A Regulatory Green Light:

How Dodd-Frank Can Address Wall Street's Role in the Climate Crisis

REPORT BY **GRAHAM STEELE**

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ABOUT THE AUTHOR

Graham Steele is the director of the Corporations and Society Initiative at Stanford Graduate School of Business. Prior to joining Stanford GSB, Graham was a member of the staff of the Federal Reserve Bank of San Francisco. From 2015 to 2017, he was the minority chief counsel for the Senate Committee on Banking, Housing & Urban Affairs. From 2010 to 2015, he was a legislative assistant for United States Senator Sherrod Brown (D-OH), handling the senator's work as a member of the Senate Banking Committee, including four years as the staff director of the Subcommittee on Financial Institutions & Consumer Protection.

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Introduction

There should be little doubt that the climate crisis is one of the defining challenges of the 21st century. The scientific consensus on climate change is clear: Carbon emissions must be radically reduced, if not eliminated, in order to sustain the future of life on this planet.[1] Notwithstanding this consensus view, we still have a significant production gap, meaning more of our energy comes from fossil fuels than from clean sources. This production gap is driven, in large part, by a massive disparity in the financial capital that flows into dirty energy at the expense of green alternatives.[2] Indeed, the largest US financial institutions are major financers of the industries driving the climate crisis, through lending, underwriting, investing, or some combination of these activities.

For a sense of Wall Street's current contributions, and exposure, to climate change, consider that, over the last three years, the six largest banks loaned, underwrote, or otherwise financed over $700 billion in fossil fuel company transactions.[3] As of 2016, large insurers held $528 billion in fossil fuel-related investments.[4] The "big three" asset managers have massive holdings of coal stocks,[5] and the world's largest asset manager, BlackRock, alone holds nearly $61 billion in equity in four of the largest global oil companies.[6] Achieving the goal of net-zero greenhouse gas emissions, through a Green New Deal or otherwise, will

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[1] See H. Res. 109 (116th Cong.) (noting that the Fourth National Climate Assessment report found that avoiding the most severe impacts of climate change will require reducing greenhouse gas emissions by 40 to 60 percent from 2010 levels by 2030 and will require net-zero global emissions by 2050).

[2] M. Lazarus, C. Verkuijl & E. Yehle, "Closing the Fossil Fuel Production Gap," Stockholm Env't Inst. (2019), https://www.sei.org/wp-content/uploads/2019/09/closing-the-fossil-fuel-production-gap-brief.pdf. For example, as of 2017, "green bonds" made up less than 0.2 percent of debt securities issued globally. See Victor Galaz, Beatrice Crona, Alice Dauriach, Bert Scholtens & Will Steffen, "Finance and the Earth System: Exploring the Links Between Financial Actors and Non-Linear Changes in the Climate System," 53 Global Envtl. Change 296, 297 (2018).

[3] See Rainforest Action Network, "Banking on Climate Change," at 7 (2019), https://www.ran.org/wp-content/uploads/2019/03/Banking_on_Climate_Change_2019_vFINAL1.pdf. Over those three years, 33 large global banks financed $1.9 trillion in fossil fuel projects. See id., at 5.

[4] See Int'l Ass'n of Ins. Supervisors & Sustainable Ins. Forum, "Issues Paper on Climate Change Risks to the Insurance Sector," at 66–67 (July 2018), https://www.unepfi.org/psi/wp-content/uploads/2018/08/IAIS_SIF_-Issues-Paper-on-Climate-Change-Risks-to-the-Insurance-Sector.pdf. This includes investments in coal, oil, and gas, and utilities that rely on coal, oil, and gas to generate electricity.

[5] See Patrick Jahnke, "Holders of Last Resort: The Role of Index Funds and Index Providers in Divestment and Climate Change," at 5 (Mar. 9, 2019) (noting that the largest US asset manager, BlackRock, has both the largest absolute holdings of thermal coal producers and the highest density of coal holdings, and that Vanguard and State Street are in the top five for thermal coal intensity), available at SSRN: https://ssrn.com/abstract=3314906. It is also worth noting that BlackRock's thermal coal intensity is approximately 50 percent higher than the fund industry average. See id., at 6.

