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Strengthening the Financial System to Meet the Challenge of Climate Change

Remarks by

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at

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I want to thank the Center for American Progress for inviting me to join you in discussing climate change and the U.S. financial system.[1] Let me start by noting these are my own views and do not necessarily reflect those of the Federal Reserve Board or the Federal Open Market Committee.

Climate change and the transition to a sustainable economy have important implications for the financial system. The financial system can be a powerful enabler to help the private sector manage climate-related risks and invest in the transition. It is vitally important to strengthen the U.S. financial system to meet the challenge of climate change.

Meeting the Challenge of Climate Change

Climate change is one of the major challenges of our time.[2] There is growing evidence that extreme weather events related to climate change are on the rise—droughts, wildfires, hurricanes, and heatwaves are all becoming more common.[3] Climate-related events are already adversely affecting the lives of many Americans. The economic and financial impacts are also increasingly evident: we are already seeing

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[1] I am grateful to Morgan Lewis, Beth Kiser, Carrie Johnson, Diana Hancock, and Nami Mukasa, as well as Norah Barger, Angelyque Campbell, Benjamin Dennis, Carol Evans, Joseph Firschein, Michael Kiley, Molly Mahar, Nancy Riley, Glenn Rudebusch, John Schindler, Susan Stawick, Kevin Stiroh, Nicholas Tabor, and Aurite Werman of the Federal Reserve for assistance in preparing this text.

[2] See Intergovernmental Panel on Climate Change, *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (Geneva: Intergovernmental Panel on Climate Change), https://www.ipcc.ch/sr15/.

[3] See WMO Task Team, *Global Warming and Hurricanes: An Overview of Current Research Results* (Princeton: Geophysical Fluid Dynamics Laboratory, 2020), https://www.gfdl.noaa.gov/global-warming-and-hurricanes/; and The Intergovernmental Panel on Climate Change, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* (Geneva: The Intergovernmental Panel on Climate Change, 2012), 44–48, https://www.ipcc.ch/report/managing-the-risks-of-extreme-events-and-disasters-to-advance-climate-change-adaptation/changes-in-climate-extremes-and-their-impacts-on-the-natural-physical-environment/.

elevated financial losses associated with an increased frequency and intensity of extreme weather events.[4] Some have described Pacific Gas and Electric's bankruptcy as the first climate-related bankruptcy of a major U.S. corporation.[5]

Average annual insured weather-related catastrophe losses have increased over the past decade.[6] With losses increasing, insurers are incorporating the impact of climate change into their underwriting assumptions, pricing, and investment decisions. Climate change is also likely to have a notable impact on coverage availability.[7] Some insurers have discontinued policies in fire-prone areas, which, in turn, is changing the costs of homeownership and the risk profiles of previously underwritten mortgages.[8]

Similarly, mortgages in coastal areas are vulnerable to hurricanes and sea level rise. New mortgages issued for U.S. coastal homes have, in aggregate, exceeded $60 billion annually in recent years.[9] Recent research suggests that lenders hit by hurricanes, particularly in areas not typically affected by natural disasters, tend subsequently to securitize more of their mortgage loans, which could have higher climate risks, higher

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[4] See "Billion-Dollar Weather and Climate Disasters: Overview," National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information, https://www.ncdc.noaa.gov/billions/.

[5] See Russell Gold, "PG&E: The First Climate-Change Bankruptcy, Probably Not the Last," *Wall Street Journal,* January 18, 2019, https://www.wsj.com/articles/pg-e-wildfires-and-the-first-climate-change-bankruptcy-11547820006.

[6] See "Sigma: Natural catastrophes in times of economic accumulation and climate change," Lucia Bevere and Michael Gloor, https://www.swissre.com/institute/research/sigma-research/sigma-2020-02.html.

[7] See Bradley Hope and Nicole Friedman, "Climate Change is Forcing the Insurance Industry to Recalculate," *Wall Street Journal*, October 2, 2018, https://www.wsj.com/graphics/climate-change-forcing-insurance-industry-recalculate/.

[8] See Michael Finney and Renee Koury, "Thousands of Homeowners in Fire Zones Are Losing Their Insurance,"*ABC7 News,* October 26, 2019, https://abc7news.com/insurance-companies-refusing-policies-in-wildfire-areas/5647865/.

