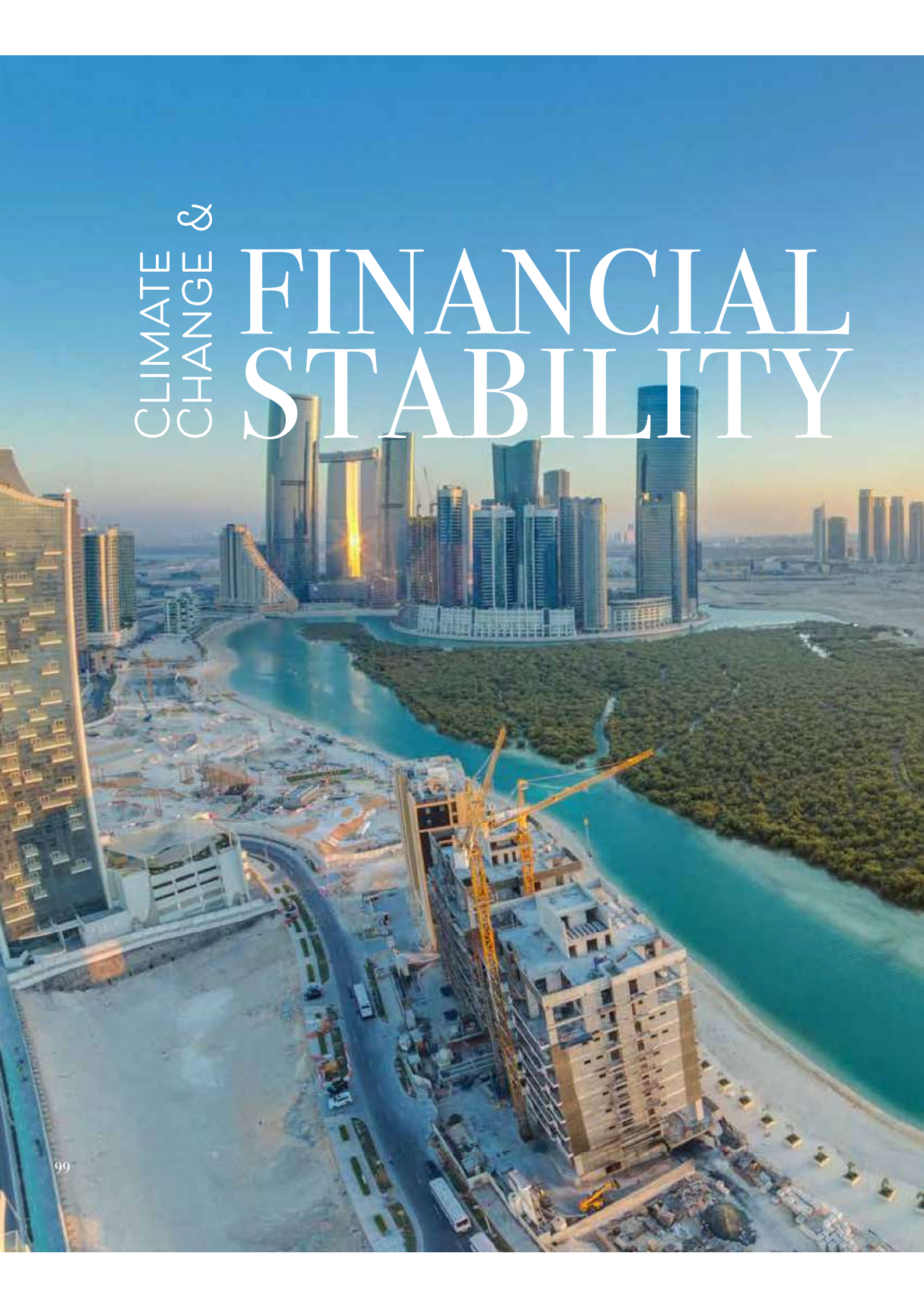


CLIMATE
CHANGE &

FINANCIAL STABILITY



To Protect Financial Stability, Confront Climate Change

Determined policy action can help meet an existential challenge.

Tobias Adrian

Climate change confronts humanity with an existential challenge. Climate-related disasters already cause immense human suffering as well as large economic, financial, and ecological damages. Direct damages from Thailand's 2011 floods, for example, cost around 10 percent of the country's GDP. Over the past decade, direct damages of climate-related disasters added up to \$1.3 trillion (or around 0.2 percent of world GDP on average per year). Indirect damages were even higher: although precise estimates currently do not exist, some have calculated that indirect costs may be five to ten times the direct costs, or \$6.5–\$13 trillion. For instance, the total estimated cost of California's 2018 wildfires is about eleven percent of California's GDP, versus only 1 percent for the direct damage. Moreover, climate science is sending us a clear warning: Unless we change our ineffective current policies, extreme weather events are destined to become more destructive and more frequent, and global warming will have increasingly disruptive socio-economic impacts.

Climate change puts global financial stability at risk. Destructive hurricanes and droughts not only increasingly chip away at the

global economy, but they also weaken financial stability. Our recent *Global Financial Stability Report* examined the impact of climate change's physical risk (the loss of life and property as well as disruptions to economic activity) on financial stability: it found that stock market investors are not paying enough attention to this risk, and they should.¹

The increasingly destructive impacts of hurricanes and wildfires illustrate that even seemingly well-known types of risks can take us by surprise. Addressing the climate challenge fundamentally requires that the global economy move away from a dependence on resources that produce high carbon dioxide emissions, like coal. To do so will require planning for a necessary and complex transition to a low-carbon economy. Firms with business models dependent on carbon emissions could see their earnings decline and their funding costs increase, while other industries may benefit from new opportunities. Global investments to address climate change are estimated in trillions of U.S. dollars, and most are likely to be intermediated through the financial system. Financial

inaction—the low-carbon transition becomes uncoordinated or abrupt, triggering rapid shifts in investor and consumer behavior. If the financial system is weak, for example, due to excessive leverage, it will exacerbate these shocks, hurting the real economy.

Policymakers are starting to recognize the dramatic implications of climate change for financial stability, and the urgency of speeding the low-carbon transition. Incorporating climate-related risks into policymaking requires assessing financial stability over longer horizons, using new methodologies. A growing number of central banks and financial regulators—including those in the Network for the Greening of the Financial System (NGFS)—are realizing the importance of these issues and are aiming to integrate climate-related risks into financial stability oversight.



The International Monetary Fund (IMF) is helping countries better understand the macro-financial transmission of climate risks. Analyzing risks and vulnerabilities is at the core of what we do at the Fund. The IMF pioneered the use of stress test for financial stability analysis 20 years ago when, along with the World Bank, it began the Financial Sector Assessment Program (FSAP). Over the past decade, one in five FSAP assessments considered climate-related risks, and IMF staff have been working to increase coverage of those risks in ongoing and planned FSAPs. Earlier tests focused on physical risks, such as insurance losses and nonperforming loans associated with natural disasters. Recently, our stress tests—such as the 2019 assessment for the Bahamas²—have included scenarios that analyze the combined macro-financial impact of a severe hurricane and an economic downturn. More comprehensive assessments are planned in other countries, and IMF staff have started examining the financial system’s exposures to the low-carbon transition. Next steps include capturing second-round effects, in which asset price declines lead to “fire sales,” generating vicious cycles that amplify the initial shock. IMF staff collaborate with World Bank colleagues, NGFS members, and others to further upgrade the framework for assessing climate-related risks.

Only with accurate and standardized reporting of climate risks in financial statements can investors discern companies’ exposures to climate-related risks. The Fund supports efforts to strengthen the quality and consistency of climate disclosures. Efforts such as those of the Task Force on Climate-related Financial Disclosures are

...containing global warming to 2°C or less

would require rapidly phasing in measures equivalent to a global tax of at least \$75 per ton by 2030, whereas the current global average carbon price is \$2 per ton.

welcome, but IMF research has found disclosures to be uneven across countries and asset classes. Partly as a result, investors have been reluctant to invest at the scale necessary to mitigate climate change, especially since policy action to address climate change has been lagging.

The standardization of climate risk disclosures would improve the comparability of information in financial statements across markets and jurisdictions.

Granular, firm-specific information on exposures and vulnerabilities would help lenders, insurers, and investors to better grasp climate risk. It would also help improve climate stress testing by central banks, supervisors, and other oversight bodies. Developing a global climate risk disclosure framework requires stepping up global cooperation and global leadership. Such a framework is essential for preserving financial stability.

More broadly, the IMF can help by providing advice to policymakers on climate-related macro-financial policies.