[6] See Inst. for Energy Econ. & Fin. Analysis, "Inaction is BlackRock's Biggest Risk During the Energy Transition," at 2, Aug. 2019 (citing a report by the consulting firm Mercer), http://ieefa.org/wp-content/uploads/2019/07/Inaction-BlackRocks-Biggest-Risk-During-the-Energy-Transition_August-2019.pdf. BlackRock recently announced that it would divest from certain coal-intensive stocks in its actively managed funds; however, it does not apply to certain large coal-intensive companies. See Thomas Biesheuvel, "Big Coal Escapes BlackRock's New Climate Plan," Bloomberg, Jan. 14, 2020 (noting that BlackRock's policy would not apply to commodities giant Glencore, which mined about 130 million tons of coal last year, because its thermal coal revenues accounted for less than 10 percent of its total revenues, below BlackRock's 25 percent threshold), https://www.bloomberg.com/news/articles/2020-01-14/blackrock-s-tough-on-coal-plan-skirts-around-the-biggest-miners.

be difficult, if not impossible, so long as we continue to allow the largest private financial institutions to make investments that dwarf their clean energy commitments.[7]

A sustainable shift to green energy requires a significant reallocation of this capital.[8] One estimate puts the amount of clean energy investment needed just to sustain the 2°C warming scenario outlined in the Paris Agreement at $200 billion per year for 40 years.[9] Unfortunately, the signs indicate that things are headed in the wrong direction. The six largest US banks are responsible for 37 percent of global fossil fuel financing since the signing of the Paris Agreement, with the amount financed rising each year.[10] Meanwhile, the largest asset managers increased their investments in carbon-intensive industries by 20 percent from 2016 to 2018.[11] While there have been some recent positive developments,[12] it appears unlikely that the largest financial institutions will take the timely and aggressive steps necessary to address the climate crisis in the absence of meaningful government action.

Achieving the goal of net-zero greenhouse gas emissions, through a Green New Deal or otherwise, will be difficult, if not impossible, so long as we continue to allow the largest private financial institutions to make investments that dwarf their clean energy commitments.

Ultimately, policymakers must deploy a number of strategies to decommission the fossil fuel industry and scale up the green energy sector to the point that it can be the exclusive source that powers our economy. While no single action will solve our climate crisis, a so-called macroprudential approach to financial regulation, one that

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7 SeeNetwork for the Greening of the Fin. Sys., "A Call For Action: Climate Change as a Source of Financial Risk," (Apr. 2019), https://www.banque-france.fr/sites/default/files/media/2019/04/17/ngfs_first_comprehensive_report_-_17042019_0.pdf.

8 See Bank of England, "Transition in Thinking: The Impact of Climate Change on the UK Banking Sector," Sept. 2018, https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/report/transition-in-thinking-the-impact-of-climate-change-on-the-uk-banking-sector.pdf?la=en&hash=A0C99529978C94AC8E1C6B4CE1EECD8C05CBF40D.

9 See Oliver Wyman, "Climate Change: Managing a New Financial Risk," at 16 (Feb. 2019) (noting that sector exclusion investment policies have been adopted in the ESG context), https://www.oliverwyman.com/content/dam/oliver-wyman/v2/publications/2019/feb/Oliver_Wyman_Climate_Change_Managing_A_New_Financial_Risk_paper.pdf. For a sense of the relative scale of this redeployment of capital, $200 billion is roughly equivalent to the total amount of credit the largest banks were extending to energy companies as of 2016. See Rachel Louise Ensign, "Banks Face New Headache on Oil Loans," *Wall St. J.*, Apr. 12, 2016, http://www.wsj.com/articles/banks-face-massive-new-headache-on-oil-loans-1460453401.

10 See Rainforest Action Network, supra, at 4.

11 See Jahnke, supra, at 5.

12 See Biesheuvel, supra; see also Russell Ward, "Goldman Sachs Curbs New Lending on Coal and Arctic Oil," Bloomberg, Dec. 15, 2019, https://www.bloomberg.com/news/articles/2019-12-16/goldman-sachs-strengthens-climate-policy-as-global-talks-falter.

addresses system-wide financial risks, has an important role to play in immediately curbing corporate investments in dirty energy industries. By not adopting effective macroprudential climate policies, financial regulators are providing a nontransparent, indirect subsidy to climate change-causing industries. As is the case with all subsidies, large financial institutions have a financial incentive to stay on the current policy path, continuing to direct massive amounts of capital into climate-change drivers like fossil fuel and deforestation businesses. This exacerbates the financing gap between fossil fuels and green energy, not to mention the risks posed by climate change to the financial system and planet.