[9] See Matthew E. Kahn and Amine Quazed, "When Climate Change Leads to Mortgage Defaults," *Bloomberg*, October 3, 2019, https://www.bloomberg.com/opinion/articles/2019-10-03/when-climate-change-leads-to-mortgage-defaults.

borrower defaults, and lower collateral values.[10] Homeowners could also face increased hardship, since many homeowner insurance policies exclude flooding.[11]

Just as there are risks, there are also promising opportunities for private-sector investments in low-carbon innovation, infrastructure, energy, and transportation. With support from accounting standard setters, credit rating agencies, and regulators, the financial system can provide useful signals to help the private sector manage climate risks and facilitate a smooth transition.[12]

Climate Risks and Financial Stability

Climate change could pose important risks to financial stability. That is true for both physical and transition risks. A lack of clarity about true exposures to specific climate risks for physical and financial assets, coupled with uncertainty about the size and timing of these risks, creates vulnerabilities to abrupt repricing events.[13] For example, a shift in the perceived frequency or severity of climate-related events, such as storms, floods, or wildfires, could rapidly change perceptions of risk and lead to rapid repricing

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[10] See Matthew E. Kahn and Amine Quazed, "Mortgage Finance in the Face of Rising Climate Risk," Working Paper 26322 (Cambridge: NBER, September 2019), https://www.nber.org/system/files/working_papers/w26322/revisions/w26322.rev0.pdf.; and Jesse Keenan and Jacob Bradt, "Underwaterwriting: from theory to empiricism in regional mortgage markets in the U.S.," *Climatic Change*, June 4, 2020, 2034–2067, https://link.springer.com/article/10.1007/s10584-020-02734-1.

[11] "Flood Insurance," FEMA, https://www.fema.gov/flood-insurance.

[12] See Mark Carney, "The Road to Glasglow" (speech at Guildhall, London, England, February 27, 2020), https://www.bankofengland.co.uk/-/media/boe/files/speech/2020/the-road-to-glasgow-speech-by-mark-carney.pdf?la=en&hash=DCA8689207770DCBBB179CBADBE3296F7982FD0); and Climate-Related Market Risk Subcommittee, *Managing Climate Risk in the U.S. Financial System* (Washington: Commodity Futures Trading Commission), https://www.cftc.gov/sites/default/files/2020-09/9-9-20%20Report%20of%20the%20Subcommittee%20on%20Climate-Related%20Market%20Risk%20-%20Managing%20Climate%20Risk%20in%20the%20U.S.%20Financial%20System%20for%20posting.pdf.

[13] See Patrick Bolton, Morgan Despres, Luiz Awazu Pererira da Silva, Frederic Samama and Romain Svartzman, *The Green Swan: Central Banking and Financial Stability in the Age of Climate Change* (Basel: Bank for International Settlements, January 2020), https://www.bis.org/publ/othp31.pdf.

of assets.[14] Similarly, changes in investor expectations about future climate policies could lead to rapid and unexpected price changes that ripple through the financial system.[15]

Assessing climate risk effects is complex because the predicted path of climate change is nonlinear and has likely tipping points, beyond which changes in climate conditions could occur rapidly, and climate forecasts based on historical data are no longer relevant.[16] This uncertainty in climate forecasts may reduce the accuracy of risk models used by investors, risk managers, asset managers, financial infrastructures, and leveraged financial institutions.

With accounting standards and disclosure frameworks for climate risk in the early stages of development and adoption, investors may lack transparency around the range of climate-related exposures facing financial firms, and non-financial short-term investors may be disinclined to fully price in longer-term climate effects.[17] Some studies suggest

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[14] See Francesc Ortega and Süleyman Taspinar, "Rising Sea Levels and Sinking Property Values: The Effects of Hurricane Sandy on New York's Housing Market," *Journal of Urban Economics* 106 (2018), 81–100.

[15] See Manthos D. Delis, Kathrin de Greiff, and Steven Ongena, "Being Stranded with Fossil Fuel Reserves? Climate Policy Risk and the Pricing of Bank Loans," Research Paper No. 18-10 (Geneva: Swiss Finance Institute, January 10, 2018), https://www.sfi.ch/en/publications/n-18-10-being-stranded-with-fossil-fuel-reserves-climate-policy-risk-and-the-pricing-of-bank-loans-s.-ongena-m.-d.-delis-and-k.-d.-greiff-2018..