Addressing climate change in a sustainable way requires strong global policy action across many policy

fronts. Macro-financial policies have a key role to play due to the magnitude and global nature of the risks and the strong complementarities of climate protection with macroeconomic performance and financial stability. For example, expanding the availability of insurance and increasing the sovereign's financial strength can reduce the impact of climatic disasters, thus decreasing financial stability risks. Fiscal policies (such as carbon pricing) and structural policies (such as emission standards) have key roles to play in reducing emissions and mobilizing revenues, but the financial sector is also critical. Financial institutions and markets already provide financial protection through insurance and other risk-sharing mechanisms, such as catastrophe bonds. The financial system can help mobilize resources for investments in climate mitigation (reducing emissions) and adaptation (building resilience) in response to price signals such as carbon prices. If policymakers implement policies to price externalities and to incentivize the low-carbon transition, the financial system can help achieve these goals efficiently. The IMF has thus been integrating climate change into its financial sector policy advice.

The COVID-19 pandemic reminds us that crisis preparedness and resilience are essential to manage risks from uncertain, complex events that can have extreme economic and human costs. The pandemic highlights the fragility of our natural world, underscoring the fact that climate change remains an urgent and existential issue. Like the pandemic, the climate crisis may seem remote, but its impact can manifest itself abruptly. Like the pandemic, the climate crisis is linked to the degradation of the natural environment. Like the pandemic, poor and vulnerable populations suffer most from climate shocks. Like the pandemic, ignoring the climate crisis involves massive financial risks. Like the pandemic, the climate crisis has no borders, and mitigation is less costly than containing the crisis once it has materialized. And like the pandemic, the climate crisis requires a forceful and globally coordinated response.

The pandemic-induced economic crisis does not change the fundamental climate challenge, or the proper response to it. Even a prolonged global recession would have only a modest impact on the stock of atmospheric greenhouse gas emissions. Therefore, raising the cost of emissions remains central to addressing the externality problem at the heart of climate change. And the policy action required also

remains ambitious: for example, containing global warming to 2°C or less would require rapidly phasing in measures equivalent to a global tax of at least \$75 per ton by 2030, whereas the current global average carbon price is \$2 per ton.

Taking action to address climate change demands the mobilization of both public and private finance. In that context, it is critical to ensure that financial instability does not undermine the low-carbon transition. Financial firms and infrastructures, central banks, and financial regulators have essential roles to play: with determined action, the financial community can help society increase its chances of survival as it confronts the looming climate crisis.

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How to Defuse the “Double Jeopardy” of Climate and Financial Risks in Developing Countries

Ceyla Pazarbasioglu

As the COVID-19 pandemic was destroying lives and livelihoods across the world, Pacific Island nations faced a catastrophe of a more familiar kind. In April, Cyclone Harold cut a deadly swath through these nations, destroying homes, schools, and hospitals and dealing an additional blow to their efforts to manage the health, social, and economic effects of the pandemic.¹

These nations, in economic terms, were already some of the world’s most vulnerable²—many of them heavily dependent on commodity exports and tourism and short on the fiscal buffers necessary to cope with setbacks. The combined effects of COVID-19 and Cyclone Harold are expected to result in a massive decline in national income in these countries. Disasters on this scale, moreover, tend to leave lasting scars³, reducing human capital and lowering productivity for years.

Pacific Island nations are hardly alone in confronting this “double jeopardy”—where climate risks and financial risks amplify one another and create a vicious circle of instability. About a third of countries in East Asia and the Pacific,

Latin America and the Caribbean, South Asia, and sub-Saharan Africa face elevated risks from extreme weather—such as floods, storms, and droughts—and from macroeconomic, debt, and banking-sector risks.⁴ These cascading risks will further compound existing vulnerabilities, further weakening countries’ abilities to confront climate impacts.

Countries facing this double jeopardy typically have limited means to recover from the physical damage caused by extreme weather events. It is hard for them to promptly mobilize the necessary financial resources because their borrowing costs tend to be relatively high. Economic problems can spill over quickly to the financial system when physical damage reduces property and asset values for businesses and consumers. At the same time, governments attempting to build low-carbon economies must contend with the financial risks associated with changing investor risk assessments and valuations.

Yet there is a way forward for these countries. Governments can build financial resilience and capacity to deal with climate-related risks. In our

experience working with developing economies, policies should strive to achieve four goals:

1. Strengthen macro-financial resilience.

As the public and financial sector play central roles in climate mitigation and adaptation efforts, measures to strengthen macro-financial systems are key for tackling the consequences of climate change. These include macro-economic, fiscal, monetary, and financial sector measures, such as adequate pricing of carbon emissions and well-designed disaster-risk financing strategies.

2. Assess and disclose climate-related risks.

Climate change poses significant physical and transition risks, but efforts to assess these risks are in their infancy. Data gaps should be addressed, and risks should be transparently disclosed and incorporated into monitoring exercises, including macro-economic and financial stress tests.

3. Incorporate impacts of climate change in growth diagnostics.

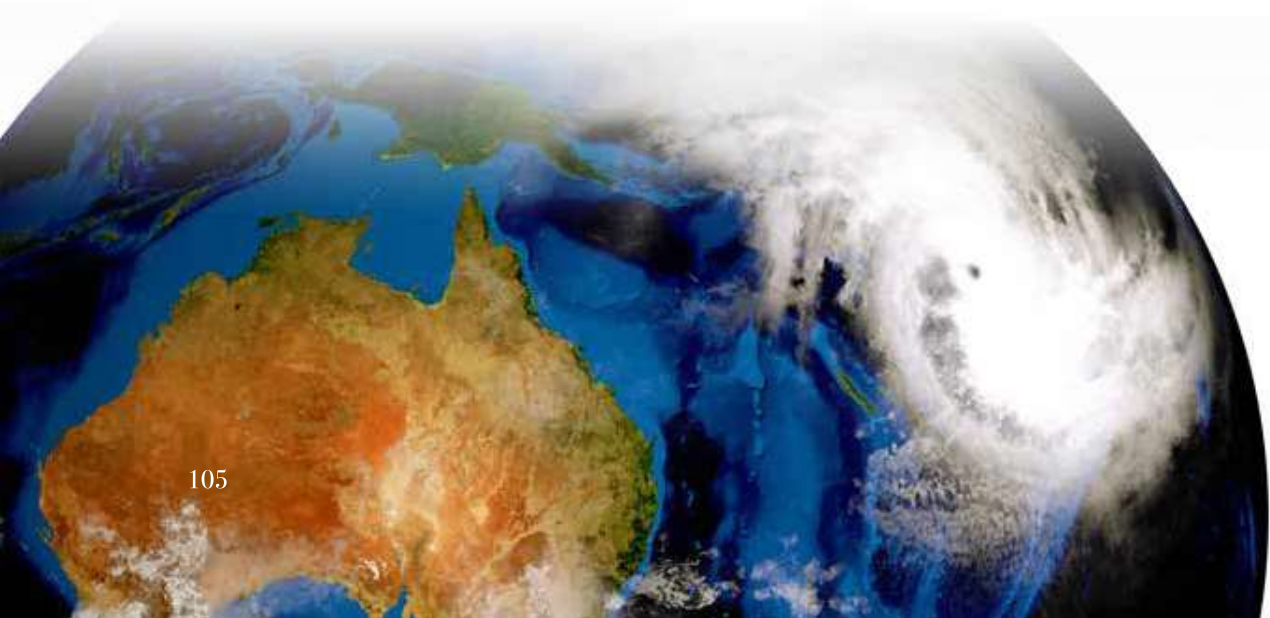
Climate-related risks to economic growth are significantly underestimated. Well-designed adaptation and mitigation efforts can have positive impacts on growth. This points to the importance of reflecting climate-related risks and mitigation and adaptation impacts in the

assessment of countries' growth prospects and the design of growth strategies.

4. Promote green finance. Green finance encompasses financial investments that have environmental objectives.⁵ Besides enhanced disclosure, green finance requires the development of widely recognized taxonomies, regulatory frameworks, and national strategies. This will create incentives for stakeholders to incorporate climate issues into their risk management and investment approaches, and it can encourage the creation of new financing instruments.

Support from the international community is crucial. The World Bank, together with partners, is working closely with vulnerable countries to address financial risks emanating from natural disasters and climate change. We are also helping clients leverage the power of the financial system to be a force for climate adaptation and mitigation.

Better financial risk management is at the heart of these efforts. The Financial Sector Assessment Program (FSAP), a joint effort of the World Bank and IMF, helps regulators and financial-sector supervisors integrate climate risk into their oversight. These pilot assessments include identifying vulnerabilities with respect to financial-sector



soundness and stability; evaluating the supervisory responses of banking, insurance, and capital market regulators; and identifying opportunities for green finance. We have also helped regulators set up stress testing for typhoon risk, and enabled some governments to adopt a similar approach to flood risk.

In developing countries, a lack of well-functioning insurance markets often exacerbates climate risks. Better developed insurance markets can contribute significantly to the resilience of the economy at large and may reduce the government's fiscal burden in rebuilding from a disaster.