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This paper proposes several ways of regulating the financial sector's role in climate change, focusing on the tools and authorities already available to regulators and avoiding the need to rely on legislative bodies that are subject to the outsized political influence of fossil fuel companies.[13] Specifically, under provisions of the Dodd–Frank Wall Street Reform and Consumer Protection Act, the 2010 law passed in the wake of the 2008 financial crisis, regulators have broad authority that can be used to require financial institutions to internalize the financial risks associated with lending and investments that drive climate change. These authorities can be deployed on the basis that climate change is associated with significant risks to financial stability, as some scenarios estimate that global economic losses from climate change could reach $23 trillion—three or four times the scale of the 2008 financial crisis.[14]

While other jurisdictions have focused on disclosure-based regimes to address the financial risks of climate change, the risks from climate change-causing investment practices require substantive macroprudential measures. The shortcoming of a

[13] See, e.g., John Noël, "Stranglehold: Oil & Gas Money is Choking Our Democracy," Clean Water Action/Clean Water Fund (2017), https://www.cleanwateraction.org/sites/default/files/docs/publications/Stanglehold%20-%20Clean%20Water%20Action%208-23-17.pdf.

[14] See Schroeders, "Climate Dashboard Points to 4°C Rise Despite Healthy Increase in Carbon Prices," Oct. 17, 2018, https://www.schroders.com/en/south-africa-insights-inst/markets/climate_dashboard_points_to_4_degree_rise_despite_healthy_increase_in_carbon_prices/.

transparency-only regime is demonstrated by the fact that the dirtiest industries largely already comply with disclosure best practices.[15] As one expert put it, "You can be fully compliant with current international regulatory best practice and still be the most destructive companies on earth."[16]

Global economic losses from climate change could reach $23 trillion—three or four times the scale of the 2008 financial crisis.

More accurately pricing the physical risks associated with climate change can better reveal the full cost of failure to take action, while more accurately pricing the transition risks associated with holding carbon assets can raise costs for fossil fuel investments. Addressing Wall Street's role in the climate crisis is a matter of both environmental and economic justice. Regulating the financial risks of the climate crisis will ensure that the true costs are paid by the institutions that cause climate change and will protect the communities that are affected by it.

Effective macroprudential financial regulation of climate risk is an essential component of any successful transition to a green economy, but it is not a comprehensive solution. These measures must be paired with other macroeconomic tools that will help allocate credit and capital to the new, green economy. Examples of such policies include the potential for public authorities to fund clean energy through "green" bond purchases.[17] Moreover, these policies are not a substitute for needed climate policies enacted and administered by the Environmental Protection Agency, the Department of Energy, and other government agencies. Nevertheless, the ideas presented here represent an important step forward and, importantly, one that does not require further congressional approval.

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[15] See Abby Innes, "Market Incentives Are Stacked Against Companies That Try to Care About Climate Change," *London Sch. of Econ. Bus. Rev.*, June 8, 2019 (noting that 100 percent of FTSE 100 electricity, gas, and oil companies are fully aligned with the Task Force on Climate-Related Financial Disclosure recommendations), https://blogs.lse.ac.uk/businessreview/2019/06/08/market-incentives-are-stacked-against-companies-that-try-to-care-about-climate-change/.

[16] Id.

[17] See, e.g., Patrick Honohan, "Should Monetary Policy Take Inequality and Climate Change into Account?" Peterson Inst. for Int'l Econ. Working Paper 19–18 (Oct. 2019), https://www.piie.com/sites/default/files/documents/wp19-18.pdf; see also Mike Konczal & J.W. Mason, "A New Direction for the Federal Reserve," at 42, Roosevelt Inst., Dec. 2017 (recommending that the Federal Reserve "purchase debt issued to finance investments that address climate change, including the development of non-carbon energy sources and building retrofits to reduce energy use"), https://rooseveltinstitute.org/wp-content/uploads/2017/11/Monetary-Policy-Toolkit-Report-1.pdf.

Climate Change Is a Source of Financial Risk

Just as there were warnings of a mortgage bubble before the global financial crisis,[18] analysts have been warning for years about the multitrillion-dollar carbon bubble that must be addressed before it pops and results in stranded assets and job losses.[19] The governors of the Bank of England and the Banque de France have said that, in regard to climate change, "financial policymakers and prudential supervisors . . . cannot ignore the obvious risks before our eyes."[20] Given their outsized footprints in their respective industries, in the financial system, and in the broader economy, the largest financial institutions are exposed to, and are a source of, significant risk from climate change.

