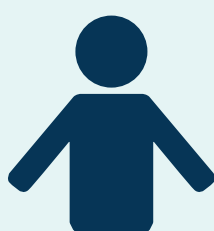
This requirement serves to mitigate the risk of default and partly explains why the IDB has a AAA rating. On the other hand, it limits the IDB's ability to invest in the developing world.



IN OTHER WORDS:



THE SOLUTION: LOAN SPONSORS



Meet the Guarantor.

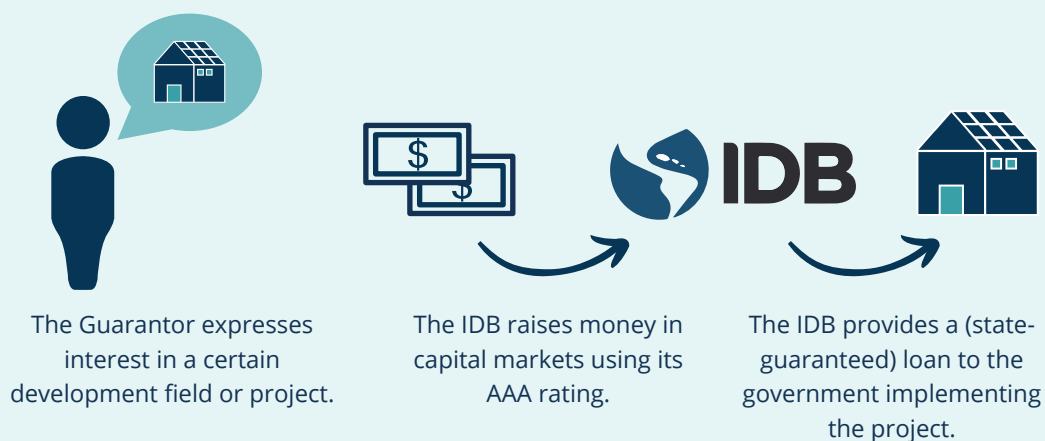
An institutional investor or an ultra-high net worth individual (UHNW).

Assumptions:

- This investor keeps some of his assets in cash. The world's 2,743 billionaires keep, on average, 22.2% of their wealth in cash.
- This investor will increasingly wish to play a role in climate change mitigation and adaptation projects and contribute to find solutions to a broad range of global development challenges. (e.g., poverty alleviation, helping reduce income inequality).



THE NEW PROCESS



The Guarantor sponsors the project by guaranteeing the loan.



This means:

- The Guarantor takes on the risk of loan.
- The IDB no longer needs to retain a minimum amount of capital on this loan: it can lend out all the money it receives from investors



THE STRUCTURE

- 1** The IDB sets up a Special-Purpose Vehicle (SPV) divided into different compartments, one for each Guarantor.
- 2** The Guarantor deposits a certain amount (say, \$100 million) for a fixed time horizon (say, 5-15 years) into their compartment.
- 3** The money is used exclusively to guarantee IDB loans for the duration of the time horizon, and is only touched in the case of a default.
- 4** The investor maintains his cash position in the long run while supporting developing goals the short term.

INCENTIVES FOR GUARANTOR

PHILANTHROPY

By sponsoring loans, the Guarantor frees up capital to be used to tackle development challenges around the world.

NO MONEY SPENT

The Guarantor is simply sponsoring the loan, not financing the project.

LOW RISK OF DEFAULT

The Guarantor's money would only be used in case of a government default. However, default is extremely unlikely due to the IDB's preferred creditor status.



A KEY ASSUMPTION:

PREFERRED CREDITOR STATUS

Refers to the fact that sovereign borrowers continue to service their loans from the IDB, even if they default on other claims.

As a result, default to the IDB is an extremely rare event. This is a key advantage of the Sponsored Loans proposal.

EXPANDING THE IDEA



CORPORATE SOCIAL RESPONSIBILITY

Multinational corporations can become Guarantors as part their CSR strategy in order to improve reputation or offset negative externalities.



SPLITTING THE SPONSORSHIP

The sponsorship could be split between several Guarantors who share an interest in a particular development project.



THEMATIC SPONSORSHIP

Sponsorship could occur under an industry or national umbrella. Ex: wealthy individuals in India sponsor a loan to rebuild a region ravaged by natural disaster.



Appendix III | Supporting the Environmental Transition in Agriculture¹⁰²

The shift to intensive industrialized agriculture with a narrow genetic base and extensive chemical inputs has been highly profitable for multinational corporations, but has intensified soil loss, degraded water supplies, driven rural-to-urban migration, accelerated land conversion from forests and threatened biodiversity, among other social and environmental impacts. Agriculture is a major contributor to climate change, with deforestation and loss of soil organic matter turning carbon sinks into sources, while high emissions of methane from cattle and sheep – amounting to two thirds of human-induced emissions of this powerful greenhouse gas – are rising rapidly. This unsustainable system is also threatening long-term food security. At the same time, the rural poor have increasing difficulty in surviving, and their young are drawn to better opportunities in the crowded cities.

World agriculture needs a socially and environmentally inspired revolution that can address a number of problems simultaneously. It would combine many innovations adapted to each local situation, whether in wealthy countries or for the rural poor of Africa, Asia, Latin America, and the Caribbean. This new agriculture reinforces local food security, creates employment, furnishes a reasonable living to smallholder families, and provides incentives to live successfully in rural areas. It would include innovations providing rural access to renewable energy and communications technologies to overcome the digital divide and raise the rural standard of living. A variety of techniques for soil restoration from no-till farming to basalt dust application and agroforestry would restore the planet's productive capacity, while capturing and storing carbon to reduce global heating.

Phasing out the excessive number of ruminants (cows and sheep) or including algae in their diet, would counter their role as major methane emitters. This would also address the inefficiency of meat as a human food source in a food-short world, while ending the destruction of rainforest to grow soybeans as animal feed and provide pasture for cattle. While considerable attention has been paid to producing electric cars, much still needs to be done to replace fossil-fuel-powered agricultural machinery, such as tractors and harvesters with equivalents powered by renewable energy. Where climate change is affecting traditional crops and agricultural practices, alternatives need to be developed. Since rural populations are least able to raise the capital for such changes, and to make the transition from unsustainable practices to new systems, this is an obvious area for external financial support for everything from research to infrastructure to local extension and implementation, yielding multiple economic, social and environmental benefits.

A related need is the reforestation of abandoned land with mixed native trees, both to capture carbon and restore biodiversity. The need for environmental restoration is widespread, ranging from areas heavily impacted by soil erosion, such as the Loess Plateau region of China and the great plains of North America, to urban parks and gardens to bring nature back into cities. These efforts can produce visible results at a time scale that would be rewarding to Guarantors – [see section above on sponsored loans program](#) – enabling their funding.