Longer-term technical assistance is also important. With the World Bank Group's private sector arm, IFC, we have started a comprehensive program to help banks and institutional investors in Colombia offer more green financing. The program consists of four components: assessing climate risks in the banking sector; integrating sustainability factors into investment decisions; developing a taxonomy of economic activities; and stakeholder engagement and capacity building.

Dialogue among financial-sector stakeholders can also make a key difference. Central banks and supervisors have joined forces across the globe to address climate related financial risks, as part of the Network for Greening the Financial System (NGFS).⁶ We also work closely with the IFC-led Sustainable Banking Network (SBN)⁷ and support the Coalition of Finance Ministers for Climate Action.⁸

Over the past decade, the World Bank has provided financing and advisory services to promote financial resilience against natural disasters and crisis risks to over 60 countries, including over US\$2.5 billion in contingent lines of credit and US\$3.9 billion in market-based



catastrophe-risk transactions. Our technical assistance has supported ministries of finance as well as helped financial and insurance regulators develop reliable risk models, and advanced financial analytics and market-based risk financing products needed to better understand, anticipate, and respond to natural disasters, climate change, and other complex crises in a timely and cost-efficient manner.

This work fits within a broader agenda for climate change. We believe fiscal-policy measures such as carbon taxation or phasing out fossil-fuel subsidies standards have a key role to play—as do regulatory measures to increase energy efficiency.

These can be politically difficult reforms—requiring citizens to accept short-term pains in return for long-term gains. Yet we must tackle them head on. COVID-19 illustrates the steep costs of complacency. All countries should act now to defuse the double jeopardy of climate and financial risks. It is within our means to shift to a low-carbon economy without creating financial risks.

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Financial Stability in the Age of Global and Systemic Ecological Risks (“Green Swans”)

Patrick Bolton, Morgan Després, Luiz Awazu Pereira da Silva,
Frédéric Samama & Romain Svartzman

Central banks’ mandates of price and financial stability will increasingly face the risks posed by climate change and other global ecological challenges such as biodiversity loss. This suggests that central banks have a role to play in managing these risks. However, climate-related risks are characterized by radical uncertainty and the need to engage in a system-wide transition, which requires both independent action from multiple stakeholders and an unprecedented level of international coordination. Central banks’ interventions are therefore constrained by both the nature of our ecological predicament and by the need for structural change. The question regarding their role must then be reframed as follows: Given that structural transformation of the global economy is a prerequisite for financial and price stability, how can central banks contribute to the coordination needed to preserve the resilience of our Earth’s ecosystems?

Climate Change Adaptation and Mitigation as Global Challenges

The unprecedented challenges posed by climate change are well documented. Climate-related impacts, such as rising sea levels, droughts, floods, extreme weather events, and soil erosion, are projected to increase over time.¹ They could lead to unbearable stresses on ecosystems and “untold suffering” for human beings, according to more than 11,000 scientists.²

Through these impacts, climate change can generate geopolitical tensions and pose significant financial and economic stability problems. What is more, the worst consequences of climate change will likely be concentrated in low-income countries³, potentially leading to the displacement of hundreds of millions of people⁴ and increasing global inequality, reversing the trends⁵ of income growth made over the past decades, and triggering new conflicts.⁶

The authors of this essay are co-authors of “The green swan: central banking and financial stability in the age of climate change.” The views expressed are those of the authors and do not necessarily reflect those of their respective institutions.

While avoiding these impacts seems a no-brainer, the hard reality is that a low-carbon transition also raises significant geopolitical issues⁷ (unless one puts all one's faith in technologies⁸ such as geoengineering that would solve the problem). For instance, a move towards renewable energy could shift the balance of power between countries, reorder trade flows and global value chains (e.g., because of climate clubs among countries willing to implement adequate carbon prices), and even generate new conflicts related to access to minerals needed for renewables.⁹ Moreover, some countries (for instance those involved in the extraction of shale oil and tar sands) would need to rapidly discontinue some key carbon-intensive activities¹⁰, which could generate important losses of revenue (although those could ultimately be compensated by employment and revenues in other sectors).

These patterns may partially explain why the principle of "common but differentiated responsibilities"¹¹ enshrined in international climate negotiations remains largely ineffective.

While many of the wealthiest countries committed to mobilize US\$100 billion per year¹² in climate financing to accelerate mitigation in developing countries, current pledges remain unfulfilled and

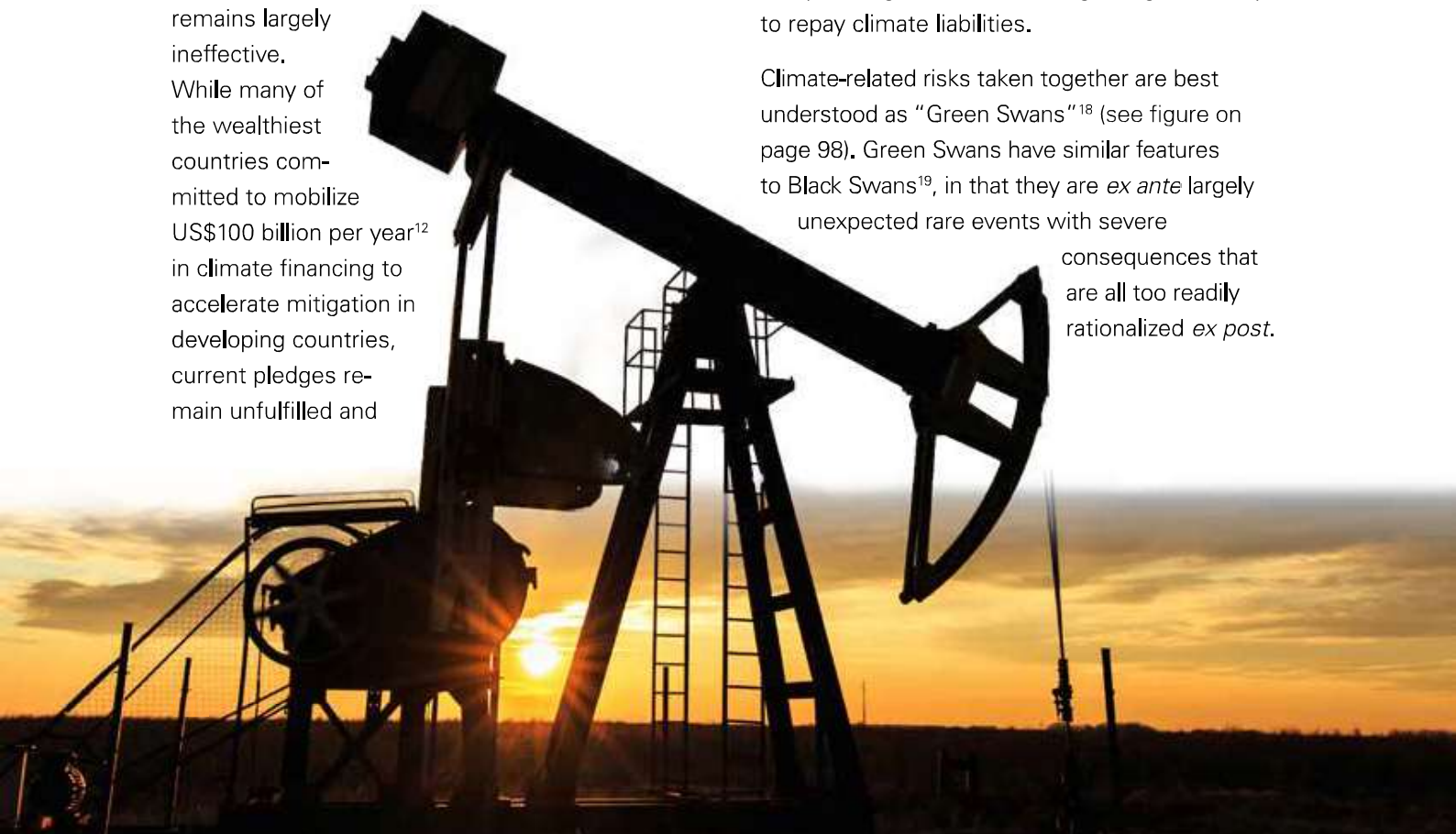
this amount will in any case fall far short of what is necessary. In the meantime, the wealthiest 10 percent of individuals on the planet are responsible for about half of total CO₂ emissions¹³, while the bottom half of the population in terms of income emits just 10 percent.

What Role for Central Banks in Managing "Green Swans?"