The leading analyses of climate financial risk focus on two primary direct financial risks:[21]

Physical risk – Risks to financed properties and assets from the changing climate and related extreme weather events.[22] Examples of physical risk include weather-induced damage to real estate that secures a mortgage, damage to crops on properties that have farm loans, and wildfire damage to factory buildings owned by companies with small business loans.

Transition risk – The risk to the economy arising from the transition from a fossil fuel-based economy to a clean-energy economy.[23] Examples of transition risks include the declining value of fossil fuel businesses, as well as the economic impacts on certain geographic regions and communities from such a transition.[24] The risks from moving away from a carbon-based economy have the potential to

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[18] See Fin. Crisis Inquiry Comm'n, "The Financial Crisis Inquiry Report," at 16 (U.S. Gov't Printing Ofc., 2011); see also Justin Lahart, "Mr. Rajan Was Unpopular (But Prescient) at Greenspan Party," *Wall St. J.*, Jan. 2, 2009.

[19] See Carbon Tracker Initiative, "Wasted Capital & Stranded Assets," Apr. 19, 2013, https://www.carbontracker.org/reports/unburnable-carbon-wasted-capital-and-stranded-assets/.

[20] Mark Carney, François Villeroy de Galhau & Frank Elderson, "Open Letter on Climate-Related Financial Risks," Apr. 17, 2019, https://www.bankofengland.co.uk/news/2019/april/open-letter-on-climate-related-financial-risks.

[21] While these are the two main risks to financial institutions from climate change, all firms are also vulnerable to operational risk as their business operations are disrupted by weather events, and reputational risks as the societal consensus regarding climate change continues to grow. See Bank of England, supra. There are also liability risks that arise when investors, communities, and other stakeholders seek to recoup damage from a foreseeable catastrophe. See id., at 26.

[22] Bank of England, supra, at 17.

[23] See Glenn D. Rudebusch, "Climate Change and the Federal Reserve," FRBSF Economic Letter 2019-09, Mar. 25, 2019, https://www.frbsf.org/economic-research/files/el2019-09.pdf.

[24] For an example of a transition risk, see Corey Paul, "'We Are Collateral Damage': Gas Industry Grapples with Political Winds," S&P Global Market Intelligence, Oct. 15, 2019, https://www.spglobal.com/marketintelligence/en/news-insights/trending/0yXZbZ0C0lYiSuP0XEofDA2. Principles for Responsible Investment has projected the Inevitable Policy Response, a set of policies that would need to be implemented in order to meet various target scenarios, along with the accompanying macroeconomic implications. See Principles for Responsible Investment, "The Inevitable Policy Response: Forecast Policy Scenario," https://www.unpri.org/download?ac=7102.

affect financial markets by impacting energy and commodity prices, corporate bonds, equities, and certain derivatives contracts.[25]

The interplay between physical and transition risks has a mutually reinforcing dynamic. The more that financial institutions invest in fossil fuels, the more climate change that they cause, leading to more potential and actual damage to their investments. At the same time, financial institutions' continued investment in fossil fuel and deforestation-related assets makes the transition to a clean-energy economy more difficult.

The physical and transition risks of climate change manifest in financial institutions through credit risk and market risk.

Credit risk – Credit risk affects lending businesses, causing loan defaults. Climate change is an especially troublesome source of credit risk because it has a potential compounding effect. Because climate events can impact both the creditworthiness of a borrower and the value of loan collateral,[26] it means both a higher probability of default and higher losses in the event of default.

Market risk – Market risk affects the capital market activities of large, diversified bank holding companies, as well as insurers and asset managers, leading to asset devaluations. This affects the value of capital market assets like stocks and bonds that are tied to climate change, including direct exposures for companies and commodities and indirect exposures for government entities.

Climate change is a complex source of risk because of the various ways, as outlined above, that it can materialize. That is not the end of the inquiry, however, because there are additional factors that render climate financial risks a threat to the stability of the entire financial system.

[25] See Bank of England, supra, at 8.

[26] See id., at 22.

The Financial Risks from Climate Change Are Systemic

THE FINANCIAL RISKS FROM CLIMATE CHANGE ARE SINGULAR IN NATURE

The financial risks of climate change deserve special attention because, while they are similar in some respects to risks that have caused other financial crises, they are singular and unprecedented in nature.