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References

- Acemoglu, Daron, Ufuk Akcigit, Douglas Hanley, and William Kerr. 2016. "Transition to Clean Technology." *Journal of Political Economy* 124 (1): 52–104.
- Agrawala, Shardul, Francesco Bosello, Carlo Carraro, Enrica De Cian, and Elisa Lanzi. 2011. "Adapting to Climate Change: Costs, Benefits, and Modelling Approaches." *International Review of Environmental and Resource Economics* 5 (3): 245–84.
- Aldy, Joseph E., Alan J. Krupnick, Richard G. Newell, Ian W. H. Parry, and William A. Pizer. 2010. "Designing Climate Mitigation Policy." *Journal of Economic Literature* 48 (4): 903–34. <https://doi.org/10.1257/jel.48.4.903>.
- Allcott, Hunt, and Nathan Wozny. 2012. "Gasoline Prices, Fuel Economy, and the Energy Paradox." Working Paper 18583. *National Bureau of Economic Research*. <https://doi.org/10.3386/w18583>.
- "Amid Multiple Crises, World Bank Group Refocuses Programs and Increases Financing to \$74 billion in Fiscal Year 2020." *The World Bank*, 10 July 2020. <https://www.worldbank.org/en/news/press-release/2020/07/10/amid-multiple-crises-world-bank-group-refocuses-programs-and-increases-financing-to-74-billion-in-fiscal-year-2020>.
- Arezki, Rabah, and Maurice Obstfeld. 2015. "The Price of Oil and the Price of Carbon – IMF Blog." 2 December. <https://blogs.imf.org/2015/12/02/the-price-of-oil-and-the-price-of-carbon/>.
- Articles of agreement of the International Monetary Fund: adopted at the United Nations Monetary and Financial Conference, Bretton Woods, New Hampshire, July 22, 1944, amended effective January 26, 2016 by the modifications approved by the Board of Governors in Resolution No. 66–2, adopted December 15, 2010.
- Batini, Nicoletta. 2019. "Transforming Agri-Food Sectors to Mitigate Climate Change: The Role of Green Finance." *Vierteljahrshefte Zur Wirtschaftsforschung / Quarterly Journal of Economic Research* 88 (3): 7–42.
- Bento, Antonio M., Mark R. Jacobsen, and Antung A. Liu. 2018. "Environmental Policy in the Presence of an Informal Sector." *Journal of Environmental Economics and Management* 90 (July): 61–77. <https://doi.org/10.1016/j.jeem.2018.03.011>.
- Bhattacharya A., J. Meltzer, J. Oppenheim, M.Z. Qureshi, and N. Stern. 2016. *Delivering on Sustainable Infrastructure for Better Development and Better Climate*. Brookings Institution, Washington DC.
- Böhringer, Christoph, Jared C. Carbone, and Thomas F. Rutherford. 2012. "Unilateral Climate Policy Design: Efficiency and Equity Implications of Alternative Instruments to Reduce Carbon Leakage." *Energy Economics* 34 (S2): 208–17.
- Bosello, Francesco, Carlo Carraro, and Enrica De Cian. 2010. "Climate Policy and the Optimal Balance between Mitigation, Adaptation and Unavoided Damage." *Climate Change Economics* 1(2): 1–22.
- Burke, Marshall, John Dykema, David B. Lobell, Edward Miguel, and Shanker Satyanath. 2015. "Incorporating Climate Uncertainty into Estimates of Climate Change Impacts." *Review of Economics and Statistics* 97 (2): 461–71. https://doi.org/10.1162/REST_a_00478.
- Calder, Jack. 2015. "Administration of a U.S. Carbon Tax." In: *Implementing a US Carbon*



Tax: Challenges and Debates. Edited by I. Parry, A. Morris, and R. Williams. New York: Routledge.

Carattini, Stefano, Maria Carvalho, and Samuel Fankhauser. 2017. "How to Make Carbon Taxes More Acceptable" Report. *Grantham Research Institute on Climate Change and the Environment, London School of Economics*. London (December).

Carattini, Stefano, Steffen Kallbekken, and Anton Orlov. 2019. "How to win public support for a global carbon tax." *Nature*: 289-291. <https://www.nature.com/articles/d41586-019-00124-x>.

Carney, Mark. 2015. "Mark Carney: Breaking the Tragedy of the Horizon - Climate Change and Financial Stability." Speech at Lloyd's of London, Bank of England, London, 29 September.

Carney, Mark, François Villeroy de Galhau, and Frank Elderson. 2019. "The Financial Sector Must Be at the Heart of Tackling Climate Change." *The Guardian*. 17 April. <https://www.theguardian.com/commentisfree/2019/apr/17/the-financial-sector-must-be-at-the-heart-of-tackling-climate-change>.

"China Corporates Snapshot - December 2020: China's Green Bond Market to Stay Robust amid Policy Support." *Fitch Ratings: Credit Ratings & Analysis For Financial Markets*, 23 December 2020. www.fitchratings.com/research/corporate-finance/china-corporates-snapshot-december-2020-china-green-bond-market-to-stay-robust-amid-policy-support-23-12-2020.

Clements, Benedict, David Coady, Stefania Fabrizio, Sanjeev Gupta, Trevor Alleyene, and Carlo Sdradelevich. 2013. *Energy Subsidy Reform : Lessons and Implications*. Washington: International Monetary Fund.

"Climate Action and Sustainable Development Are Inseparable: SDG Knowledge Hub: IISD." *SDG Knowledge Hub*, 23 July 2019. sdg.iisd.org/commentary/guest-articles/climate-action-and-sustainable-development-are-inseparable/.

Climate Bonds Initiative and Syn Tao Green Finance. 2020. "China's Green Bond Issuance and Investment Opportunity." *Climate Bonds Initiative*, 28 October 2020, www.climatebonds.net/resources/reports/china%E2%80%99s-green-bond-issuance-and-investment-opportunity.

Coady, David, Ian Parry, Louis Sears, and Baoping Shang. 2015. "How Large Are Global Energy Subsidies?" IMF Working Papers 15 (105). <https://doi.org/10.5089/9781513532196.001>.

Coady, David, Ian Parry, Nghia-Piotr Le, and Baoping Shang. 2019. "Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates." IMF Working Paper 19/89, *International Monetary Fund*, Washington, DC. <https://www.imf.org/en/Publications/WP/Issues/2019/05/02/Global-Fossil-Fuel-Subsidies-Remain-Large-An-Update-Based-on-Country-Level-Estimates-46509>.

"Communiqué of the Forty-third Meeting of the IMFC." *International Monetary Fund*, 8 April 2020. <https://www.imf.org/en/News/Articles/2021/04/08/communique-of-the-forty-third-meeting-of-the-imfc>.

Dasgupta, Susmita, Benoit Laplante, Craig Meisner, David Wheeler, and Jianping Yan. 2009. "The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis." *Climatic Change* 93 (3-4): 379-88. <https://doi.org/10.1007/s10584-008-9499-5>.

Dellink, Rob, Elisa Lanzi, Jean Chateau, Francesco Bosello, Ramiro Parrado, and Kelly



De Bruin. 2014. "Consequences of Climate Change Damages for Economic Growth: A Dynamic Quantitative Assessment." OECD Economics Department Working Papers, No. 1135, *Organisation for Economic Co-operation and Development*, Paris.

Dinan, Terry. 2015. "Offsetting a Carbon Tax's Burden on Low-Income Household." In: *Implementing a US Carbon Tax: Challenges and Debates*. Edited by I. Parry, A. Morris, and R. Williams. New York: Routledge.

"Economists' Statement on Carbon Dividends Organized by the Climate Leadership Council". <https://www.econstatement.org/>.