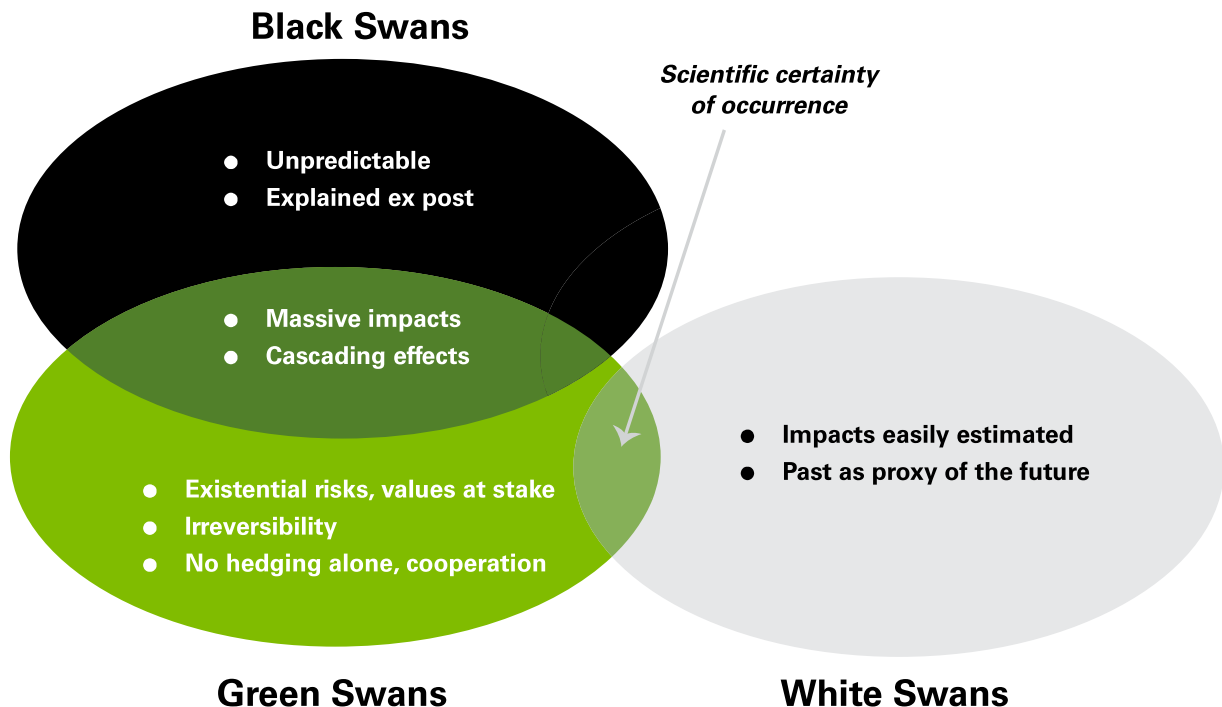
Central banks and financial regulators now recognize that these patterns are a source of financial instability.¹⁴ The physical impacts of climate change could lead to much more disastrous and irreversible outcomes¹⁵ than the COVID-19 pandemic, while the transition to a low-carbon economy also raises significant risks. For instance, limiting global warming to less than 1.5°C or 2°C requires keeping a large proportion of existing fossil fuel reserves in the ground. These stranded assets¹⁶ could suddenly be written down and trigger a "climate Minsky moment"¹⁷—a systemic crisis triggered by an abrupt change of sentiment regarding the ability to repay climate liabilities.

Climate-related risks taken together are best understood as "Green Swans"¹⁸ (see figure on page 98). Green Swans have similar features to Black Swans¹⁹, in that they are *ex ante* largely unexpected rare events with severe

consequences that are all too readily rationalized *ex post*.



Black, White, and Green Swans



But Green Swans have two additional features: (i) scientific evidence suggests that climate-related shocks are almost sure to occur (though the exact timing and impacts of these events remains highly uncertain); and (ii) they involve irreversible losses (financial, material, and the loss of human lives) that can pose an existential threat to humanity.

Importantly, Green Swans involve other ecological risks, such as those tied to the accelerating decline of the Earth's biodiversity.²⁰ For instance, the crisis caused by the pandemic of COVID-19 has been linked to the destruction of our natural habitats, which in turn is likely to facilitate the emergence of other pandemics in the future.²¹ Viewed from this perspective, the current crisis is the manifestation of a particular Green Swan event.²²

Given that climate change and other ecological challenges are a source of financial risks, it is within the mandate of central banks²³ to safeguard the financial system against these risks. The central bank response cannot rely on traditional risk assessment models, which merely extrapolate historical trends and do not include the risks related to natural disasters (of rising magnitude and incidence) and to a system-wide transition (which has not yet occurred). Therefore, in order to better understand Green Swans, a methodological shift in macroeconomic and financial modeling is needed. For instance, focusing more on forward-looking scenario analysis²⁴ and on non-equilibrium modeling²⁵ can better represent uncertain transition dynamics.

But no single model will be able to account for the uncertainty and complexity of Green Swan

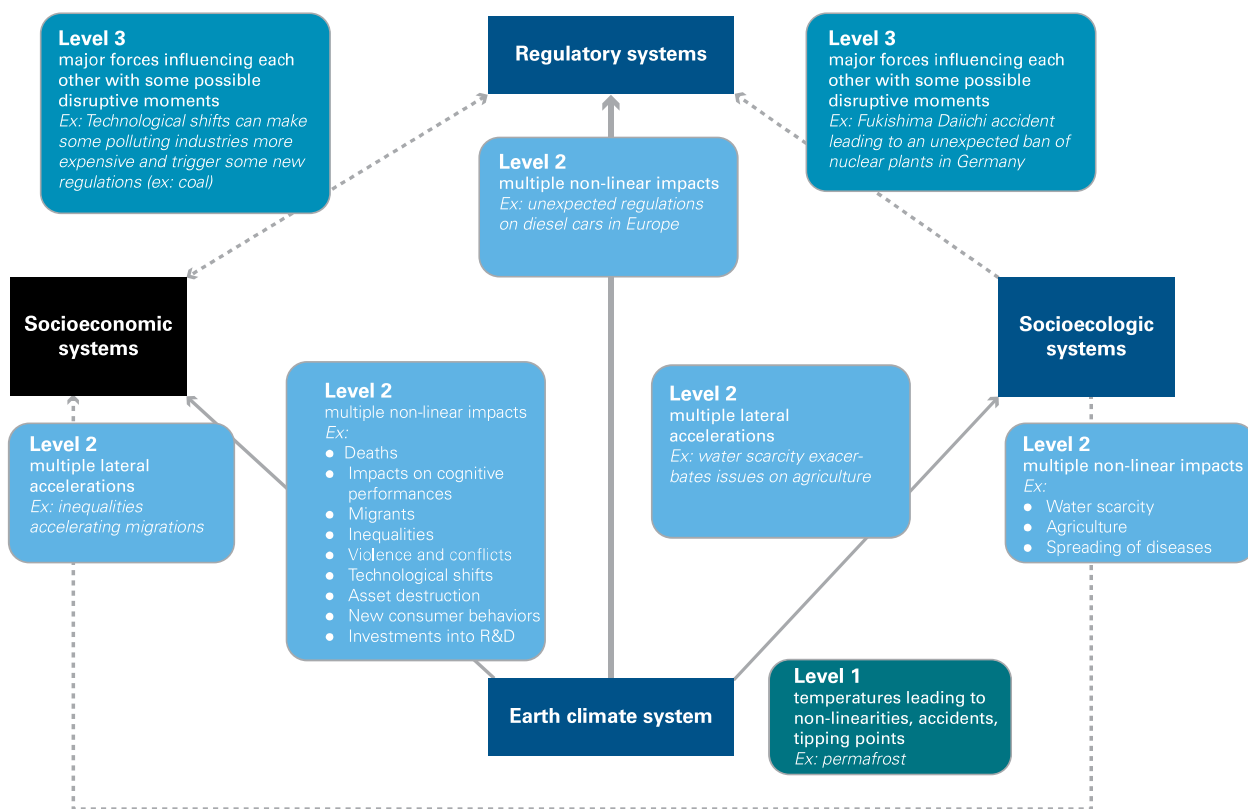
The central bank response cannot rely on traditional risk assessment models, which merely extrapolate historical trends and do not include the risks related to natural disasters (of rising magnitude and incidence) and to a system-wide transition (which has not yet occurred).

events, which involve physical and transition risks that propagate non-linearly, with multiple feedback loops and chain reactions that cascade across sectors, countries, and systems (see figure below). With regard to physical risks, when climate tipping points are crossed²⁶, there may be catastrophic and irreversible impacts that are simply impossible to quantify²⁷ with any reasonable degree of accuracy. Staying below these tipping points requires multiple immediate and ambitious

measures towards an economic structural change²⁸ and an even deeper socio-technical transition²⁹, which also generates significant complexity and uncertainty.

This means that central banks cannot address climate change on their own. They must join forces with other institutions. In “The Green Swan”³¹ we outline four areas in which they could do this: (i) the quest for new policy mixes between fiscal, regulatory, monetary, and prudential

Chain reactions stemming from climate-related physical and transition risks



Source: Bolton et al. (2020)³⁰

policies; (ii) the promotion of long-termism and environmental values in the financial sector; (iii) the integration of sustainability accounting in national and corporate accounting frameworks; and (iv) the reform of the international monetary and financial system.