[16] See Yongyang Cai and Thomas S. Lontzek, "The Social Cost of Carbon with Economic and Climate Risks," *Journal of Political Economy* (September 2019), Vol. 127, No. 6, https://www.journals.uchicago.edu/doi/pdf/10.1086/701890. "The integrated assessment models (IAM) literature has recently studied the importance of climate tipping points, which refer to 'a critical threshold at which a tiny perturbation can qualitatively alter the state or development of [the climate] system,' and tipping elements, which are defined as 'large-scale components of the Earth system that may pass a tipping point' (both definitions from Lenton et al. 2008, 1786). A key feature of a tipping element is that current temperature affects the likelihood of a tipping element experiencing a tipping event—that is, a transition to an irreversible climate process, called a tipping process. Examples of tipping processes include the irreversible melting of the Greenland ice sheet, the collapse of the West Antarctic ice sheet, and the weakening of the Atlantic thermohaline circulation."

[17] See Richard Mahony and Diane Gargiulo, "The State of Climate Risk Disclosure: A Survey of US Companies," White Paper (Chicago: Donnelley Financial Solutions, 2019),

that even well-informed investors may underestimate the likelihood of large shocks related to climate.[18] Combined with the uncertainty in the timing and magnitude of climate change itself, this mispricing could lead to financial volatility as conditions evolve and perceptions shift.

Consistent, comparable, and actionable disclosures are critical to understanding firms' exposures to climate risks and to accurately pricing that risk. The Task Force on Climate-Related Financial Disclosures (TCFD), a private sector-led initiative with support from the Financial Stability Board, provides a consistent global framework for companies and other organizations to improve standardization of climate-related financial disclosures. As of October 2020, nearly 1,500 organizations with a combined market capitalization of $12.6 trillion, including financial institutions that own or manage assets of $150 trillion, had expressed their support for the TCFD framework. This support signifies strong demand from the private sector and investors for greater transparency around climate-related risks to better inform decisionmaking.[19]

We are improving our understanding of climate risks and their impact on financial stability through staff research and engagement with other central banks on topics like climate scenario analysis. One useful approach to assessing the effect of climate-related risks is through scenario analysis of how the financial system is exposed and how it may respond to climate-related risks. Climate scenario analysis identifies climate-related

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https://www.dfinsolutions.com/sites/default/files/documents/2019-10/TCFD_II_Climate_Disclosure_V10_revisedFINAL.pdf.

[18] See Harrison Hong, Frank Weikai, and Jiangmin Xu, "Climate risks and market efficiency," *Journal of Econometrics* (October 2018), https://www.sciencedirect.com/science/article/pii/S0304407618301817?via%3Dihub.

[19] See Task Force on Climate-related Financial Disclosures, *2020 Status Report* (Basel: Financial Stability Board, September 2020), https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD_Status-Report.pdf.

physical and transition risk factors facing financial firms, formulates appropriate stresses of those risk factors under different scenarios, and measures their effects on individual firms and the financial system as a whole.[20] In part because of the different nature of climate-related risks relative to financial and economic downturns and the significantly longer planning horizon, this is distinct from established regulatory stress tests at banks, which are used to assess capital adequacy over a relatively short horizon.

Measuring, Modelling, and Managing Climate Risk in the Banking System

Supervisors are responsible for ensuring that supervised institutions are resilient to all material risks, including those associated with climate change. The economic and financial market consequences of climate change and the accompanying economic transition will have direct implications for bank balance sheets, strategies, and operations, and could increase credit, market, liquidity, or operational risk at banks. These climate-related developments may affect the creditworthiness of corporate, household, and government borrowers.[21] Climate-related risks may reduce a borrower's repayment

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[20] See Network for Greening the Financial System, *Guide to Climate Scenario Analysis for Central Banks and Supervisors*, June 2020, https://www.ngfs.net/sites/default/files/media/2020/06/29/ngfs_guide_scenario_analysis_final.pdf. The Bank Policy Institute has noted, "it is important that research continues in this area and that banks continue to make advancements in their internal scenario analysis" and that "banks, central banks and supervisors partner with the climate modelers to ensure that expertise is shared across the disciplines," Francisco Covas, "Challenges in Stress Testing and Climate Change," Bank Policy Institute, October 19, 2020, https://bpi.com/challenges-in-stress-testing-and-climate-change/.