Ellmers, Bodo. 2020. "Financing Sustainable Development in the Era of COVID-19 and Beyond." Germany: Bischöfliches Hilfswerk MISEREOR, Global Policy Forum Europe, Brot für die Welt. https://unctad.org/system/files/non-official-document/20210127_lgefd_GlobalPolicyForumEurope_contribution.pdf.

Escalante, Donovan. 2021. "Green Bonds in China: the State and Effectiveness of the Market / 中国绿色债券市场：趋势与分析." *CPI*, 11 March. www.climatepolicyinitiative.org/publication/green-bonds-in-china-the-state-and-effectiveness-of-the-market/.

FAO, UN Food and Agriculture Organisation. 2020. "The State of Food and Agriculture 2020: Overcoming Water Challenges in Agriculture." Rome: FAO. <https://www.fao.org/3/cb1447en/online/cb1447en.html>.

Farid, Mai, Michael Keen, Michael Papaioannou, Ian Parry, Catherine Pattillo, and Anna Ter-Martirosyan. 2016. "After Paris: Fiscal, Macroeconomic, and Financial Implications of Climate Change." IMF Staff Discussion Note 16/01, *International Monetary Fund*, Washington, DC.

"Fiji Issues First Developing Country Green Bond, Raising \$50 Million for Climate Resilience." *World Bank*, 17 October 2017. www.worldbank.org/en/news/press-release/2017/10/17/fiji-issues-first-developing-country-green-bond-raising-50-million-for-climate-resilience.

Fleming, Sean. 2020. "What Is Green Finance and Why Is It Important?" *World Economic Forum*, November 9. www.weforum.org/agenda/2020/11/what-is-green-finance/#:~:text=Green%20finance%20is%20any%20structured,could%20soon%20hit%20%242.36%20trillion.&text=The%20World%20Economic%20Forum's%20Green,the%20recovery%20from%20COVID%2D1.

Garcia-Verdu, Rodrigo, Alexis Meyer-Cirkel, Akira Sasahara, and Hans Weisfeld. 2019. "Importing Inputs for Climate Change Mitigation: The Case of Agricultural Productivity." IMF Working Paper, *International Monetary Fund*, Washington.

Gaspar, Vitor and Ian Parry. 2021. "A Proposal to Scale Up Global Carbon Pricing," IMFBlog, June 18.

Gates, Bill. 2021. *How to Avoid a Climate Disaster: The Solutions We Have and the Breakthroughs We Need*. Penguin, Random House, United Kingdom.

Gearino, Dan. 2020. "What Germany Can Teach the US About Quitting Coal." *Inside Climate News*, 12 December. insideclimatenews.org/news/15102020/germany-coal-transition/.

Gençsü, Ipek, and Miyuki Hino. 2015. "Raising Ambition to Reduce International Aviation and Maritime Emissions." *The New Climate Economy*. newclimateeconomy.report/2015/wp-content/uploads/sites/3/2015/09/NCE-Aviation-Maritime_final.pdf.

"Germany: Law on Phasing-Out Coal-Powered Energy by 2038 Enters into Force |



Global Legal Monitor." *Global Legal Monitor*, 31 August 2020. www.loc.gov/law/foreign-news/article/germany-law-on-phasing-out-coal-powered-energy-by-2038-enters-into-force/#:~:text=The%20Coal%20Phase%2DOut%20Act,start%20operating%20after%20August%2014%2C.

Gillingham, Robert, and Michael Keen. 2012. "Mitigation and Fuel Pricing in Developing Economies." In: *Fiscal Policy to Mitigate Climate Change: A Guide for Policymakers*. Edited by R. Parry, M. de Mooij, and M. Keen. Washington: International Monetary Fund.

Global Commission on the Economy and Climate. 2014. "Better Growth, Better Climate: The New Climate Economy Synthesis Report." *World Resources Institute*. https://newclimateeconomy.report/2016/wp-content/uploads/sites/2/2014/08/BetterGrowth-BetterClimate_NCE_Synthesis-Report_web.pdf.

Goulder, Lawrence H., and Ian W. H. Parry. 2008. "Instrument Choice in Environmental Policy." *Review of Environmental Economics and Policy* 2 (2): 152–74. <https://doi.org/10.1093/reep/ren005>.

"Growing Momentum for Sovereign Green Bonds." *OECD*, 20 September 2020. www.oecd.org/coronavirus/en/data-insights/growing-momentum-for-sovereign-green-bonds.

Habermeier, Karl, and Andrei A. Kirilenko. 2003. "Securities Transaction Taxes and Financial Markets". *IMF Staff Papers*, 50:165-180.

Hallegatte, Stéphane. 2016. *Shock Waves: Managing the Impacts of Climate Change on Poverty*. Washington, DC: World Bank Publications.

Hallegatte, Stéphane, Franck Lecocq, and Christian De Perthuis. 2011. "Designing Climate Change Adaptation Policies: An Economic Framework" Policy Research Working Papers, *World Bank*, Washington. <https://doi.org/10.1596/1813-9450-5568>.

Hallegatte, Stéphane, Adrien Vogt-Schilb, Mook Bangalore, and Julie Rozenberg. 2016. *Unbreakable: Building the Resilience of the Poor in the Face of Natural Disasters*. Washington, DC: World Bank Publications.

Hau, Harald. 2006. "The Role of Transaction Costs for Financial Volatility: Evidence from the Paris Bourse." *Journal of the European Economic Association* 4 (4): 862–90. <https://doi.org/10.1162/jeea.2006.4.4.862>.

Henckens, M. L. C. M., P. P. J. Driessen, C. Ryngaert, and Ernst Worrell. 2016. "The set-up of an international agreement on the conservation and sustainable use of geologically scarce mineral resources." *Resources Policy* 49 (2016): 92-101.

"Holding Kleptocrats to Account: Redirecting Frozen Assets and the International Anti-Corruption Court." *Initiatives International*, 6 August 2020. <https://www.thedialogue.org/analysis/holding-kleptocrats-to-account-redirecting-frozen-assets-and-the-international-anti-corruption-court/>.

"IMF Governors Approve a Historic US\$650 Billion SDR Allocation of Special Drawing Rights." *International Monetary Fund*, Press Release no. 21/235, 2 August 2021. <https://www.imf.org/en/News/Articles/2021/07/30/pr21235-imf-governors-approve-a-historic-us-650-billion-sdr-allocation-of-special-drawing-rights>.

"Impacts of Climate Change on Sustainable Development Goals Highlighted at High-Level Political Forum." *United Nations Framework Convention on Climate Change*. 19 July 2019. unfccc.int/news/impacts-of-climate-change-on-sustainable-development-goals-highlighted-at-high-level-political-forum.



Ingram, Joseph, Bernard Schutz. 2019. *iPolitics*, August 11. "[The Dangerous Delusion of Climate Change Denial.](#)"

Inter-American Development Bank. 2020. "Annual Report 2020." <https://publications.iadb.org/publications/english/document/Inter-American-Development-Bank-Annual-Report-2020-The-Year-in-Review.pdf>.

Intergovernmental Panel on Climate Change (IPCC). 2014. "Climate Change 2014: Synthesis Report Summary for Policymakers." Geneva.

Intergovernmental Panel on Climate Change (IPCC). 2019. "Summary for Policymakers. In: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems." Shukla P.R., Skea J., Calvo Buendia E., Masson-Delmotte V., Pörtner H-O, et al., (eds.).