Scope – The climate crisis has a broader impact than most other sources of risk. With global scale and scope, climate change cannot be contained as a regional phenomenon or diversified away. Climate events are already touching almost all regions of the United States, and occurring more frequently, with more intensity, and lasting longer than experienced under historical patterns, including flooding and snow in the Northeast; tornadoes and floods in the Midwest; hurricanes in the South; and more flooding, droughts, and wildfires in the West. There are also international climate events, like earthquakes and tsunamis, that can reverberate across the globe.

Size – The size of the potential losses caused by climate change far exceeds other potential risks identified by financial regulators.[27] For example, the assets exposed to potential losses exceed the entire subprime mortgage market prior to the global financial crisis.[28]

Probability – The probability of risks arising from climate change is high, as demonstrated in recent decades.[29] The climate will warm by 1.1°F over the next century

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[27] See, e.g., Fin. Stability Oversight Council, "2018 Annual Report," at 107 (cybersecurity incidents have the potential to impact tens of millions of Americans and result in financial losses of billions of dollars), https://home.treasury.gov/system/files/261/FSOC2018AnnualReport.pdf; see also Sally Bakewell & Thomas Beardsworth, "Regulators Alarmed by Risky Loans, But Don't Know Who Holds Them," Bloomberg, June 11, 2019 (citing one estimate of potential losses in the leveraged loan market of approximately $500 billion).

[28] See Ben S. Bernanke, statement before the Fin. Crisis Inquiry Comm'n, at 1–2, Sept. 2, 2010 ("With more than $1 trillion in subprime mortgages outstanding, the potential for losses on these loans was large in absolute terms; however, judged in relation to the size of global financial markets, prospective subprime losses were clearly not large enough on their own to account for the magnitude of the crisis."), https://www.federalreserve.gov/newsevents/testimony/files/bernanke20100902a.pdf.

[29] See Task Force on Climate-Related Fin. Disclosures, "2019 Status Report," at 55 (June 2019) (finding that almost half of corporate respondents said climate-related risks are material today, and almost a quarter said climate-related risks will be material in the next 1–2 years or 3–5 years), https://www.fsb-tcfd.org/wp-content/uploads/2019/06/2019-TCFD-Status-Report-FINAL-053119.pdf; see also Rhodium Group, "Clear, Present and Underpriced: The Physical Risks of Climate Change," at 2 (Apr. 2019) (noting that a 2018 report by the World Economic Forum listed extreme weather events as the most likely risk to the global economy over the next 10 years and the second most impactful), available at: https://rhg.com/wp-content/uploads/2019/03/RHG_PhysicalClimateRisk_Report_April_Final.pdf.

solely based upon emissions that are already in the atmosphere.[30] Meeting the goals in the Paris Agreement or pursuing a more aggressive path would require significant reductions in carbon emissions, possibly to zero or negative, by 2040.[31] This far exceeds the estimates of tail events predicted by financial models before the 2008 crisis.[32]

Duration – Unlike other financial crises and recessions that last months or years, many of the risks arising from climate change are irreversible and will last much longer. As the National Climate Assessment states, "Climate change resulting from human-caused emissions of carbon dioxide will persist for decades to millennia."[33]

THE RISKS OF CLIMATE CHANGE COULD UNDERMINE FINANCIAL STABILITY

According to the Australian central bank, "Climate change could emerge as a risk to financial stability if it is not properly managed, or if the size of climate-related losses increased materially," and "financial regulators have a role to play in ensuring that climate risks are effectively managed by financial institutions."[34]

The concept of "systemic risk" does not have a uniform definition in US law, but it can be summarized as the "risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy."[35] Experts have identified two primary channels through which financial institutions transmit systemic risk:[36]

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[30] US Global Change Research Program, "Fourth Nat'l Climate Assessment, Volume II," at 80 (2018), https://nca2018.globalchange.gov/downloads/NCA4_Ch02_Changing-Climate_Full.pdf.

[31] See id., at 83.

[32] See, e.g., Fin. Crisis Inquiry Comm'n, testimony of Gary Gorton, at 17–18 (stating that AIG's risk models showed that there was a 0.05 percent chance that their credit default swap portfolio would experience any losses), https://fcic-static.law.stanford.edu/NARA.FCIC.2016-03-11/SCREENED%20Interviews/2010-05-11%20Transcript%20of%20Gary%20Gorton%20Interview%20by%20D%20Noonan_1.pdf.