[21] For example, Barrot and Sauvagnat find that firms experience an average drop of 2 to 3 percentage points in sales growth following a major natural disaster that hits one of their suppliers. See Jean-Noël Barrot and Julien Sauvagnat, "Input Specificity and the Propagation of Idiosyncratic Shocks in Production Networks," *The Quarterly Journal of Economics* (August 2016): Vol. 131 No. 3, https://academic.oup.com/qje/article/131/3/1543/2461213. Bernstein et al. find that homes exposed to sea level rise sell for approximately 7 percent less than equivalent unexposed properties. See Asaf Bernstein, Matthew T. Gustafson, and Ryan Lewis, "Disaster on the Horizon: The Price Effect of Sea Level Rise," *Journal of Financial Economics* 134 (November 2019), https://www.sciencedirect.com/science/article/pii/S0304405X19300807. Hsiang et al. find evidence that the poorest third of U.S. counties experience damages of up to 20 percent of county income as a result of climate change. See Solomon Hsiang, Robert Kopp, Amir Jina, James Rising, Michael Delgado, Shashank Mohan, D.J. Rasmussen, Robert Muir-Wood, Paul Wilson, Michael Oppenheimer, Kate Larsen, and Trevor

capacity or the value of assets collateralizing a loan, exposing banking institutions to losses. Similarly, climate-related risks may impact the level and volatility of asset prices, thus affecting the value of a bank's portfolios. Severe weather events may disrupt a bank's data centers or operations and impede its ability to provide financial services to customers.

Although the transmission channels through which climate risks affect banks are increasingly apparent, quantification of those risks remains challenging. To date, measurement efforts have been hampered by data gaps and methodological hurdles, many of which are unique to climate change and contribute to elevated uncertainty in estimates of climate-related risks. For instance, assessment of the potential impact of climate change on a bank may require precise data on the geolocation of a counterparty's assets and operations, as well as information on local weather patterns for those locations. It may also require knowledge of a counterparty's carbon emissions and of policies in different industries and jurisdictions. Data at this level of granularity are often unavailable or extremely difficult to acquire, presenting challenges in calculating the magnitude of climate-related financial risks. Two-thirds of respondents to a recent survey of members of the Basel Committee on Banking Supervision's Task Force on Climate-Related Financial Risks (TFCR) indicated that they lack sufficiently granular or reliable data necessary to run climate risk assessment models.[22]

Houser, "Estimating Economic Damage from Climate Change in the United States," *Science Magazine* 356 (June 30, 2017), 1362 –1369, https://science.sciencemag.org/content/356/6345/1362/.

[22] Basel Committee on Banking Supervision, "Climate-related financial risks: a survey on current initiatives," Survey (Basel: Bank for International Settlement, April 2020), https://www.bis.org/bcbs/publ/d502.pdf.

Filling these data gaps is critical for measuring the banking sector's exposure to climate risk and analyzing the implications for financial stability and prudential risks. Federal Reserve staff are participating in a new Network for Greening the Financial System (NGFS) workstream on "Bridging the Data Gaps." The workstream will create a detailed list of gaps in data items at the macroeconomic level, the market level, and the financial market participant level needed to model climate risk.[23]

Climate change also poses distinct modelling challenges. The several decades over which climate risks are projected to materialize far exceed a bank's typical risk management and planning time horizon. Moreover, financial risk models are often backward-looking and extrapolate historical trends, which, in the case of climate, may be unreliable predicators of future outcomes. New tools and forward-looking approaches will be required. [24]

We continue to strengthen our understanding of how banks are measuring and managing climate risks. Over time, it will be important to develop a framework for evaluating how banks are taking into account climate-related risk in their modelling and management of credit, market, liquidity, and operational risks. Some jurisdictions have developed programs to provide banks with supervisory expectations to manage their risks associated with climate change.[25] As a financial industry association has noted, "Climate

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[23] Network for Greening the Financial System, "WS-Bridging the data gaps workstream: Mandate and workplan from April 2020 to April 2022," September 3, 2020, https://www.ngfs.net/sites/default/files/media/2020/09/03/wsbdg_mandate_final.pdf.