———. 2018. "Global Warming of 1.5 °C." Geneva. <https://www.ipcc.ch/sr15/>.

International Energy Agency (IEA). 2020. "World Energy Outlook." Paris. <https://www.iea.org/reports/world-energy-outlook-2020>.

———. 2021. *Net Zero by 2050: A Roadmap for the Global Energy Sector*, Paris. <https://www.iea.org/reports/net-zero-by-2050>.

International Monetary Fund (IMF). 2008. "The Fiscal Implications of Climate Change." Washington DC.

———. 2009. "Fiscal implications of the global economic and financial crisis." Occasional Paper No. 269, Washington, D.C.

———. 2011a. "Promising Domestic Fiscal Instruments for Climate Finance." Background Paper for the International Monetary Fund and World Bank Report to the G20, Mobilizing Sources of Climate Finance, Washington DC.

———. 2011b. "Market-Based Instruments for International Aviation and Shipping as a Source of Climate Finance." Background Paper for the International Monetary Fund and World Bank Report to the G20, Mobilizing Sources of Climate Finance, Washington DC.

———. 2019a. "Fiscal Policies for Paris Climate Strategies—from Principle to Practice." IMF, Policy Paper 19/010, Washington DC.

———. 2019b. "Fiscal Monitor: How to Mitigate Climate Change." October, Washington DC.

———. 2019c. "Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates" [David Coady, Ian Parry, Nghia-Piotr Le, and Baoping Shang (eds.)]. IMF Working Paper. <https://www.imf.org/en/Publications/WP/Issues/2019/05/02/Global-Fossil-Fuel-Subsidies-Remain-Large-An-Update-Based-on-Country-Level-Estimates-46509>.

Jacobs, Jay. 2019. "What Are YieldCos?" *Global X ETFs*, 24 January. www.globalxetfs.com/what-are-yieldcos/.

Jones, Benjamin, Michael Keen, and Jon Strand. 2013. "Fiscal Implications of Climate Change." *International Tax and Public Finance* (20)1: 29–70.

Jones, Charles M., and Paul J. Seguin. 1997. "Transaction Costs and Price Volatility: Evidence from Commission Deregulation." *The American Economic Review* (87) 4: 728–737.



- Jones, Liam. 2021. "Record \$269.5bn Green Issuance for 2020: Late Surge Sees Pandemic Year Pip 2019 Total by \$3bn." *Climate Bonds Initiative*, 15 February. www.climatebonds.net/2021/01/record-2695bn-green-issuance-2020-late-surge-sees-pandemic-year-pip-2019-total-3bn.
- Jones, Marc, and Dhara Ranasinghe. 2020. "Analysis: Central Banks Flexing Their Green Muscle for Climate Fight." Reuters, Thomson Reuters, 28 October uk.reuters.com/article/uk-global-cbanks-green-analysis-idUKKBN27D1YK.
- Jorgenson, Dale W., Richard J. Goettle, Mun S. Ho, and Peter J. Wilcoxon. 2013. *Double Dividend: Environmental Taxes and Fiscal Reform in the United States*. Cambridge, Massachusetts: MIT Press.
- Keen, Michael, Ian Parry, Jon Strand, Chiara Fumagalli, and Elisabetta Iossa. 2013. "Planes, Ships and Taxes: Charging for International Aviation and Maritime Emissions." *Economic Policy* 28 (76): 701–49.
- Keynes, John Maynard. 1973. *The General Theory of Employment, Interest and Money*. The Macmillan Press Ltd, London (first edition published in 1936).
- Khan, Mehreen. 2021. "EU to Target Aviation in Revamp of Fossil-Fuel Levy." *Financial Times*, 22 May. www.ft.com/content/bdacdc5-4e7b-491e-8621-bddabd208be5.
- Klein, Aaron. 2020. "What Is a Financial Transaction Tax?" *Brookings*, 27 October. www.brookings.edu/policy2020/votervital/what-is-a-financial-transaction-tax-2/.
- Krushelnyska, Olha, and David Rodgers. 2017. "Introduction to Green Finance." *Global Environment Facility*. <https://www.thegef.org/sites/default/files/events/Intro%20to%20Green%20Finance.pdf>.
- Larsen, Mathias Lund. 2021. "A Growing Toolbox of Sustainable Finance Instruments." *Green Belt and Road Initiative Center*, 8 March. green-bri.org/a-growing-toolbox-of-sustainable-finance-instruments/.
- Liu, Shinhua, and Zhen Zhu. 2009. "Transaction Costs and Price Volatility: New Evidence from the Tokyo Stock Exchange." *Journal of Financial Services Research* 36 (1): 65–83. <https://doi.org/10.1007/s10693-009-0063-x>.
- Lopez-Claros, Augusto. 1987. *The Search for Efficiency in the Adjustment Process: Spain in the 1980s*, Occasional Paper 57, International Monetary Fund, Washington DC.
- Lopez-Claros, Augusto. 2014. "Fiscal Challenges After the Global Financial Crisis: A Survey of Key Issues," *Journal of International Commerce, Economics and Policy*, Volume 5, No. 2, 1-34.
- Lopez-Claros, Augusto, Arthur D. Dahl, Maja Groff. 2020. *Global Governance and the Emergence of Global Institutions for the 21st Century*. Cambridge University Press.
- "Management of Stolen Assets." Stolen Asset Recovery Initiative. *The World Bank*. UNODC. <https://star.worldbank.org/focus-area/management-stolen-assets>.
- McCollum, David L., Wenji Zhou, Christoph Bertram, Harmen-Sytze de Boer, Valentina Bosetti, Sebastian Busch, Jacques Després, et al. 2018. "Energy Investment Needs for Fulfilling the Paris Agreement and Achieving the Sustainable Development Goals." *Nature Energy* 3 (7): 589–99. <https://doi.org/10.1038/s41560-018-0179-z>.
- McKibben, Bill. 2020. "130 Degrees". *The New York Review of Books*, Volume LXVII, Number 13 August, 8-10.
- Meltzer, Joshua P. 2016. "Financing Low Carbon, Climate Resilient Infrastructure:



the Role of Climate Finance and Green Financial Systems." *Global Economy and Development at Brookings*, vol. 96, September.

Metcalf, Gillbert E., and David Weisbach. 2009. "The Design of a Carbon Tax." *Harvard Environmental Law Review* 33: 499.

"Morgan Stanley Survey Finds Investor Enthusiasm for Sustainable Investing." *Morgan Stanley*, 12 September 2019. www.morganstanley.com/press-releases/morgan-stanley-survey-finds-investor-enthusiasm-for-sustainable-

Morisset, Jacques, and Victoria Cunningham. 2016. "Why Isn't Anyone Paying Taxes in Low-Income Countries?" *Brookings*, 29 July. www.brookings.edu/blog/future-development/2015/04/30/why-isnt-anyone-paying-taxes-in-low-income-countries/.

Murray, Brian, and Nicholas Rivers. "British Columbia's revenue-neutral carbon tax: A review of the latest "grand experiment" in environmental policy." *Energy Policy* 86 (2015): 674-683.

National Geographic Society. 2019. "How Climate Change Impacts Water Access." *National Geographic Society*, 19 September. www.nationalgeographic.org/article/how-climate-change-impacts-water-access/.

