

WHY CENTRAL BANKS NEED TO STEP UP ON GLOBAL WARMING

A decade after the world bailed out finance, it's time for finance to bail out the world.

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In October 2012, the global financial system got its first taste of the effects of climate change when Hurricane Sandy roared through lower Manhattan, shutting down Wall Street. Amid the blackout, the power remained on in the tower containing the headquarters of Goldman Sachs, offering to the world a striking if accidental symbol of a future age of climate inequality.

As the investment bank stood firm, the U.S. government's outpost on Wall Street, the New York branch of the Federal Reserve, made plans to pull up stakes. In response to the hurricane, the Fed created new backup capacity for market operations farther inland, at the Federal Reserve Bank of Chicago.

Descended from historical port cities, it is not by accident that the world's leading financial centers—New York City, London, Singapore, Hong Kong, Shanghai—are vulnerable to flooding. But the larger challenge that climate change poses is not so much the physical as the systemic risk. What central bankers—the world's preeminent economic decision-makers since the 1980s—are beginning to worry about is the potential for climate change to trigger financial crisis.

They have been relatively late to the problem. Mark Carney—formerly of Goldman Sachs and the Canadian central bank, now governor of the Bank of England—can take credit for first raising the issue in financial circles at an after-dinner speech at Lloyd's of London in September 2015. Two years later in Paris, leading central bankers and regulators founded the Network for Greening the Financial System (NGFS), which aims to throw the weight of key financial institutions behind the goals of the Paris climate agreement. The

membership of the NGFS now includes most of the central banks of the G-20, such as the European Central Bank and the People's Bank of China.

THE CENTRAL BANKS HAVE THE POWERS TO BE A MAJOR PART OF THE CLIMATE RESPONSE. AS OF YET, THEIR RESPONSE IS DEFENSIVE, FOCUSING ON MANAGING FINANCIAL RISKS.

Private financial actors have also joined the green finance bandwagon. At the One Planet Summit in New York City in 2018, 23 leading global banks, eight of the top 10 global asset managers, the world's leading pension funds and insurers, the two preeminent shareholder advisory service companies, and other major financial firms—which are together responsible for managing almost \$100 trillion in assets—committed themselves to the transparency principles of the blue-ribbon Task Force on Climate-related Financial Disclosures, which was launched by Carney in his capacity as head of the Financial Stability Board and is chaired by Michael Bloomberg.

It is telling that the only financial authority not to be involved in these initiatives is the U.S. Federal Reserve, the most powerful central bank in the global financial system. But even if it were to come aboard, the most critical question would remain whether the green agenda of the world's central banks is adequate to the challenge of mitigating the effects of the climate crisis—and perhaps holding it within manageable bounds. The central banks have the powers to be a major part of the climate response. As of yet, their response is defensive, focusing on managing financial risks. The rest of us have no choice but to hope that they move into a more proactive mode in time.

NOTE: VALUES ADJUSTED TO REFLECT 2015 INFLATION RATES BASED ON COUNTRY CONSUMER PRICES INDEX, MOVING AVERAGE BASED ON EIGHT-YEAR CALCULATIONS. SOURCES: GEO RISKS RESEARCH, MUNICH REINSURANCE COMPANY, AND NAVIGANT REINSURANCE COMPANY OF ENGLAND.

Weather-Related Losses Worldwide, 1980-2016

As Carney laid it out back in 2015, three types of risk could strike the financial system: losses in the insurance system, climate change liability, and the problem of stranded assets.

The insurance system is the economy's shock absorber. Its role is to spread the impact of losses from those immediately affected to those with the wherewithal to bear the shock. In

good times, the insurers earn handsome returns for accepting this risk. They cover their own liabilities by taking out reinsurance, further spreading the losses.

It is a highly effective system and enormous in scale. Property and casualty insurance (as distinct from life and health insurance) generates global premiums in excess of \$1.5 trillion a year. The business is profitable so long as the risks remain within familiar limits and largely uncorrelated with each other. But that is precisely what climate change has called into question. As Carney put it in 2015, as a result of climate change, “the tail risks of today” will be “the catastrophic norms of the future.” Since the 1980s, the scale of weather-related insurance losses has risen fivefold to about \$55 billion a year. Uninsured losses are twice as much again.

In theory, the costs due to this shift in risk profiles should be capable of being contained within the insurance sector itself. But as the fate of AIG made painfully apparent in 2008, insurance firms are key nodes in the global financial system. The money accumulated by the insurers is reinvested in money markets, banks, and other funds. Nine major insurers are listed as globally systemically important by the Financial Stability Board. They are too big to fail.