What Global Monetary and Financial Architecture to Preserve Climate and Financial Stability?

With regard to the fourth area, it is important to emphasize that climate stability is a global public good and that an equitable transition to a low-carbon economy will require an unprecedented level of international cooperation. As a first step, and especially in light of the COVID-19 pandemic, massive public investments will be needed. Multilateral development banks will have a critical role to play in this area.³² They can help coordinate national governments' crisis mitigation public policies, prioritize emergency funding for the poorest countries, and ensure debt sustainability following the crisis.

But more is needed. Tackling the new global challenges posed by climate change demands a global joint governance of climate and financial stability, possibly including the creation of a new international agency that would: (i) provide financial and logistical support to countries facing a climate or ecological shock; and (ii) supervise and coordinate climate mitigation policies among

member countries. Some analysts have also proposed adding a climate change mitigation mandate to existing international institutions such as the International Monetary Fund (IMF), as part of their responsibilities to manage the international monetary and financial system. In particular, proposals have been made to issue "green" Special Drawing Rights (SDRs)³³ through the IMF to finance green funds. SDRs could be allocated to national and multilateral development banks and be pledged to finance the national commitments to reduce carbon emissions under the Paris Agreement.

As bold as they seem, these initiatives are essential to build a multilateral governance system capable of channeling savings from all parts of the world to finance the low-carbon transition. This new governance architecture would then facilitate the task of central banks, but the reverse may also be true. For instance, by joining forces among themselves with the creation of the NGFS (Network for Greening the Financial System)³⁴, central banks have shown that international cooperation on climate change, in the spirit of the Bretton Woods order³⁵, is possible. This is what we need to address today's global challenges.

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Climate Change and Financial Stability



An Interview
with Selwin Hart,
Special Adviser to the
UN Secretary-General on
Climate Action &
Financial Stability





NATIONS UNIES

Written Interview with Selwin Hart, Special Adviser to the UN Secretary-General on Climate Action & Financial Stability and Assistant Secretary-General for the Climate Action Team

Q: How will climate change influence global financial stability?

Shortly before the COVID-19 pandemic, Secretary-General António Guterres said climate disruption poses a serious and growing threat to the world's short- and long-term economic prospects, adding, "That is why I will continue to push to keep the climate crisis at the top of the international agenda."

The rising emissions and increasing greenhouse gas concentrations that we saw through the end of 2019 provide the potential for catastrophic outcomes that warrant urgent policy actions. Putting policy instruments and market adjustments in place to bring about a dramatic reduction in CO₂ emissions is an urgent priority.

The economic predictions for 2020, issued this January, did not foresee a good year ahead—and those forecasts preceded the human and economic calamity that is still unfolding due to COVID-19. But had we heeded the warning signals, perhaps the scope of the pandemic's damage—in terms of lives lost and livelihoods destroyed—could have been less.

The Secretary-General recently told ministers, "I am not here today to tell you that everything will be OK. We need to be honest with ourselves. The COVID-19 crisis is having devastating impacts because of our past and present failures."

The failures, he said, include not taking the Sustainable Development Goals seriously enough, not heeding warnings about the damage we are inflicting on our natural environment, and taking risks with climate disruption. "We put up with inequalities within and between countries that have left billions of people just one crisis away from poverty and financial ruin. We have not invested adequately in resilience – in universal health coverage; quality education; social protection; safe water and sanitation. We have yet to right the power imbalances that leave women and girls to constantly bear the brunt of any crisis."

There has been a surge in interest from companies in adopting sustainable business plans that are compatible with a 1.5°C future, yet with a few notable exceptions, markets and major financial institutions have yet to take climate change seriously. Major pensions funds and investment firms acknowledge that their portfolios are more aligned with a 3.5°C future.

Many investors continue to underestimate the risks of climate change and are still making short-sighted decisions to expand investment into carbon-intensive assets. One of the primary ways to [break the link between greenhouse gas emissions and economic activity is to change the energy supply mix, transitioning from fossil fuels to renewable sources of energy.

This transition will require policies that steer nations towards carbon neutrality well before 2050. The Secretary-General has set six priority areas for climate action during the COVID-19 recovery phase including: investing in decent jobs; no bail-outs for polluting companies; abandoning perverse fossil fuel subsidies; ending investment in and construction of coal-fired power plants by 2020; taking climate risks and opportunities into account in all financial and policy decisions; increasing international cooperation; and ensuring a just transition that leaves nobody behind.

And if we don't? We ignore these risks at our peril. Rising sea level and energy consumption will require major infrastructure investments in cities, but will cities continue to be able to raise money from municipal bonds? Will home mortgages still be available if lenders can't estimate the impact of climate risk over such a long timeline, and if there is no viable market for flood or fire insurance in impacted areas? What happens to inflation, and in turn interest rates, if the cost of food climbs from drought and flooding? How can we model economic growth if emerging markets see their productivity decline due to extreme heat and other climate impacts?

Q: What steps can the foreign policy community take to address climate-related risks in this area?

In 2015 the world came together to adopt the Paris Agreement on climate change and the Sustainable Development Goals. We are not on track to achieve the goals of either.

International cooperation is fundamental to addressing climate change as it is truly a challenge that affects all countries—and no country can solve it on its own. Progress in one place can easily be offset by increased emissions in another.

But while some countries and companies have gotten the message that climate concerns must be part of their COVID-19 recovery plans, many have not. Recent reports show that in major emitting countries, recovery stimulus packages are spending twice as much on fossil fuels than on clean energy sources.

Implementation of the Paris Agreement requires full transparency and international cooperation. Developing countries require assistance to enable them to decarbonize their economies with clean, renewable energy, and to help build adaptation and resilience against a problem that is not of their making.

National action needs to be mirrored by actions abroad. Phasing out coal domestically is necessary and essential, but countries can't stop there—they must also stop funding of coal abroad and actively offer funding for renewables instead.

Governments need to show that they are serious about honoring their national contributions under the Paris Agreement; they need to substantially increase their ambitions under their Nationally Determined Contributions. They also need to show that they are ready to meet their obligations under the Paris Agreement to ramp up financial support to developing countries.

Q: What role should central banks play in combating the climate crisis, and is there a need to adjust their mandate or the powers they possess?

For the role of central banks, I look to UN Special Envoy on Climate Finance Mark Carney, who, until recently, was the Governor of the Bank of England. According to Mr. Carney, a new and sustainable financial system is slowly, yet surely, being built that will provide funding for the initiatives and innovations of the private sector, which in turn has the potential to amplify the effectiveness of the climate policies of governments.ⁱ

“But the task is large, the window of opportunity is short, and the risks are existential,” he said, adding that “like virtually everything else in the response to climate change, the development of this new sustainable finance is not moving fast enough for the world to reach net zero.”

There are several key points that Mr. Carney makes about changing the financial landscape to fully bring climate risks and resilience into the heart of financial decision-making.

First, climate disclosure must become comprehensive, climate risk management must be transformed, and sustainable investing must go mainstream, using the framework provided by the Task Force on Climate-related Financial Disclosures—a comprehensive, practical and flexible framework for corporate disclosure of climate-related risks and opportunities.

Second, make these disclosures mandatory everywhere. “It’s time for every country to get involved because the world won’t get to net zero if the financial sector doesn’t know how our

companies are responding,” said Mr. Carney. “In order to watch we must be able to see.”

In addition, the providers of capital—banks, insurers, asset managers—and those who supervise them all need to improve their understanding and management of climate-related financial risks. The changes in climate policies, new technologies, and growing physical risks will prompt reassessments of the values of virtually every financial asset, and firms that align their business models to the transition to a net zero world will be rewarded handsomely—while those that fail to adapt will cease to exist.

Finally, financial markets increasingly recognize that sustainable investment is the new horizon that can bring enormous opportunities. To go mainstream, Mr. Carney said that sustainable investing must cover, catalyze, and support “all companies that are working to transition from brown to green.”

Q: How prepared is the financial system for regulatory shock and large investments becoming stranded assets—and what do regulators need to do to shore up the system?

It is increasingly clear that the world cannot afford to burn all of its fossil fuel reserves if we are to succeed in limiting climate change to sustainable, livable, levels. This raises the question of assets that will be abandoned well before their intended date of retirement and will not produce the expected returns. Already, coal mines are being closed as the price of coal becomes increasingly more expensive compared with renewable energy sources.

Losses due to stranded assets can imperil financial stability. According to Mr. Carney, a stress test is needed, and it is necessary to build a large coalition of central banks and supervisors to conduct these tests. “The Bank of England will become the first regulator to stress test its

ⁱ Carney, M. (2020, April 16). Mark Carney on how the economy must yield to human values. *The Economist*. <https://www.economist.com/by-invitation/2020/04/16/mark-carney-on-how-the-economy-must-yield-to-human-values>

major banks and insurers against different climate pathways, including the catastrophic business-as-usual scenario,” said Mr. Carney. “Our stress test of the world’s leading international financial centre will show how major financial firms expect to adjust their business models, and what the collective impact of these responses could be on the wider economy.”