Network for Greening the Financial System (NGFS). 2019. "A Call for Action: Climate Change as a Source of Financial Risk". NGSF First Comprehensive Report, Banque de France.

Nordhaus, William D. 2018. "Projections and Uncertainties About Climate Change in an Era of Minimal Climate Policies." *American Economic Journal: Economic Policy* 10: 333–60.

Nordhaus, William D. 2020. "The Climate Club: How to Fix a Failing Global Effort." *Foreign Affairs*, May/June. https://www.foreignaffairs.com/articles/united-states/2020-04-10/climate-club?utm_source=facebook_posts&utm_medium=social&utm_campaign=fb_daily_soc&fbclid=IwAR0JiQTuBdzF2rY05SB3GFYy4YsNtbILtTkjECAabGnJnmPmh5iwKYag_M.

OECD. 2017. "Investing in Climate, Investing in Growth." Paris.

OECD. 2021. "Global Outlook on Financing for Sustainable Development."

Olsen-Rong, Tess. 2015. "Bonds and Climate Change – The State of the Market in 2015." Climate Bonds Initiative, July.

Osberghaus, Daniel, Astrid Danneberg, Tim Mennel, and Bodo Sturm. 2010. "The Role of the Government in Adaptation to Climate Change - Daniel Osberghaus, Astrid Dannenberg, Tim Mennel, Bodo Sturm, 2010." *Environment and Planning: Government and Policy*, no. 28(5): 834–50.

"Overview of the Type of Assistance StAR Can Provide to Countries." *World Bank*, 12 February 2018. <https://www.worldbank.org/en/news/factsheet/2018/02/12/overview-of-the-type-of-assistance-star-can-provide-to-countries>.

Parry, Ian W.H. 2015. "Carbon Tax Burdens on Low-Income Households: A Reason for Delaying Climate Policy?" In: *Inequality and Fiscal Policy*. Edited by B. Clements, R. de Mooij, S. Gupta, and M. Keen. Washington: International Monetary Fund.

"Passive Sustainable Funds: The Global Landscape." *Morningstar*. www.morningstar.com/lp/passive-esg-landscape?utm_source=corp_comm&utm_medium=referral.

Raghuram Rajan, 2019. "A Fair and Simple Way to Tax Carbon Emissions," *Financial Times*, December 17. <https://www.ft.com/content/96782e84-2028-11ea-b8a1-584213ee7b2b>.



- Roll, Richard. 1989. "Price Volatility, International Market Links, and Their Implications for Regulatory Policies." *Regulatory Reform of Stock and Futures Markets*, no. 3: 113–148. doi:10.1007/978-94-009-2193-1_10.
- S. & P. Global Ratings. 2016. "RatingsDirect, Inter-American Development Bank." July 27. <https://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=EZSHARE-503692004-12>.
- Schmierer, Stefan, and Anna Lau. 2020. "Green Bonds: Financing a Greener Future Enhanced with Securitisation and Derivatives." *Lexology*, 9 September. www.lexology.com/library/detail.aspx?g=f1470ba6-d935-4bf9-83bb-9577070362ea.
- Serres, Alain de, Fabrice Murtin, and Giuseppe Nicoletti. 2010. "A Framework for Assessing Green Growth Policies." OECD Economics Department Working Papers, No. 774, OECD Publishing, Paris, (June). <https://doi.org/10.1787/5kmfj2xvcmkf-en>.
- Shiller, Robert. 2009. "A failure to control the animal spirits." *Financial Times*, 9 March. <https://www.ft.com/content/453e55ca-0c0c-11de-b87d-0000779fd2ac>.
- Slav, Irina. 2021. "Why The Green Bond Market Is So Popular In 2021." *OilPrice.com*, 18 January. oilprice.com/Energy-General/Why-The-Green-Bond-Market-Is-So-Popular-In-2021.html.
- "Soil Loss: an Unfolding Global Disaster – Grantham Centre Briefing Note." *Grantham Centre for Sustainable Futures*, Grantham Centre for Sustainable Futures, 9 September 2020. grantham.sheffield.ac.uk/soil-loss-an-unfolding-global-disaster/.
- Stern, Nicholas. 2007. *The Economics of Climate Change*. Cambridge, UK: Cambridge University Press.
- Stern, Nicholas, and Joseph Stiglitz. 2017. "Report of the High-Level Commission on Carbon Prices." Paper of the Carbon Pricing Leadership Coalition of the World Bank Group, Washington, DC.
- Stern, Nicholas. 2021. "G7 Leadership for Sustainable, Resilient and Inclusive Economic Recovery and Growth: An Independent Report Requested by the UK Prime Minister for the G7." *The London School of Economics and Political Science*, June.
- Stevens, Pippa. 2020. "ESG Index Funds Hit \$250 Billion as Pandemic Accelerates Impact Investing Boom." *CNBC*, 2 September. www.cnbc.com/2020/09/02/esg-index-funds-hit-250-billion-as-us-investor-role-in-boom-grows.html.
- Stiglitz, Joseph E. 2019. "Addressing Climate Change through Price and Non-Price Interventions." *European Economic Review* 119 (October): 594–612. <https://doi.org/10.1016/j.eurocorev.2019.05.007>.
- "Stolen Asset Recovery Initiative". *The World Bank*. UNODC. <https://star.worldbank.org/about-star>.
- "Stopping Nigeria's Spiralling Farmer-Herder Violence." *Crisis Group*, 29 April 2020. www.crisisgroup.org/africa/west-africa/nigeria/262-stopping-nigerias-spiralling-farmer-herder-violence.
- Schwab, Klaus. 2019. "The Global Competitiveness Report." *World Economic Forum*. https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.
- Tett, Gillian. 2021. "The Developing World is Key to Climate Action." *Financial Times*, April 23.
- Thaler, Richard H. 2017. "Behavioral Economics." *Journal of Political Economy*: 1799-1805.