[33] "Fourth Nat'l Climate Assessment," supra, at 100.

[34] Reserve Bank of Australia, :"Financial Stability Review," at 59–60, Oct. 2019, https://www.rba.gov.au/publications/fsr/2019/oct/pdf/financial-stability-review-2019-10.pdf.

[35] Int'l Monetary Fund, Bank for Int'l Settlements & Secretariat of the Fin. Stability Board, "Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations," at 5–6, Oct. 2009, https://www.imf.org/external/np/g20/pdf/100109.pdf; compare Michael S. Barr, Howell E. Jackson & Margaret E. Tahyar, "Financial Regulation: Law And Policy," at 97 (2016) ("Systemic risk" is the sum of financial weaknesses, including "high leverage, widespread liquidity vulnerabilities, lack of transparency of positions, inadequate risk analysis, and interconnected exposures among market participants," such that "the failure of one or more financial institutions can cause a cascading failure that leads to the collapse of the financial system.").

[36] There is a third transmission channel, substitutability, that is less relevant for the purposes of specifically assessing climate financial risk.

Counterparty transmission channel – When financial markets are in a vulnerable condition and financial institutions are exposed to one another, losses or the threat of losses of a single large counterparty lead to runs and fragility for other counterparties.[37] An example of the counterparty transmission channel is the global insurer AIG, which underwrote billions of dollars of credit default swap (CDS) contracts on mortgage-backed securities with banks and other financial institutions. When AIG was unable to pay its counterparties for those CDS contracts, the government stepped in with a $182 billion bailout, largely to protect the solvency of AIG's counterparties, themselves major global financial institutions.

Asset liquidation channel – When a number of financial firms hold the same assets and the financial system experiences fragility, this can lead to runs or fire sales that decrease the value of those assets and thereby endanger the value of firms' capital.[38] Here, think of the market for subprime mortgage-backed securities (MBS) during the financial crisis. As mortgage defaults rose, market participants refused to buy MBS from banks that needed to sell assets to meet their funding pressures, causing the value of MBS to plummet. Again, significant government intervention was required to prop up important financial markets and institutions.

As we will see below, climate financial risk can stem from many underlying events, implicate different risks, and flow through a financial industry that is deeply interconnected. As a result, risk—particularly climate risk—can be transmitted within and across subsectors through either of these channels.

EXAMPLES OF THE MANIFESTATIONS OF SYSTEMIC CLIMATE RISKS

Climate risks have specific implications for lending, securities underwriting and investment, and insurance claim underwriting.

A climate event can impact the credit risk of a loan portfolio through the physical risks of catastrophic climate events. For example, the value of mortgage portfolios can rapidly decline in areas hit by floods, wildfires, and other natural disasters. Loans to agribusiness can lose their value during extended droughts. Transition risks, like changes in building

[37] See Jeremy Kress, Patricia McCoy & Daniel Schwarcz, "Regulating Entities and Activities: Complementary Approaches to Nonbank Systemic Risk," at 14–15 (August 24, 2018), available at SSRN: https://ssrn.com/abstract=3238059.

[38] See id., at 16.

and zoning policies and other business practices, can also affect the cash flows and appraised value of various types of loans, increasing default risk.

Climate market risk impacts the equities and bonds held in funds owned, sponsored, and managed by large financial companies. For example, transition policies can cause losses to investments in fossil fuel companies in both actively and passively managed funds of banks, asset managers, and insurers. This could lead to sudden fire sales of securities tied to these industries or commodities impacted by these policies, leading to declines in funds' valuations, increases in fund redemptions, and collateral calls.[39] Ultimately, these types of panics can result in funding problems, depletion of capital, and insolvency, which then lead to defaults on payments to counterparties, many of which may be systemically important financial institutions.

Finally, insurers specifically can face losses in their insurance business, as property and casualty companies have when catastrophic weather events like hurricanes have hit coastal areas.

Just like the climate itself, financial risk can cause spillovers and create feedback loops, leading to contagion across various portfolios and asset classes simultaneously.