If estimates are even approximately correct, he said, “it would render the vast majority of reserves ‘stranded’ – oil, gas and coal that will be literally unburnable without expensive carbon capture technology, which itself alters fossil fuel economics.”

Q: What is the role of insurance providers and regulators for setting price signals and helping to advance the transition to a more sustainable economy?

The insurance sector can supply expertise, money, and perspective that are crucial in helping society adjust to the reality of a transition to a sustainable economy. The sector, with assets over US\$30 trillion, can help make decisive contributions to reduce the protection gap, financing resilient infrastructure or improving reporting, risk management, and return optimization across the financial sector.

Insurers understand the physical risks of climate change that are being felt across the globe; insured losses in 2018 were US\$80 billion, double the inflation-adjusted average for the past 30 years.

In low and middle income countries, a lack of protection means that even greater costs are being borne by the uninsured. In 2017, the record US\$140 billion of insured losses was eclipsed by an additional US\$200 billion of uninsured losses.

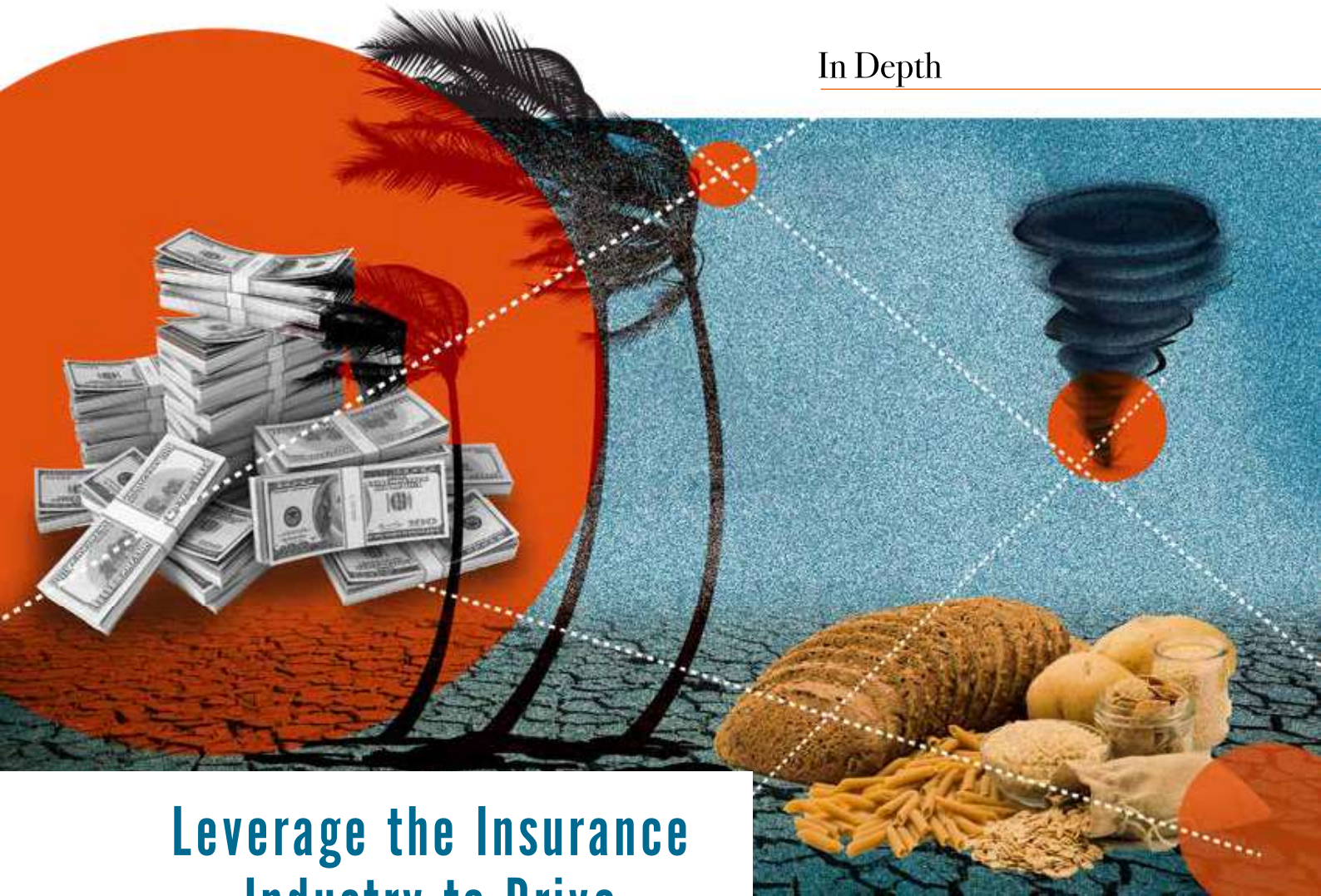
According to Mr. Carney, both sides of insurers’ balance sheets need to respond. On the liability side, the focus must be reducing the protection gap and supporting the resilience of households

and companies to growing climate risks. And on the asset side, infrastructure investments will be essential. To transition to net zero, all countries need to step up their investments in sustainable energy. The reality of climate change also means that all countries, but particularly developing and emerging economies, will need to invest in new climate-resilient infrastructure in order to adapt to the new realities of a hotter and more volatile climate.

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Leverage the Insurance Industry to Drive Climate-Proof Development

**Les Williams &
Andres Franzetti**

As the global economy becomes increasingly interconnected, so too have the risks. A single disaster or event in one region can have severe implications felt halfway around the globe. No single risk illustrates this interconnectedness better than climate change. The increased frequency of extreme weather events and their growing intensity is affecting every facet of the world and humanity. Extreme weather events have created added strain on global food production, caused supply chain disruptions, and are constantly testing the endurance of global infrastructure as well as financial resiliency. Addressing climate change is a complex and daunting task that

requires an international coordinated response from policymakers. To enact effective change, however, policymakers must do more than simply implement policies in a unilateral fashion; they must formulate public-private partnerships that can execute such actions. One key player that can help facilitate this, and has yet to be fully utilized, is the insurance industry.

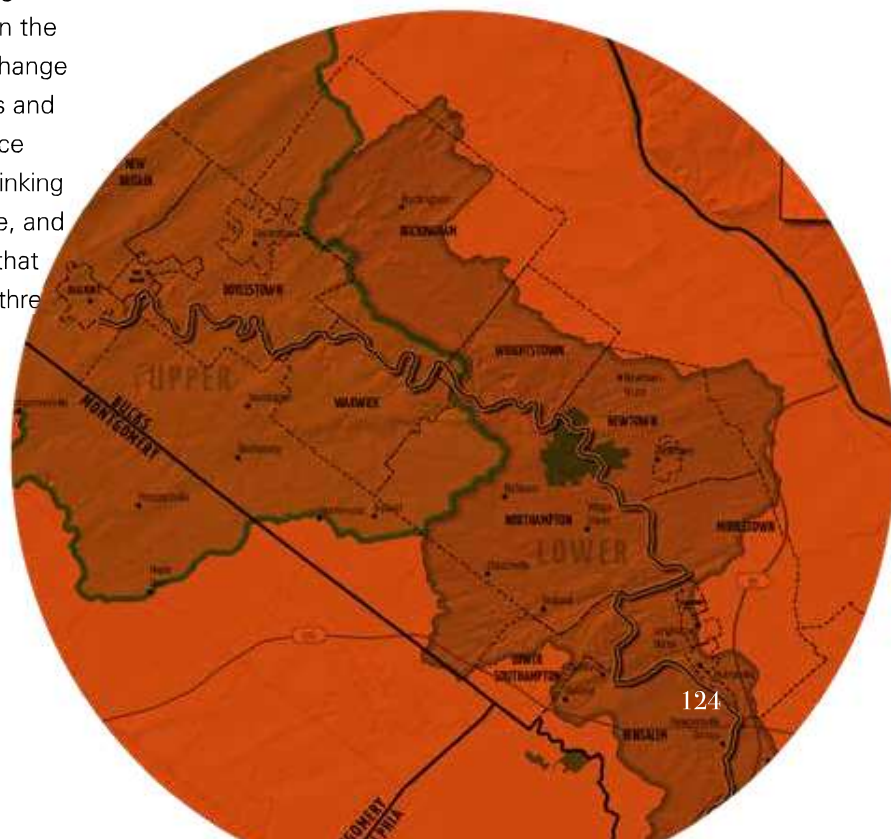
The insurance industry is uniquely positioned to drive a fundamental improvement of sustainability practices across the global economy through its vast financial assets, expertise, and influence. It touches virtually every sphere of human

endeavor, and insurers' ability to effectively grant or revoke permission for companies to operate affords them singular leverage in relation to curbing high-risk behaviors and encouraging financial resiliency. In 2019, 820 natural disasters around the globe caused overall losses of US\$150 billion¹, of which only US\$52 billion were insured. This widening protection gap, and the indiscriminate nature with which extreme weather events occur, could lead to a dramatic rise in global poverty levels unless addressed. Creating more access to insurance solutions can expedite recovery efforts to restore livelihoods and rebuild critical infrastructure so that people, communities, and economies can rebound.