- Tobin, James. 1978. "A Proposal for International Monetary Reform." *Eastern Economic Journal*, 4(3): 153-159.
- Tol, Richard S. J. 2014. "Correction and Update: The Economic Effects of Climate Change." *Journal of Economic Perspectives* 28 (2): 221–26. <https://doi.org/10.1257/jep.28.2.221>.
- ul Haq, Mahbub, Inge Kaul, and Isabelle Grunberg (editors). 1996. *The Tobin Tax: Coping with Financial Volatility*. Oxford University Press.
- Umlauf, Steven R. 1993. "Transaction Taxes and the Behavior of the Swedish Stock Market." *Journal of Financial Economics* 33 (2): 227–40. [https://doi.org/10.1016/0304-405x\(93\)90005-v](https://doi.org/10.1016/0304-405x(93)90005-v).
- United Nations Framework Convention on Climate Change (UNFCCC). 2015. "INDCs as communicated by Parties." www.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx.
- United Nations (UN). 1992. "United Nations Framework Convention on Climate Change." United Nations, New York.
- . 2020. "Progress towards the Sustainable Development Goals: Report of the Secretary-General." United Nations, New York.
- United Nations Development Programme. 2007. "Human Development Report 2007/2008 – Fighting climate change: Human solidarity in a divided world." New York.
- United Nations. Inter-Agency Task Force on Financing for Development. 2020. "Financing for Sustainable Development Report 2020." New York: United Nations. https://developmentfinance.un.org/sites/developmentfinance.un.org/files/FSDR_2020.pdf
- USGCRP. 2018. *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment*, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program. doi: 10.7930/NCA4.2018.
- Velten, Eike Karola, et al. 2016. "Smart Cash for the Climate: Maximising Auctioning Revenues from the EU Emissions Trading System." *Ecologic*. www.ecologic.eu/sites/default/files/publication/2016/2584-maximiseretsfulltechnicalreport_final.pdf.
- Weiss, Martin A. 2018. "2018 World Bank Capital Increase Proposal." *CRS Report No. 7-5700*. <https://fas.org/sgp/crs/misc/IF10895.pdf>.
- Weitzman, Martin L. 2014. "Can Negotiating a Uniform Carbon Price Help to Internalize the Global Warming Externality?" *Journal of the Association of Environmental and Resource Economists* 1 (1/2): 29–49. <https://doi.org/10.1086/676039>.
- Williams, Roberton, and Casey Wichman. 2015. "Macroeconomic Effects of Carbon Taxes." In: *Implementing a U.S. Carbon Tax: Challenges and Debates*. Edited by I. Parry, A. Morris, and R. Williams. New York: Routledge.
- Wolf, Martin. 2021. "The UK must try harder if it is to lead the world on climate," *Financial Times*, 3 May. <https://www.ft.com/content/8105329b-d8d0-4e4e-8e1e-fafaca102f61>.
- Wolf, Martin. 2021. "A windfall for poor countries is within Reach: high-income states can help by reallocating their IMF Special Drawing Rights quotas," *Financial Times*, 1 June. <https://www.ft.com/content/fe826780-c973-476f-b057-7a8aa678ec7b>.



Wolverton, Ann, and Gloria Helfand. 2011. "Evaluating the Consumer Response to Fuel Economy: A Review of the Literature." *International Review of Environmental and Resource Economics*, no. 5: 103–46.

World Bank. 2012. "Groundswell: Preparing for Internal Climate Migration." Washington, DC: World Bank.

———. 2014. "Climate Change Public Expenditure and Institutional Review Sourcebook." Washington.

———. 2019. "Using Carbon Revenues." Washington, DC: World Bank.

———. 2020a. "Amid Multiple Crises, World Bank Group Refocuses Programs and Increases Financing to \$74 billion in Fiscal Year 2020."

———. 2020b. "World Bank Group Exceeds 2020 Climate Finance Target for 3rd Consecutive Year - \$21.4 Billion in Funding for Climate Action."

———. 2020c. "World Bank Group Entities Issue Financial Statements for FY20."

"World Bank Group Entities Issue Financial Statements for FY20." *The World Bank*, 10 August 2020. <https://www.worldbank.org/en/news/press-release/2020/08/10/world-bank-group-entities-issue-financial-statements-for-fy20>.

"World Bank Group Exceeds 2020 Climate Finance Target for 3rd Consecutive Year - \$21.4 Billion in Funding for Climate Action." *The World Bank*, 30 August 2020. <https://www.worldbank.org/en/news/feature/2020/08/30/world-bank-group-exceeds-2020-climate-finance-target-for-3rd-consecutive-year-214-billion-in-funding-for-climate-action>.

"World Bank Monitoring of Repatriated Abacha Funds." *The World Bank*, 4 December 2017. <https://www.worldbank.org/en/news/factsheet/2017/12/04/world-bank-monitoring-of-repatriated-abacha-funds>.

Yamazaki, A. 2017. "Jobs and Climate Policy: Evidence from British Columbia's Revenue Neutral Carbon Tax." *Journal of Environmental Economics and Management*, 83.

Yellen, Janet. 2021. "Letter to G20 Colleagues." 25 February. https://home.treasury.gov/system/files/136/Secretary_Yellen_G20_Letter.pdf.

Zucman, Gabriel. 2015. *The Hidden Wealth of Nations. The Scourge of Tax Havens*. University of Chicago Press.



Endnotes

- 1 IMF. 2019b.
- 2 IMF. 2019b.
- 3 Nordhaus. 2020.
- 4 “Economists’ Statement on Carbon Dividends Organized by the Climate Leadership Council”. <https://www.econstatement.org/>.
- 5 McKibben (2020. p. 8) asks: “Didn’t the world leaders who signed the Paris climate accords commit to holding temperature increases to ‘well below’ two degrees Celsius, and as close as possible to 1.5 degrees? They did – in the preamble to the agreement. But then they appended their actual pledges, country by country. When scientists added up all those promises – to cut emissions, to build renewable energy, to save forests – and fed them to a computer, it spit out the news that we are headed for about 3.5-degree rise this century.” He then adds: “A three-degree rise in temperatures takes us to a level of global heat no human has ever experienced – you have to wind time back at least to the Pleistocene, three million years ago, before the Ice Ages.”
- 6 Meltzer. 2016. Such estimates are, inevitably, subject to considerable margins of uncertainty. Somewhat lower figures are provided, for instance, by Stern (2021) in a report published at the request of the UK Prime Minister ahead of the recent G7 Summit. Both exercises are not fully comparable, but their respective conclusions are broadly consistent: the transition to a low carbon economy will require large-scale investments over the next decade and beyond.
- 7 A particular criticism of the GCF’s operations to date is the perceived reliance on private capital to meet funding targets. The GCF’s Private Sector Facility was established in order to attract the capital of institutional investors; however, many critics believe its creation demonstrates that the GCF is beholden to the interests of investors in rich countries, rather than catering to the needs of small and medium-sized enterprises in poor countries.
- 8 Although operated as an independent fund, the GEF operates through partnerships with government agencies and other organizations to implement its projects. These partners include the **United Nations Development Program, World Bank, and Inter-American Development Bank.**
- 9 IMF. 2019b.
- 10 IMF. 2019c.
- 11 IMF. 2019b.
- 12 Ibid.
- 13 Gates. 2021.
- 14 IMF. 2019b.
- 15 While it did not involve a transition out of fossil fuels, the experience of Spain in the first half of the 1980s is relevant here. Faced with overcapacity in steel, shipbuilding, textiles and other sectors and with little prospects for a sustained recovery, the Spanish government implemented a program of industrial reconversion. It involved the shutting down of many of these industries – which had been a great burden on the budget – and the retraining of tens of thousands of workers to enable them to transition into other more promising sectors, as well as adequate compensation for those workers near the age of retirement. From the mid-1980s onwards Spain had one of the best performing economies in Europe. For further details see: Lopez-Claros. 1987.
- 16 At a US\$75/ton tax the number of lives saved would rise to 725,000.
- 17 According to the IMF’s Gaspar and Parry (2021): “some countries and regions with high or rising carbon prices are considering placing charges on the carbon content



of imports from places without similar schemes. From a global climate perspective, however, such border carbon adjustments are insufficient instruments as carbon embodied in trade flows is typically less than 10 percent of countries' total emissions."

18 This is unlikely to happen without government intervention. According to Tett (2021): "in recent years China has financed some 240 coal-powered plants in Asia and Africa as part of its Belt and Road Initiative. Some calculations suggest these BRI countries could account for half of all carbon emissions by 2050."

19 Our brief reference to the role of regulation here reflects simply the fact that it is not the focus of this paper. But it is evident that its importance cannot be overestimated. It is a powerful instrument to precipitate changes in incentives and behaviors.