Driven by the desire for self-preservation, insurers and actuaries have begun to develop highly sophisticated models for handling catastrophic risk. But that is precisely the kind of reinsurance doled out all too often in the years before the 2008 financial crisis. A recent modeling exercise by the rating agency S&P suggested that the insurance industry may still be underestimating possible losses from extreme weather by as much as 50 percent. Given the complexity of physical and financial interactions, the margins for error are terrifyingly small. Research sponsored by Lloyd’s of London calculated that the 20-centimeter rise in sea level near Manhattan in the prior decades increased the insured losses inflicted by Hurricane Sandy in New York by 30 percent. The far more dramatic rises forecasted for the coming decades will do incalculably more damage.

WITHOUT THE ABILITY TO INSURE AGAINST CATASTROPHIC LOSS, THE GLOBAL CREDIT SYSTEM AS WE KNOW IT WOULD SIMPLY CEASE TO FUNCTION.

Given the increase of catastrophic risk, the basic question for the insurance industry is who will pay. Will it be the industry and its shareholders, or will it be those forced to purchase coverage at exorbitant rates? One likely outcome is the worst of all: that nobody in the market could afford to pay. As the former CEO of AXA insurance group warned, referring to potential changes in average annual temperatures, whereas “a [2 degrees

Celsius] world might be insurable, a [4 degrees Celsius] world certainly would not be.” Without the ability to insure against catastrophic loss, the global credit system as we know it would simply cease to function.

At some point, market solutions won't be sufficient for the financial problems posed by climate change. Disaster will be so frequent that there will be no alternative either to abandoning insurance protection or to nationalizing risks and transferring them to taxpayers at large. In some places, that is already happening. In the United Kingdom, for example, after a bout of catastrophic flooding, a national fund was established in 2016 to offer affordable insurance to buildings in exposed areas. A bitter argument promptly ensued about whether the insurance industry or the taxpayer should provide the ultimate backstop. As of now, it is funded through a flat-rate levy on everyone taking out home insurance in the U.K., transferring the cost from owners of riverside mansions to inner city apartment dwellers.

For large countries with solid tax bases and relatively favorable climates, the socialization of climate risk may be manageable. For smaller, highly exposed island nations, it will be overwhelming. Before they are physically inundated, their sovereignty will be drowned under an economic and financial deluge.

From the point of view of humankind's collective survival—certainly of the economic and political systems we have come to know—it seems obvious that the world needs to do everything possible to mitigate the risks of climate disaster. But that comes with its own costs, so-called “transition risks.”

As optimists never fail to point out, decarbonization need not be an economic damper. It will bring spectacular new business opportunities for renewables and low-carbon technologies of all sorts. There is no reason why an environmentally sustainable economy should be one of zero growth. Nevertheless, there are bound to be losers. Investment in renewables is not free. If undertaken on the scale needed, which will run into the tens of trillions of dollars over several decades, it will squeeze consumption and investment spending in other activities, in the same way that the shale boom squeezed out other activities in Texas and Oklahoma.

Furthermore, legacy energy assets have to be taken out of commission. Assuming no spectacular breakthrough in carbon capture, if we are to stabilize temperatures below catastrophic levels, the vast majority of the world's known fossil fuel reserves will have to stay in the ground.

Leaving that energy untapped will mean as much as \$28 trillion in lost revenue for oil, gas, and coal companies over the next 20 years. And that matters for the financial system because investors already own bonds and shares connected to those assets. All told, one-third of equity and fixed income assets issued in global financial markets can be classified

as belonging to the natural resource and extraction sectors, as well as carbon-intensive power utilities, chemicals, construction, and industrial goods firms. Decarbonization would essentially strand those assets, resulting in losses in asset values for the energy sector of \$1 trillion to \$4 trillion. In the broader industrial sector, the stranded asset risks could rise to \$20 trillion.

IN THE SUBPRIME MORTGAGE SECTOR, WHICH WAS WORTH AROUND \$1 TRILLION, LOSSES RAN TO A FEW HUNDRED BILLION DOLLARS.

If financial markets have time to adjust, even such huge losses could be absorbed. But if the changes strike lenders and investors suddenly and unexpectedly, they risk triggering what Carney referred to as a “climate Minsky moment.” Hyman Minsky is the legendary financial economist whose model was widely deployed to understand the 2008 financial crisis. What Minsky describes is the way that unsustainable financial bubbles tend to expand on waves of confidence and then burst, threatening not just a recession but a financial heart attack, a crippling blow to bank balance sheets that radiates, as we saw in 2008, to the entire economy. In the subprime mortgage sector, which was worth around \$1 trillion, losses ran to a few hundred billion dollars. The carbon bubble is far larger. The question is whether the losses from shifting to a zero-emission economy have the potential to unleash a financial chain reaction as in 2008.