Traditionally, policymakers have addressed climate change via regulatory means, like carbon taxes, cap-and-trade programs, and stricter emissions standards. From an insurance perspective, policymakers have worked with insurers in the promotion of premium rate relief for companies who practice responsible behavior, like utilizing eco-friendly manufacturing processes. This approach has proven effective and will be part of the solution to combat climate change for the foreseeable future. The next evolution in the utilization of insurance to combat climate change involves policies that encourage companies and insurers to participate in innovative insurance solutions. Future-proofing food supplies, rethinking insurance's role in energy and infrastructure, and designing resilient infrastructure solutions that are affordable for multiple stakeholders are three key areas of innovation that policymakers should pursue alongside the insurance industry.

Future-proofing Food Supplies

Policymakers understand that a critical aspect of climate change is its impact on global food supplies and agriculture. Climate change has undercut the reliability of the years of data and weather patterns farmers have traditionally depended on to plant and harvest their crops. Extreme weather events, dramatic fluctuations in precipitation, and heat patterns are having a detrimental impact on crop growth, livestock health, fisheries, and other related resources. The United Nations' International Panel on Climate Change (IPCC)² is forecasting a 2 to 6 percent decrease in global crop production every decade for the foreseeable future. While policymakers have implemented various types of crop insurance initiatives designed to help abate some of these risks for farmers, these programs utilize an outdated, retroactive risk modeling that does not contemplate climate change impacts, and provides funds for losses only once they have occurred. Such programs do nothing to meet the dynamic nature of climate



risks, nor do they help smaller, less financially stable farmers salvage their crops and livestock in real time.

When losses can be anticipated, such as during extended droughts, existing parametric insurance programs play a pivotal role for farming communities. Parametric insurance policies utilize pre-determined triggers to determine whether a loss is likely to occur, such as insufficient rainfall. This allows insurers to pay insurance claims proactively and allows farmers to replant crops within the same harvest. Some smaller innovative companies, like AcreFrica, are deploying these types of solutions in Kenya. By embedding a mobile-activated code in the bags of seeds, farmers obtain immediate drought insurance. If insufficient rainfall occurs, measured via satellites and sensors, funds are sent automatically to farmers. While countries like the United States have made crop insurance programs available and affordable to farmers, often via premium subsidies and tax incentives, this is not a widely utilized concept. Emerging countries do not have these types of advanced insurance programs in place that would provide farmers access to risk transfer products, like crop insurance. Policymakers in developing economies could work with insurers to provide more proactive and innovative parametric program structures to encourage

participation by private insurers in these markets. Parametric policies, especially those leveraging innovative technology and dynamic data modeling like that found in AcreFrica's solution, help reduce the overall severity of losses over time, create a more resilient food production supply chain, and build the necessary financial resiliency and economic stability for emerging markets.

A select number of countries have leveraged these types of programs to help establish insurance funds. Sovereign parametric insurance programs—where national governments are the buyer and the insurance relies on satellite and data modeling rather than on-the-ground damage assessments to estimate the cost of disasters—help countries manage climate disasters and enable expedited recovery efforts. Surprisingly, developing country governments have been quick to adopt these programs at the national level to offset catastrophic losses. But they have not been successful in encouraging the insurance industry to invest in creating the primary insurance markets (such as business interruption insurance vehicles) so their citizens and businesses can also benefit from these types of financial risk transfer tools.



Building for the New Normal: Impact on Energy and Infrastructure

Working towards cleaner, more efficient energy standards has long been an objective in the fight against climate change. In an interesting twist of fate, the fallout from COVID-19 has aided this task by raising the profile of clean energy projects and increasing their importance for large energy producers. For instance, in the aftermath of the pandemic, the French oil behemoth Total³ cut capital spending by more than 20 percent and eliminated share buybacks. However, the unit dubbed “new energies,” which included investments in alternative energy infrastructure such as wind and solar, was spared from budget cuts.

The pandemic lockdowns knocked the price of oil from above US\$60 a barrel down towards \$0⁴, an unprecedented benchmark. Although negative oil prices were an anomaly related to futures contracts, and prices are slowly recovering as lockdowns end and OPEC cuts production until significant demand returns, the future of oil assets remains uncertain. Policymakers had been pressuring oil companies to diversify from these stranded assets to alternative sources well before the pandemic, but the unique slump in oil demand is a rare opportunity to accelerate these efforts.

As cheap oil dominates the headlines, policymakers must work even harder to ensure that clean energy investments like those undertaken by Total continue to proliferate. They can do this by:

- » Increasing the number of new commercial and residential real estate developments required to have energy efficient systems installed, such as solar panels.
- » Working with insurers to encourage insurance premium rebates to companies and residences that adopt energy efficient infrastructure improvements, such as the installation of solar panels and other alternative energy solutions.
- » Working with insurers to expand their investments in renewable and clean energy vehicles via financial incentives (such as tax breaks). Examples of investments include MetLife’s ownership in a solar PV power plant in Texas, and Allianz having investments in wind farms and solar parks throughout Europe.
- » Increasing the adoption of Feed-in tariffs, where homeowners are compensated for any unused solar energy that is returned to the power grid.



» Easing restrictions placed on offshore wind farms.

While it is difficult to determine the lasting impacts of the pandemic on global travel, early indicators show some changes may be permanent, with lasting impacts on infrastructure maintenance at critical transportation hubs. As firms around the world have shifted to teleworking policies, travel has declined drastically, with air travel down more than 90 percent from this time last year. The International Air Transport Association (IATA) estimated that demand for air travel in 2021 will be 24 percent less than what it was in 2019, and not return to pre-pandemic levels until 2023. IATA's most pessimistic recovery scenario projected a 41 percent decrease in demand by 2021, with a five to seven-year timeframe before returning to 2019 levels. This is fueled both by consumer fears and shifting corporate views on "essential business travel" needs, especially with increased video conferencing capabilities.

This reduced travel has helped to curb greenhouse emissions in the short term, but it has also halted key infrastructure improvements at airports and other transportation hubs. To keep infrastructure improvement projects on the agenda post-pandemic, policymakers can work with insurers to establish the types of incentives that encourage energy-efficient improvements to critical infrastructure like airports and ports, such as discounts on insurance premiums.

Policymakers need look no further than California as an example. The insurance commissioner for the state recently introduced the Climate Smart Insurance Products Database⁵, a groundbreaking list of green insurance policies. Individuals and businesses alike can choose from hundreds of

insurance policies that address climate risks, such as policies that factor green energy use in the discounting of insurance premiums.

Designing Affordable Resiliency

As the world's population creeps towards 8.5 billion over the next decade, urbanization and development of megacities around the world is accelerating. This rapid urban development, however, has not fully accounted for the new risks introduced by climate change. The past few years has shown the impact of these new weather patterns—causing devastating floods across the United Kingdom and Indonesia, igniting powerful wildfires throughout Australia and the Amazon rainforest, and bringing record-breaking high temperatures to Siberia. Houston, the fourth largest city in the United States, has now seen three consecutive 1,000-year floods in the past two years. To put this in perspective, 1,000-year floods statistically have a 0.1 percent chance of happening in any given year. These types of floods not only cost billions in damages, but also displace thousands of people. Current city planning and construction has further exacerbated these weather events by limiting natural mitigation systems such as root systems, forestry, and other barriers that reduce flooding.

By working with policymakers, insurers could help guide a more resilient approach to the development of major cities. Policymakers must enact stronger guidelines for building codes, aligning with insurers' risk models to limit losses. Encouraging developers to consider the new threat landscape that extreme weather events are creating, via measures like reduced insurance premiums, can drastically reduce the overall damage and loss of economic activity.

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There is a school of thought, now backed by a growing body of evidence, that suggests that protecting nature's boundaries is critical.⁶ This is particularly important in post-disaster reconstruction cases where questions of *build back*, *build back better*, or *build back at all* require consideration of nature's lines of defense. Barrier reefs, for example, offer clear advantages in abating storm surges and coastal flooding, as do mangroves. Groups like Conservation International are exploring ways to leverage these natural defensive systems to reduce risks of flooding and property damage in collaboration with insurers. Their objective is to not only limit potential damage, but also work to establish greater access to insurance solutions in developing countries. By reducing the risk profile of property projects in developing countries, insurers can expand their risk appetite into regions they might have otherwise deemed too risky. This can be encouraged with the support of policymakers enforcing these types of "natural defense" building codes.