20 Carattini, Carvalho, and Fankhauser. 2017.

21 Martin. 2021.

22 Schwab. 2019. p. xiii.

23 Carattini, Kallbekken, and Orlov. 2019.

24 Gasper and Parry. 2021.

25 Carattini, Carvalho, and Fankhauser. 2017.

26 Murray and Rivers. 2015.

27 Carattini, Carvalho, and Fankhauser. 2017.

28 Ibid.

29 In an Annex to its Fiscal Monitor: How to Mitigate Climate Change, the IMF explains how carbon taxes or emissions trading systems can be used to offset the negative impacts of distortionary taxes and therefore lead to net economic gains (even before factoring in environmental benefits). Distortionary taxes, such as taxes on personal and corporate income, capital investments, payrolls, and personal savings, reduce the overall level of economic activity and distort the composition of economic activity. By lowering the return from work, taxes on labor income tend to depress work effort. Similarly, taxes on capital investments and corporate income reduce capital accumulation. However, a reduction in economic activity is not the only distortionary effect. Taxes change the composition of economic activity by encouraging more activity in the less-productive informal sector and generating a bias toward tax-sheltered services or goods. This distortion also reduces economic efficiency. Cutting distortionary taxes like income tax or capital taxes produces an economic efficiency gain. Therefore, if carbon tax or ETS auction revenues are used to lower distortionary taxes, they can actually improve economic efficiency by increasing the incentive to work and to invest in capital, and by reducing the distortionary bias towards tax-favored goods and assets. That being said, there is a potential counteracting economic cost. Carbon taxes tend to increase energy prices, thereby reducing overall economic activity. As a result, if carbon taxes are not used to lower distortionary taxes, they can actually compound the distortions. On the whole, the IMF concludes that as long as countries properly exploit the revenue opportunities from a carbon tax or ETS, there will be a net economic gain from shifting taxes from labor and capital to fossil fuels. This means that governments must not freely allocate emissions in an ETS or return carbon tax revenues as a lump-sum transfer; instead, they should use these revenues either to invest in the economy or to reduce distortionary taxes on capital or labor. IMF. 2019b.

30 For an important example of how governments can sometimes succeed in implementing unpopular but necessary reforms, see Appendix I: Governments Can Succeed in Implementing Unpopular But Needed Reforms: the Nordic Case.

31 Carattini, Kallbekken, and Orlov. 2019.

32 Rajan. 2019.

33 Rajan. 2019.

34 "Germany: Law on Phasing-Out Coal-Powered Energy by 2038 Enters into Force



- | Global Legal Monitor." Global Legal Monitor, 31 August. 2020. www.loc.gov/law/foreign-news/article/germany-law-on-phasing-out-coal-powered-energy-by-2038-enters-into-force/#:~:text=The%20Coal%20Phase%2DOut%20Act,start%20operating%20after%20August%2014%2C; Gearino. 2020.
- 35 Gaspar and Parry. 2021.
- 36 Fleming. 2020.
- 37 Krushelnytska and Rodgers. 2017.
- 38 Jones, and Ranasinghe. 2020.
- 39 Larsen. 2021.
- 40 "Fiji Issues First Developing Country Green Bond, Raising \$50 Million for Climate Resilience." World Bank, 17 October 2017. www.worldbank.org/en/news/press-release/2017/10/17/fiji-issues-first-developing-country-green-bond-raising-50-million-for-climate-resilience.
- 41 Some would argue that, in fact, the first "green" bond was issued by the European Investment Bank in 2007. Issued as a "Climate Awareness Bond" it was very much a green bond.
- 42 Schmierer and Lau. 2020.
- 43 Slav. 2021.
- 44 Jones. 2021.
- 45 Inter-American Development Bank. 2020. p. 19.
- 46 Flemming. 2020.
- 47 Jones. 2021.
- 48 "Growing Momentum for Sovereign Green Bonds." OECD, 20 September 2020. www.oecd.org/coronavirus/en/data-insights/growing-momentum-for-sovereign-green-bonds.
- 49 "Morgan Stanley Survey Finds Investor Enthusiasm for Sustainable Investing." Morgan Stanley, 12 September 2019. www.morganstanley.com/press-releases/morgan-stanley-survey-finds-investor-enthusiasm-for-sustainable-.
- 50 Jacobs. 2019.
- 51 "Passive Sustainable Funds: The Global Landscape." Morningstar. www.morningstar.com/lp/passive-esg-landscape?utm_source=corp_comm&utm_medium=referral.
- 52 Stevens. 2020.
- 53 Escalante. 2021.
- 54 Climate Bonds Initiative and Syn Tao Green Finance. 2020.
- 55 "China Corporates Snapshot - December 2020: China's Green Bond Market to Stay Robust amid Policy Support." Fitch Ratings: Credit Ratings & Analysis For Financial Markets, 23 December 2020. www.fitchratings.com/research/corporate-finance/china-corporates-snapshot-december-2020-china-green-bond-market-to-stay-robust-amid-policy-support-23-12-2020.
- 56 However, of the US\$107.4 billion, a full US\$51.8 billion correspond to three Flexible Credit Lines for Chile, Colombia and Peru; actual IMF disbursements, therefore, thus far, account for no more than 2.2 percent of the IMF's own estimates for the financing needs of emerging markets and developing countries.
- 57 Over the past six years, the IDB has leveraged more than US\$4.5 billion in investments with high potential for socioeconomic, environmental and climate-related benefits. Using public-private financial products and thematic bonds, the Bank has also mobilized over US\$480 million from donors and in international climate-related financing during this period. These resources will be critical to a sustainable post-pandemic recovery.
- 58 "Amid Multiple Crises, World Bank Group Refocuses Programs and Increases



Financing to \$74 billion in Fiscal Year 2020.” The World Bank, 10 July 2020. <https://www.worldbank.org/en/news/press-release/2020/07/10/amid-multiple-crises-world-bank-group-refocuses-programs-and-increases-financing-to-74-billion-in-fiscal-year-2020>.

59 “World Bank Group Exceeds 2020 Climate Finance Target for 3rd Consecutive Year - \$21.4 Billion in Funding for Climate Action.” The World Bank, 30 August 2020. <https://www.worldbank.org/en/news/feature/2020/08/30/world-bank-group-exceeds-2020-climate-finance-target-for-3rd-consecutive-year-214-billion-in-funding-for-climate-action>.

60 “World Bank Group Entities Issue Financial Statements for FY20.” The World Bank, 10 August 2020. <https://www.worldbank.org/en/news/press-release/2020/08/10/world-bank-group-entities-issue-financial-statements-for-fy20>.

61 Weiss. 2018.

62 As another example: the IDB’s ninth general capital increase (GCI-9) went into effect in February of 2012 and consisted of US\$1.7 billion of paid-in capital, to be paid by members over a period of five years, as well as US\$68.3 billion of callable capital. According to a Standard & Poor’s report on the IDB, payments of the annual instalments have often been late and “as we expect the IADB to continue distributing US\$200 million yearly in grants to Haiti until 2020, the gains from GCI-9 are largely offset.” See: S. & P. Global Ratings. 2016. p 4.

63 This proposal draws from Eduardo Pascual Pouteau’s finalist entry to the New Shape Prize competition sponsored by the Global Challenges Foundation in 2018. It can be found at: <https://globalchallenges.org/library-entries/the-sponsored-loans-program-how-to-mobilize-private-sector-into-global-development/>.