[24] See Kevin Stiroh, "Emerging Issues for Risk Managers" (remarks at GARP Global Risk Forum, New York, NY, November 17, 2019), https://www.newyorkfed.org/newsevents/speeches/2019/sti191107.

[25] See, for example, Australian Prudential Regulation Authority Letter, "Understanding and managing the financial risks of climate change," February 24, 2020, https://www.apra.gov.au/sites/default/files/2020-02/Understanding%20and%20managing%20the%20financial%20risks%20of%20climate%20change.pdf; Bank of England, Supervisory Statement | SS3/19 "Enhancing banks' and insurers' approaches to managing the financial risks from climate change," April 2019, https://www.bankofengland.co.uk/-

risk analysis and measurement is—rightly—rising quickly on both the industry and regulatory agenda. Both regulators and firms want to better understand risk profiles to ensure effective management of transition and physical risks as well as potential adequacy of financial resources."[26]

We benefit from continued engagement both domestically and internationally with colleagues from other regulatory agencies, supervisory authorities, and international standard setting bodies. For instance, the Federal Reserve co-chairs the Basel Committee on Banking Supervision's TFCR.[27] The TFCR is mapping the transmission channels and studying the measurement methodologies of climate-related financial risks to the banking system. It will also examine the extent to which climate-related financial risks are incorporated in the existing Basel Framework. Based on this analysis, the TFCR is charged with and is developing recommendations for effective supervisory practices to mitigate climate-related financial risks.[28]

/media/boe/files/prudential-regulation/supervisory-statement/2019/ss319; Bank of England, Prudential Regulatory Agency Letter, "Managing the Financial Risks from Climate Change, July 19, 2020, https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/letter/2020/managing-the-financial-risks-from-climate-change.pdf?la=en&hash=A6B4DD1BE45B2762900F54B2F5BF2F99FA448424; and European Central Bank, Banking Supervision "Guide on climate-related and environmental risks: Supervisory expectations relating to risk management and disclosure," November 2020, https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.202011finalguideonclimate-relatedandenvironmentalrisks~58213f6564.en.pdf.

[26] Institute of International Finance Sustainable Finance Working Group, "Letter to the NGFS on Climate Risk Analysis and Measurement," December 16, 2019, https://www.iif.com/Portals/0/Files/content/Regulatory/12162019_iif_sfwg_climate_letter_to_ngfs.pdf

[27] See Kevin Stiroh, "The Basel Committee's initiatives on climate-related financial risks" (remarks at the 2020 IIF Annual Membership Meeting, Basel, October 14, 2020), https://www.bis.org/speeches/sp201014.htm.

[28] See Bank for International Settlements, "Basel Committee Publishes Stocktake Report on Climate-Related Financial Risk Initiatives," news release, April 30, 2020, https://www.bis.org/press/p200430.htm.

Climate Change and Community Reinvestment

Financial institutions can also help communities and individuals build greater resilience to climate risk. Recent research highlights the significant ways in which lower-income households and underserved areas are affected by natural disasters and climate risk.[29] Lower-income households with low levels of liquid savings tend to be less resilient to the temporary loss of income, property damage, displacement costs, and health challenges they face from disasters.[30] In addition, low- and moderate-income (LMI) communities are often located in areas that are particularly vulnerable to climate-related risks, have greater health-related impacts due to climate change, or have housing that is more susceptible to disaster-related damage.[31]

Under the Community Reinvestment Act (CRA), banks have an affirmative obligation to meet the needs of their local communities, including LMI communities. Existing CRA regulations allow banks to receive CRA credit for activities to revitalize

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[29] See Federal Reserve Bank of New York, "Reducing Climate Risk for Low-Income Communities," news release, November 19, 2020, https://www.newyorkfed.org/newsevents/events/regional_outreach/2020/1119-2020; and Jesse M. Keenan and Elizabeth Mattiuzzi, "Climate Adaptation Investment and the Community Reinvestment Act," *Community Development Research Briefs* (June 16, 2019), https://www.frbsf.org/community-development/publications/community-development-research-briefs/2019/june/climate-adaptation-investment-and-the-community-reinvestment-act/. See also "Record of Meeting: Community Advisory Council and Board of Governors," Federal Reserve, last modified on November 1, 2019, https://www.federalreserve.gov/aboutthefed/files/cac-20191101.pdf.