Optimists insist that there will be no shock. Markets will adjust smoothly. The present decline of the coal industry, they argue, is a case in point; there have been a string of bankruptcies, but the misery has been concentrated and has not triggered a systemwide crisis. In advanced economies, coal has already effectively been priced out of the market by much cheaper gas, oil, and renewables. For rich countries, abandoning coal ought to be a no-brainer. Oil, by contrast, remains too cheap and too convenient to forgo. Ending its consumption will require deliberate government action.

And that is precisely what fossil fuel interests have been lobbying hard to prevent. This resistance may make sense from the industry’s narrow point of view, but by blocking proactive decarbonization and clinging to a vision of a fossil-fueled future, it also maximizes the risk of a large-scale buildup of stranded assets. It is the old dilemma of conservative politics: By resisting progressive adjustment, they are courting a revolution. For the financial system, that is very bad news.

Carbon Budget vs. Carbon in Fossil Fuel Reserves

Scientists refer to the cumulative carbon emissions needed to maintain a global temperature rise below 2 degrees Celsius as the carbon budget, estimated at between 590 and 1,240 gigatons of carbon dioxide. The carbon potential of total reserves of fossil fuels is estimated at 2,750 gigatons of carbon dioxide after 2015, most of it from coal.

NOTE: CARBON BUDGET ESTIMATES DEPEND ON A NUMBER OF FACTORS, INCLUDING THE PROBABILITY OF WARMING STAYING BELOW 2 DEGREES CELSIUS AND THE CONTRIBUTIONS OF NON-CARBON EMISSIONS.

Economists at the Bank of England have laid out two divergent economic

scenarios for the transition away from fossil fuels. One is a world in which governments are able to persuade industry that they are serious about zero emissions. Steep taxes on carbon are backed by all parties and stakeholders and are telegraphed far in advance. This clarity of vision encourages industry to invest heavily in alternatives to carbon. As a result of large-scale investment, the cost of renewable energy falls swiftly. That, in turn, makes it more credible for governments to commit to full-scale decarbonization because the trade-offs will be less painful. Financial markets' positive assessment of government climate policy then serves to confirm the investment decisions of the private sector. In this scenario, those with fossil fuel assets face losses, but those losses are clearly identified and can be efficiently priced. The financial system doesn't suffer a shock.

In the other scenario, governments talk about climate change but take no credible steps to shift the energy mix. As a result, private sector investment in renewables remains low. Fossil fuels continue to enjoy significant cost advantages in key areas such as motor vehicles, airline travel, and electricity generation in poorer countries. Oil companies continue to deploy sophisticated new technologies to unlock new reserves. The fracking revolution continues at pace and spreads worldwide. The low cost of fossil fuels makes it hard to believe that politicians are serious about a zero-emissions future. In this scenario, fossil fuel companies like ExxonMobil and their shareholders are the winners—at least until catastrophic global warming takes hold.

When it does, the insurance industry is not the only institution that will face calamity. As people struggle to maintain their way of life, severe clashes will ensue. In 2015, Carney discussed what he called “liability risk”—the risk that heavy polluters will be sued by victims of climate change and will face crippling court-ordered damages. Among U.S. states, Massachusetts, New York, and Rhode Island have all begun to take legal action against fossil fuel companies, as have at least nine major cities and a bevy of children's charities. Those cases are making their way up the chain of appeals. The business lobby is fighting back.

But to assume that the distributional struggles unleashed by massive climate change will take the form of courtroom drama is to indulge in wishful thinking. Climate change is not the same as asbestos poisoning or tobacco litigation. It is not individualized medical conditions but an environmental shift that will affect the very basis of human existence on the planet. It will likely create hundreds of millions of refugees. If that happens, the distribution of costs is unlikely to be decided mainly in the form of financial liability assigned by the courts. Rather, more direct and unpredictable forms of political action will come into play. Some seeking redress will be reduced to social protest; the better-off will have direct access to levers of political power.

Against that backdrop, how will politicians react, and what economic consequences will those reactions have? Having failed to manage climate change, it is easy to imagine a variety of scapegoating tactics. German Chancellor Angela Merkel's snap decision to end nuclear power generation in Germany after the Fukushima nuclear accident in Japan in 2011 may be a foretaste. Sensing the popular mood, she overturned an elaborately negotiated phasing-out timetable for Germany's atomic power plants. Germany's energy utilities have still not recovered from the shock to their share prices.