64 The International Finance Corporation’s Managed Co-Lending Portfolio Program (MCP) has sought to develop instruments that might boost its lending capacity, the central aim of the sponsored loans program. The aim of the MCP is to create a diversified portfolio of emerging market private sector loans that mirror the portfolio the IFC is creating for its own account, not unlike an index fund. Project appraisal, approval, and supervision are delegated to the IFC, thereby helping investors identify viable investment opportunities in the developing world. The fact that the IFC maintains a share of each investment for itself ensures alignment of its interests with those of the participating

investor and may have contributed to its relative success, in its first 5 years of operations the MCP raised some US\$7 billion from 8 institutional investors. More recently, in 2020, the IFC extended the MCP to make it more open, to include regional development banks and/or sovereign wealth funds as potential investors.

65 In 2016, the IMF approved a Flexible Credit Line for Mexico in the amount of US\$88 billion, or about 700 percent of its IMF quota; one upper middle-income country and one facility, accounting for a sizable share of total IMF firepower.

66 Articles of agreement of the International Monetary Fund. Article VIII, section 7.

67 The first SDR issue in the amount of SDR 9.3 billion was concluded in 1972; the second issue in the amount of SDR 12.1 billion was concluded in 1981.

68 Yellen. 2021.

69 “Communiqué of the Forty-third Meeting of the IMFC.” International Monetary Fund, 8 April 2020. <https://www.imf.org/en/News/Articles/2021/04/08/communique-of-the-forty-third-meeting-of-the-imfc>.

70 Assuming an allocation of US\$650 million, the amounts allocated to high-income countries would come to US\$437 billion, a sum which highlights the large scope for potential “support” to low and middle-income countries.

71 “IMF Governors Approve a Historic US\$650 Billion SDR Allocation of Special Draw-



ing Rights.” International Monetary Fund, Press Release no. 21/235, 2 August 2021. <https://www.imf.org/en/News/Articles/2021/07/30/pr21235-imf-governors-approve-a-historic-us-650-billion-sdr-allocation-of-special-drawing-rights>.

72 Wolf. 2021.

73 The organization [Integrity Initiatives International](#) has put forward a proposal for the creation of an International Anti-Corruption Court, to address the problem of lack of accountability of kleptocrats in many countries who enjoy impunity because they control the courts, the prosecutors and the police.

74 This section draws from research done for Lopez-Claros, Dahl, and Groff. 2020. Chapter 12.

75 Following the Financial Crisis, in September 2009, French president Nicolas Sarkozy raised the issue of a Tobin tax. In early November 2009, at the G20 finance ministers’ summit in Scotland, the British Prime Minister Mr. Brown and Nicolas Sarkozy, France’s president, suggested that revenues from the Tobin tax could be devoted to the world’s fight against climate change, especially in developing countries. They suggested that funding could come from “a global financial transactions tax.” However British officials later argued the main point of a financial transactions tax would be to provide insurance for the global taxpayer against a future banking crisis.

76 ul Haq, Kaul, and Grunberg. 1996.

77 This school of thought is also shifting following the rise of behavioral economics and Richard Thaler’s research on humans being “predictably irrational.”

78 Tobin had proposed a tax on foreign exchange markets, which could have been circumvented by trading of derivative financial instruments that tracked the foreign exchange market instead of the currency itself.

79 Tobin. 1978.

80 Because it is difficult to predict the decline in trading volume as a result of an FTT, there is some uncertainty regarding the tax revenue generated. Further, an FTT may increase the cost of capital, which would lower owners’ returns to capital and workers’ returns to labor. This could reduce revenue from income and payroll taxes. The authors of this paper have considered these factors but believe the decline in trading volume will not be large enough to offset the benefits of the FTT and the adoption of the tax across asset classes would ameliorate the impact on revenues from income and payroll taxes.

81 [The Robin Hood tax](#) is a package of FTTs proposed by a campaigning group of civil society NGOs. Campaigners suggested the tax could be implemented globally, regionally or unilaterally by individual nations. As part of a focus on combating the pandemic, Angela Merkel announced that she would be pushing for a Robin Hood Tax as her country took over the presidency of the European Union in July of 2020. The technical work is already done, with 10 countries in mainland Europe including Italy and Germany in talks for a number of years. The amounts expected to be collected initially are not especially large (up to some €20 billion annually) but setting up the administrative and logistical machinery would clearly be an early priority. However, the financial industry has been furiously lobbying for governments to drop the initiative. A final decision on the tax has been postponed twice.

82 On 1 August 2012, France introduced a financial transaction tax in French tax regulation pursuant to Article 5 of the French Amended Finance Bill of 14 March 2012. Two other taxes applicable to financial transactions were also introduced, including a tax on high-frequency trading, the FTT levies a 0.2% tax on stock purchases of French publicly traded companies with a market value over €1 billion.

83 He did not identify specific areas but, in today’s context, it is evident that a portion of such revenues could be allocated to, for instance, low-carbon resilient infrastructure



investments.

84 Germany had a similar experience; its briefly imposed tax resulted in a one-third decrease in trading public companies. Klein. 2020.

85 To be clear, the collection of such a tax would not necessitate the creation of a new fiscal agency. The tax would be collected by the tax authorities in the countries where the transactions would take place and simply passed on to, for instance, countries engaged in credible climate change mitigation projects or to multilateral development banks supporting countries' efforts to build climate resilient infrastructures or, more generally, managing the transition from fossil fuels to renewable sources of energy. In this respect, the experience of the EU is illustrative: EU members pass on to the EU budget a share of VAT contributions and customs duties collected at the national level.

86 United Nations. Inter-Agency Task Force on Financing for Development. 2020. p. 136.

87 Ellmers. 2020.

88 Morisset, and Cunningham. 2016.

89 The Paying Taxes indicator in the World Bank's Doing Business report provides ample and convincing evidence of the extent to which, over the past 15 years, advances in technology and the use of online tax payments has sharply improved the ability of tax authorities everywhere, but particularly in the developing world, to improve tax collection.

90 OECD. 2021. p. 34.

91 Zucman. 2015.

92 OECD. 2021. p. 34.

93 "Holding Kleptocrats to Account: Redirecting Frozen Assets and the International Anti-Corruption Court." Integrity Initiatives International, 6 August 2020. <https://www.thedialogue.org/analysis/holding-kleptocrats-to-account-redirecting-frozen-assets-and-the-international-anti-corruption-court/>.

94 Velten, et al. 2016.

95 "Stolen Asset Recovery Initiative." The World Bank. UNODC. <https://star.worldbank.org/about-star>.

96 "World Bank Monitoring of Repatriated Abacha Funds." The World Bank, 4 December 2017. <https://www.worldbank.org/en/news/factsheet/2017/12/04/world-bank-monitoring-of-repatriated-abacha-funds>.

97 "Management of Stolen Assets." Stolen Asset Recovery Initiative. The World Bank. UNODC. <https://star.worldbank.org/focus-area/management-stolen-assets>.

98 Khan. 2021.

99 Gençsü and Miyuki. 2015.

100 Keen, Parry, and Strand. 2013.

101 Henckens, Driessen, Ryngaert, and Worrell. 2016.

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