[30] See U.S. Global Research Program, *Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States* (Washington, D.C.: U.S. Global Change Research Program, 2018), https://nca2018.globalchange.gov/; Patrick Sisson, "In Many Cities, Climate Change Will Flood Affordable Housing," *Bloomberg*, December 1, 2020, https://www.bloomberg.com/news/articles/2020-12-01/how-climate-change-is-targeting-affordable-housing; and Eleanor Kruse and Richard V. Reeves, "Hurricanes hit the poor the hardest," Brookings Institution, September 18, 2017, https://www.brookings.edu/blog/social-mobility-memos/2017/09/18/hurricanes-hit-the-poor-the-hardest/.

[31] In the global development context, see Lael Brainard, Abigail Jones, and Nigel Purvis, *Climate Change and Global Poverty: a Billion Lives in the Balance* (Washington, DC: Brookings Institution Press, 2009). See also Department of Treasury, "U.S. Takes a Significant Step Toward a Clean Energy Future," news release, October 29, 2013, https://www.treasury.gov/press-center/press-releases/Pages/jl2195.aspx.

and stabilize communities after a natural disaster has occurred in certain federally designated disaster areas.[32] For natural disasters that have caused widespread devastation and economic impact, such as Hurricanes Katrina and Maria, the Board has worked with other banking regulators to provide CRA consideration for bank investments in stabilization and revitalization outside of a bank's assessment area or regional area.[33]

It is important to LMI communities and other underserved communities to be proactive in working to equitably mitigate the risks of climate change in advance. Reflecting this, the Federal Reserve's recent advance notice of proposed rulemaking on the CRA for the first time seeks feedback on providing CRA credit to encourage loans and investments that promote disaster preparedness and climate resilience.[34] We want to encourage lenders to invest and rebuild in ways that will increase resilience to future climate risks in underserved and local LMI communities. We look forward to receiving comment on our questions regarding disaster preparedness and climate resilience by the February 16, 2021, deadline.[35]

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[32] See 12 CFR 228.12(g); and Kevin Dancy, "Weathering the Storm: A Framework for Meeting CRA Obligations," *Community Development Publication* (August 2018), https://www.dallasfed.org/cd/pubs/storm.aspx.

[33] CA 06-5, CRA Consideration for Community Development Activities in Hurricanes Rita and Katrina Disaster Areas, February 24, 2006, https://www.federalreserve.gov/boarddocs/caletters/2006/0605/caltr0605.htm; CA 18-1, CRA Consideration for Community Development Activities in the U.S. Virgin Islands and Puerto Rico Following Hurricane Maria, January 25, 2018, https://www.federalreserve.gov/supervisionreg/caletters/CA%2018-1%20Hurricane%20Maria.pdf.

[34] Board of Governors of the Federal Reserve, "Federal Reserve Board issues Advance Notice of Proposed Rulemaking on an approach to modernize regulations that implement the Community Reinvestment Act," news release, September 21, 2020, https://www.federalreserve.gov/newsevents/pressreleases/bcreg20200921a.htm.

[35] See "Electronic Comment Form," Board of Governors of the Federal Reserve System, last modified on February 24, 2012, https://www.federalreserve.gov/secure/forms/ElectronicCommentForm.aspx?doc_id=R-1723&doc_ver=1. Comments may also be submitted by email to regs.comments@federalreserve.gov and include docket (R-1723) and RIN numbers (7100-AF94) in the subject line of the message.

Looking Ahead

A year ago, I laid out some of the important areas where climate change matters for the Federal Reserve's statutory responsibilities.[36] The Federal Reserve has been making important progress in laying the groundwork to incorporate climate considerations where they are material and relevant to our statutory responsibilities, today and in the future. Across the Federal Reserve System, we have sought to deepen our understanding of the implications of climate change for the U.S. economy and financial system, including through the Virtual Seminar on Climate Economics series, internal groups focused on the emerging climate literature, and academic conferences at several Federal Reserve Banks.[37] Federal Reserve staff are collaborating and sharing knowledge through our System Climate Network and other forums. We have recruited economists with expertise in climate-related topics and obtained a variety of climate-related data resources.