THIS KIND OF SCENARIO — PROTRACTED DENIAL FOLLOWED BY PANIC-DRIVEN DECARBONIZATION — IS WHAT CONCERNS THE CENTRAL BANKERS MOST OF ALL.

This kind of scenario—protracted denial followed by panic-driven decarbonization—is what concerns the central bankers most of all. And it is closest to our reality.

On the basis of a report by the Intergovernmental Panel on Climate Change (IPCC), the world is already past the point at which a drastic turn away from fossil fuels can be avoided. In a few decades' time, nothing less than a revolution will be required. Yet under President Donald Trump, energy and environmental policy in the United States is headed in the wrong direction. And even if the Democrats gain the White House in 2020, there is little prospect that they'll manage to muster a congressional majority for rapid decarbonization. The Europeans remain nominally committed to targets set out by the 2015 Paris climate change agreement, which the United States has abandoned. But even supposedly enlightened Germany still cannot envision giving up coal before 2038.

China's authoritarian regime has come closest to following the first scenario outlined by the Bank of England—a government-assisted glide path away from fossil fuels that prevents the stranding of fossil fuel assets. Beijing has supercharged its solar power, battery, and electric vehicle industries. But overall economic growth remains Beijing's

main priority, and it has struggled to contain the runaway construction of coal-fired power plants by regional governments. The same is true in India. All the signs suggest that we are headed for a scenario of continued growth in carbon dioxide emissions, disastrous global warming in the 3 to 4 degree Celsius range, and a multitrillion-dollar problem of stranded assets.

One might think that this terrifying scenario would shake even the most sanguine technocrat into radical action. But central bankers and financial regulators have found a way to translate it into familiar terms. Since the 2008 financial crisis, they have busied themselves with something called macroprudential regulation. Bank regulators oversee private balance sheets, and they conduct resilience and stress tests. Financial stability is their most important goal. The financial sector is proposing to take the same approach—of oversight and regulation—to climate change.

That is the thinking behind Bloomberg's financial disclosures task force: identify and disclose risks so that markets and regulators can prepare themselves for the worst case. As Carney envisions it: "[Stress testing] is another area where insurers are at the cutting edge. Your capital requirements are based on evaluating the impact of severe but plausible scenarios. You peer into the future, building your defenses against a world where extreme events become the norm. ... Stress testing, built off better disclosure and a price corridor, could act as a time machine, shining a light not just on today's risks but on those that may otherwise lurk in the darkness for years to come."

Taken at face value, the macroprudential approach makes sense. It is better for the financial system to be resilient. But in adopting this approach, the central banks are using the same conservative approach to climate change that proved lacking when it came to financial reform. In the years since the 2008 financial crisis, they have perfected their tools of crisis management but without addressing the root cause of the problem: that banks were too big to fail. More than a decade on, they still are.

Of course, everything possible should be done to make the financial system resilient in the face of climate-related Minsky moments. But why is financial stability the principal concern? Central banks and financial regulators should instead be urgently exploring what they can do to alter the course of economic growth so that the world can rapidly decarbonize and thus prevent worst-case climate change—and the related financial fallout—in the first place.

One of the goals of the NGFS is to promote markets for green bonds. This is commendable. The first green bonds were issued by the World Bank in 2008. By 2018, that market had expanded to an annual volume of \$170 billion. The central banks hope to further encourage that growth by developing legal standards and an agreed classification of what actually constitutes green finance. China is leading the way in this regard. Indeed, it is one

of the first areas of financial governance in which China is setting the pace. But this almost certainly won't be enough.

NOTHING IN THE CENTRAL BANKERS' DISCUSSION SO FAR ACKNOWLEDGES THE SPECTACULAR DIMENSIONS AND URGENCY OF THIS CHALLENGE.

According to authoritative estimates by the Organization for Economic Cooperation and Development and the IPCC, an energy transition adequate to stabilize global warming will involve investing trillions of dollars per year over the next two decades. Nothing in the central bankers' discussion so far acknowledges the spectacular dimensions and urgency of this challenge.

What could central banks do to help sustain a historic investment drive running into the tens of trillions of dollars? One promising—though rather technical—possibility is to use capital requirements and collateral rules to favor green investments. Capital requirements govern the amount of money banks must hold against the risk of losses on their loans and other investments. If central banks required lower capital allocations for green investments, private banks would be keener to lend for that purpose. The incentive would be reinforced if central banks gave privileges to green bonds when they were offered as collateral in exchange for cash borrowing by stressed banks. Such a system would involve a bias by the central banks toward a particular class of investment. But precisely such preferences have been routinely used to favor both sovereign borrowing and mortgage lending. They are the foundation of government bond markets and private homeownership. And, as critics point out, bond purchases under quantitative easing programs in the wake of the financial crisis have been heavily biased toward bonds issued by fossil fuel companies.