Integrating these natural defenses into man-made projects is not the only way to leverage the protection they provide. In many places around the world, natural assets act as the primary barrier against natural disasters and extreme weather events. Coral reefs, mangroves, wetlands, and forests can often minimize the damage caused by these events near metropolitan areas. It is equally important to protect these natural assets, much like property developments are protected.

The effects of human development and natural degradation (such as wind, rain, and erosion) takes its toll on these natural barriers, rendering them less effective over time. Fortunately, a select number of pioneering insurers have

developed highly bespoke products to insure nature's assets. One of the first, and most notable projects, was an insurance policy designed to protect the Mesoamerican Reef in the Caribbean Sea.⁷ By quantifying the economic impact of potential damages and lost GDP that would be incurred should the reef cease to exist, insurers were able to develop an insurance policy protecting this asset. The policy would pay for the maintenance, revitalization, and repair efforts needed if the reef sustained any damage.

While these types of customized insurance solutions are uncommon, it is imperative for policymakers to encourage more of these solutions into their broader strategy for fighting climate change. Working in collaboration with policymakers and the private sector, insurers can help establish added layers of financial resources that will not just maintain natural assets, but also help reduce damages and protect economic interests while building more resilient communities.

This approach allows for both proactive regulatory measures and revitalization efforts to work in unison. Multilateral organizations like the World Bank have also developed and promoted sovereign insurance funds⁸ to address these types of complex, large scale risks with insurance funds, working directly with sovereign governments. However, there is greater scope to promote this approach, e.g. by involving the participation of private sector insurers and working closer with policymakers to establish subsidiaries. Doing so would both encourage governments to offset potential losses from their balance sheets and enable private sector participation in these types of innovative risk transfer solutions.

Aligning insurance underwriting requirements and regulations, via policies that allow insurers to influence buying behaviors, further encourages the proliferation of these innovative solutions. The requirement to not only keep natural protective barriers intact as regions become developed, but also mandating the ongoing maintenance of such natural barriers as part of the insurance policy, will have a lasting impact in terms of limiting potential economic losses and damages from extreme weather events.

This is akin to the practices employed by insurers and regulators during periods of urbanization in the late 19th century. When large cities, using wood as the dominant construction material, expanded along with the adoption of electricity, stricter building codes were required as a public safety measure. This served a dual purpose from insurers' perspective: stricter building codes and fire prevention measures enabled insurers to both reduce damages and contain losses in highly urbanized environments.

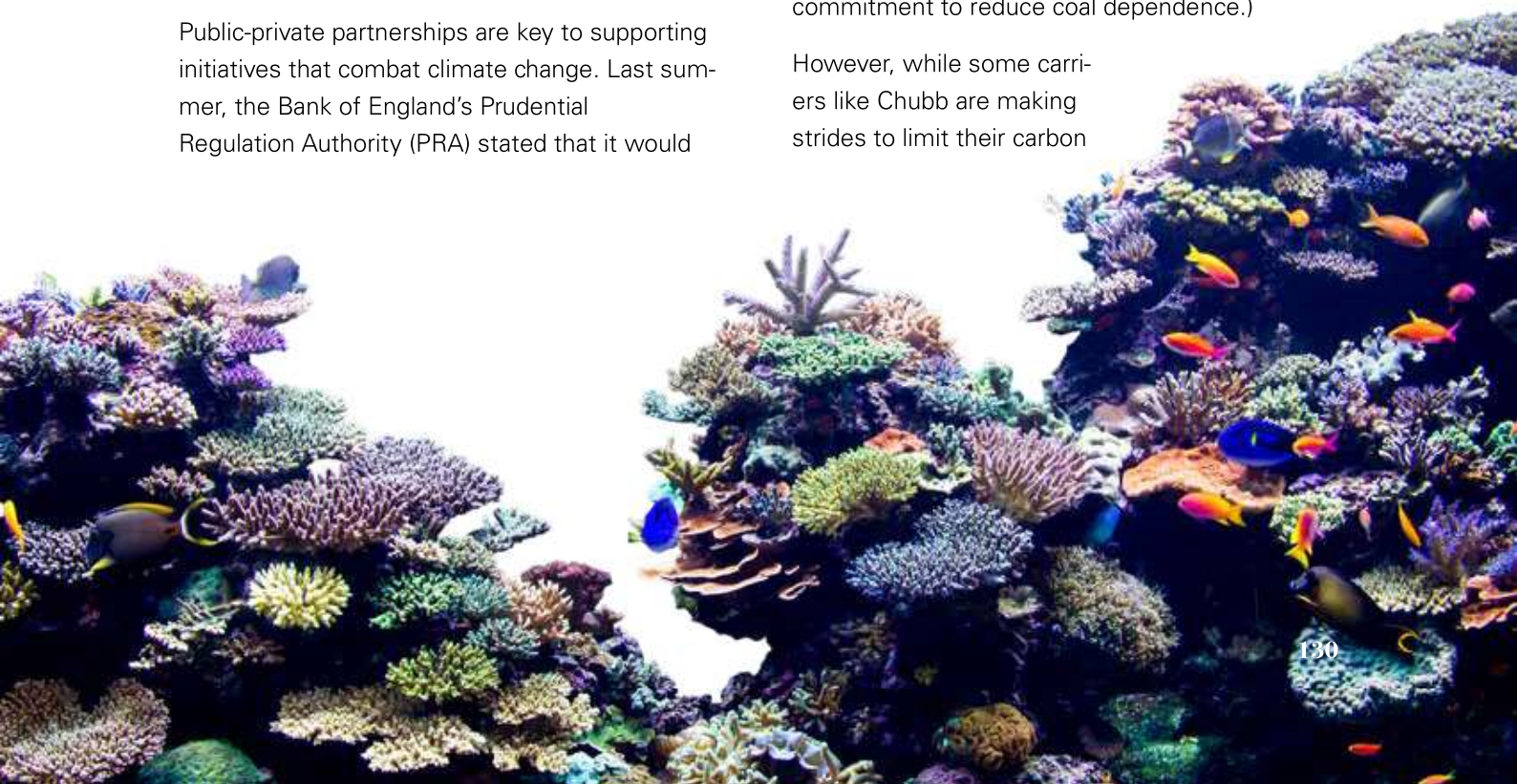
Regulation and Public-Private Partnerships

Public-private partnerships are key to supporting initiatives that combat climate change. Last summer, the Bank of England's Prudential Regulation Authority (PRA) stated that it would

work with United Kingdom insurers to determine how climate change will affect their finances.⁹ Given the impact climate change is having on insurance claims globally, the PRA is wise to investigate how climate change will affect insurers' balance sheets as it will have a direct impact on the bank's financial health. California's insurance regulator has followed a similar posture, asking insurers operating in the state to conduct veritable climate stress tests on their balance sheets to not only identify stranded assets exposed to climate change, but also recalibrate their liabilities.

Policymakers must work with insurers globally to include climate change impacts into insurance underwriting models, compelling more businesses to make climate-sensitive changes to their operations in order to secure favorable premiums or coverage in the first place. Some insurers have taken steps in this direction. The insurance giant Chubb says it will no longer underwrite risks related to the construction and operation of new coal-fired plants.¹⁰ (Exceptions to the policy will be considered until 2022 in regions that do not have practical near-term alternative energy sources and taking into account the insured's commitment to reduce coal dependence.)

However, while some carriers like Chubb are making strides to limit their carbon



footprints and wield their investment dollars to fight climate change, it is not the industry standard. Encouraging more insurance carriers to adopt this mindset and aligning shared interests would not only drive effective climate risk reduction, but also propel insurers to expand the access of their products to more emerging markets, creating broader global resiliency. The Sustainable Insurance Forum (SIF) is one such group that is gaining momentum with this effort. SIF is a global network of insurance regulators working on the sustainability issues confronting the insurance industry, and it is influencing regulation aimed at reducing the impact of climate change.¹¹

The International Chamber of Commerce (ICC) is an important element of the public-private partnership needed on a global scale. The ICC has launched its Climate Coalition, a global network of over 45 million businesses that convene on a regional level to devise solutions aimed at reducing climate change's impact—it is a type of marketplace, just as Lloyd's is the marketplace through which insurance buyers and sellers meet. The word "public-private partnership" is used casually, but the ICC's Climate Coalition is a global resource where this partnership has the chance to create public-private partnership models that can be scalable globally.

Climate change poses a global threat that requires a multi-faceted, international coalition to help change its trajectory. As governments seek to implement new guidelines and goals for how to fight its impact, they would do well to recognize that insurers can play an important role—through data sharing and financial tools that equip countries with additional funds and resources needed to rebound quickly from

disasters linked to climate change. Policymakers must encourage insurers to expand their market access, bringing sophisticated risk transfer solutions to both advanced economies and those throughout the developing world. With an aligned agenda, this type of public-private partnership can affect material change and build greater financial resiliency while navigating the new risk landscape shaped by climate change.

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