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[36] See Lael Brainard, "Why Climate Change Matters for Monetary Policy and Financial Stability" (remarks at "The Economics of Climate Change" Research Conference, San Francisco, CA, November 8, 2019), https://www.federalreserve.gov/newsevents/speech/brainard20191108a.htm. See also Mary Daly, "Why Climate Change Matters to Us" (remarks at "The Economics of Climate Change" Research Conference, San Francisco, CA, November 8, 2019), https://www.frbsf.org/our-district/press/presidents-speeches/mary-c-daly/2019/november/why-climate-change-matters-to-us/ and Glenn D. Rudebusch, "Climate Change and the Federal Reserve," (FRBSF Economic Letter, March 25, 2019), https://www.frbsf.org/economic-research/publications/economic-letter/2019/march/climate-change-and-federal-reserve/.

[37] See "Economic Risks of Climate Change: Implications for Financial Regulators," Federal Reserve Bank of San Francisco, last modified on December 4, 2020, https://www.frbsf.org/economic-research/events/2020/december/economic-risks-of-climate-change-implications-for-financial-regulators; Federal Reserve Bank of New York, "Reducing Climate Risk for Low-Income Communities," press release, November 19, 2020, https://www.newyorkfed.org/newsevents/events/regional_outreach/2020/1119-2020; "Virtual Seminar on Climate Economics," Federal Reserve Bank of Richmond, https://www.frbsf.org/economic-research/events/virtual-seminar-on-climate-economics; "Climate Change Economics," Federal Reserve Bank of Richmond, last modified on November 20, 2020, https://www.richmondfed.org/conferences_and_events/2020/20201119_climate_change; and Galina B. Hale, Òscar Jordà, and Glenn D. Rudebusch, "The Economics of Climate Change: A First Fed Conference" (December 2019), https://www.frbsf.org/economic-research/publications/economic-letter/2019/december/economics-climate-change-first-fed-conference/.

Last month, the Federal Reserve Financial Stability Report incorporated for the first time an analysis of the ways climate change could present risks to financial stability.[38] Similarly, the Federal Reserve Supervision and Regulation Report described how climate-related risks can create microprudential risks and how supervisors are working to better understand, measure, and mitigate these risks.[39] Last quarter, the Federal Reserve released a CRA proposal that for the first time highlighted the importance of investing in climate resilience for LMI and underserved communities.

Building on this foundation, this week the Federal Reserve Board became a full member of the NGFS. We look forward to learning from and collaborating with foreign central banks on addressing data gaps and undertaking research on the implications of climate change for financial stability and the economy.[40]

In the years ahead, there will be significant opportunities for collaboration across the U.S. regulatory agencies in strengthening the U.S. financial system to meet the challenge of climate change. Together, these efforts can help equip the deepest financial market in the world to support our dynamic private sector in assessing and addressing climate-related risks and investing in the transition.

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[38] Board of Governors of the Federal Reserve System, Financial Stability Report (Washington: Board of Governors, November 2020), https://www.federalreserve.gov/publications/2020-november-financial-stability-report-purpose.htm.

[39] Board of Governors of the Federal Reserve System, Supervision and Regulation Report (Washington: Board of Governors, November 2020), https://www.federalreserve.gov/publications/files/202011-supervision-and-regulation-report.pdf.

[40] A statement from several U.S. banks notes, "We agree… that the U.S. should join the Network for Greening the Financial System, so that U.S. financial regulators can leverage the shared learning of the international regulatory community in developing the appropriate approach to managing climate risk in the U.S. financial system." Citi, JP Morgan, and Morgan Stanley Joint Statement on CFTC Climate Report, September 2020, https://cftc.gov/sites/default/files/2020-09/Citi%20-%20JP%20Morgan%20-%20Morgan%20Stanley%20Joint%20Statement%20re%20Managing%20Climate%20Risk%20in%20the%20U.S.%20Financial%20System.pdf.