The problem is not that favoring green bonds would induce bias. The problem is that the bias might still not be sufficient to address the urgency of the climate crisis.

If the world is to cope with climate change, policymakers will need to pull every lever at their disposal. Politicians will need to abolish carbon subsidies and replace them with a steep and growing carbon tax. Only when carbon is properly priced will there be a major economic incentive to large-scale private investment. But even that may not be enough. To generate substantial private investment, governments will need to establish a credible commitment to decarbonization. The scale of the leap required is huge. Between fiscal years 1978 and 2018, spending by the U.S. Energy Department on research in renewable

energy came to a grand total of \$27.65 billion in constant 2016 dollars. That's less than Americans spent on pet food and treats last year.

Accomplishing the necessary transformation will require a huge redirection and increase in public spending on infrastructure, research and development, and assistance to lower-income countries. Those in the United States who call for a Green New Deal or a Green Marshall Plan are, if anything, understating the scale of what is needed. Compared to what the global energy transition demands, the historic programs evoked as namesakes were modest in scale and short in duration. What is needed is something less than the kind of mobilization achieved by rich democracies such as the United States and Britain during World War II, let alone the total war efforts of the Soviet Union or Nazi Germany; nevertheless, the energy transition must be sustained over decades, and it offers no promise of the restoration of pre-crisis lifestyles in years to come.

Such a gigantic mobilization will have to be financed. Carbon taxes may look tempting. But as the yellow vest protests in France have shown, such taxes are politically disastrous. By trying to impose new fuel taxes while cutting taxes for the most affluent, French President Emmanuel Macron only succeeded in driving a wedge between lower-income taxpayers and green politics. It would be far better to distribute the proceeds of the carbon tax to the entire population, as a carbon dividend, and to rely on conventional revenue sources—progressive taxes on income, wealth, and borrowing—for the other necessary investments.

Given the long-term nature of those investments, there is a strong case for funding a large part of this decarbonization drive through the issuance of long-term debt. It is not the business of central banks to issue such loans. The debts should be issued by public investment banks or directly by national governments. But it should be the job of central banks to support this push by acting as a buyer of last resort for those long-term debts.

The public discussions of the central bankers have not yet extended this far. But managing the secondary market for public debt is historically the essential function of central banks. It is what makes them one of the most powerful agencies of the state. Like any major financial mobilization, this will no doubt raise fear of inflation. But this is one respect in which the world is fortunate: As advanced economies age, central bankers are struggling not to tame inflation but to ensure that it remains at least 2 percent per year.

WHEN FACED WITH THE PROSPECT OF GLOBAL FINANCIAL COLLAPSE, THEY ENGAGED IN EXTRAORDINARY MEASURES TO STABILIZE THE GLOBAL BANKING SYSTEM AND FLOOD THE WORLD WITH LIQUIDITY. THE CLIMATE EMERGENCY POSES A RISK THAT IS EVEN MORE EXISTENTIAL.

Acting as a backstop to the issuance of a massive volume of publicly issued green bonds is certainly a novel role for the central banks. But after their exertions in the 2008 financial crisis, central bankers, of all public officials, can't plausibly retreat into an insistence on the limits of their mandate. When faced with the prospect of global financial collapse, they engaged in extraordinary measures to stabilize the global banking system and flood the world with liquidity. The climate emergency poses a risk that is even more existential. Faced with this threat, to indulge in the idea that central banks, as key agencies of the state, can limit themselves to worrying about financial stability and can confine themselves to designing better rules for the private issuance of green bonds, is its own form of denial.

If the central bankers need inspiration, they should remember Mario Draghi's decisive intervention as president of the European Central Bank (ECB) at the height of the eurozone crisis. In the summer of 2012, with the future of the eurozone on the line, Draghi did not talk about regulation or risks or even the technicalities of the intervention he planned. What turned the tide was his determined declaration of the role of the ECB as an agency of an emerging European state: "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro. And believe me, it will be enough." In 2012, it was the financial markets themselves that were panicking, so Draghi's words had an immediate, almost magical, effect in restoring confidence.

Decarbonization is a vastly more complex technical, economic, and social problem. But to embark on solving it we need to mobilize all the resources we can muster. The essential responsibility of the central banks is to ensure that money does not stand in the way.

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