Climate financial risk is not isolated to a specific financial sector or market. Just like the climate itself, financial risk can cause spillovers and create feedback loops, leading to contagion across various portfolios and asset classes simultaneously. For example, the unwillingness of property and casualty insurers to insure certain properties would have implications for real estate-collateralized lending.[40] Likewise, threats to the solvency of property and casualty insurers could result in an inability to pay claims, which in turn could increase the credit risk of bank loans that are collateralized by real estate. Banks are also providers of letters of credit that back insurers' captive reinsurance transactions,[41]

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[39] The Bank of England has described this as a potential "climate Minsky moment," wherein "wholesale reassessment of prospects could destabilise markets, spark a pro-cyclical crystallisation of losses and lead to a persistent tightening of financial conditions" which would be "difficult for banks to manage their exposures to carbon-intensive investments simultaneously, increasing losses and potentially also causing liquidity issues." Id., at 24.

[40] See id., at 22; also id., at 26 ("Physical risks from increases in global temperatures well in excess of 2°C could not only lead to more extensive physical damage to collateral and other financial assets held by banks, but also to insurance being significantly re-priced, or withdrawn, therefore increasing banking sector exposures.").

[41] See Daniel Schwarcz & Steven L. Schwarcz, "Regulating Systemic Risk in Insurance," 81 *U. of Chi. L. Rev.* 1569, 1610 (2014).

meaning an insolvency of a large insurer could lead to sudden funding pressures for banks that must suddenly allow insurers to draw on their lines of credit.

Finally, the three largest asset managers are the largest shareholders in three of the four largest US banks.[42] This exposure can flow two ways: Significant losses at bank holding companies would have a detrimental impact on the value of asset managers' holdings, while instability of an asset manager could necessitate fire sales of bank equities, leading to distress in the banking sector.

THERE IS A HIGH DEGREE OF UNCERTAINTY IN THE PROJECTION OF CLIMATE RISKS

When considering hypothetical climate scenarios, it is important to remember that there is a high degree of uncertainty in predictive climate modeling. The National Climate Assessment reminds us that the interdependency between sectors and systems directly exposed to climate, such as energy, water, and agriculture, and those less directly exposed to climate, like the financial sector, "can lead to complex behaviors and outcomes that are difficult to predict."[43]

The vulnerability of our climate to sudden and unpredictable movements that lead to cascading effects is analogous to our understanding of how financial panics manifest.[44] In a climate-driven financial crisis, the unpredictability of climate forecasting is compounded by the unpredictable behavior of financial markets.[45]

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[42] See José Azar, Sahil Raina & Martin Schmalz, "Ultimate Ownership and Bank Competition," at 45 (May 4, 2019), available at SSRN: https://ssrn.com/abstract=2710252. For the fourth bank, Wells Fargo, the Big Three asset managers are three of the four largest shareholders.

[43] "Fourth Nat'l Climate Assessment," supra, at 640.

[44] See Bernanke, statement before the Fin. Crisis Inquiry Comm'n, supra, at 4 (describing the crisis of 2008 as a "cascade of events").

[45] See Vincent Bielski, "Chaos Scientist Finds Hidden Financial Risks That Regulators Miss," Bloomberg, Oct. 3, 2019 (comparing agent-based modeling in natural sciences as analogous to measuring the complexity of the financial system), https://www.bloomberg.com/news/features/2019-10-03/chaos-scientist-finds-hidden-financial-risks-that-regulators-miss.

The Dodd-Frank Act Can Be Used to Regulate the Systemic Risks of Climate Change

The Dodd–Frank Wall Street Reform and Consumer Protection Act (also known as the Dodd-Frank Act or simply Dodd-Frank) was passed in 2010 in response to the global financial crisis of 2008. The law was intended to prevent "recurrence of the same problems" that gave rise to the financial crisis, but also to create a "new regulatory framework that can respond to the challenges of a 21st century marketplace."[46] Climate change is one of the defining challenges of the 21st century marketplace and, indeed, the entire planet.

Dodd-Frank established new mechanisms for federal regulators to tackle risks that threaten the entire financial system, many of which can be deployed to mitigate the financial risks of climate change. Financial regulators should force large financial institutions to internalize the costs of climate risk through rigorous stress tests, increased capital requirements, and margin requirements for capital markets trading. If these measures prove insufficient, financial agencies have authority to prohibit institutions from making further investments in climate change drivers and to require divestiture from climate-related assets.

THE DODD-FRANK ACT SETS A FRAMEWORK FOR USING MACROPRUDENTIAL REGULATION TO ADDRESS SYSTEMIC RISK

Dodd-Frank created a "new framework to prevent a recurrence or mitigate the impact of financial crises that could cripple financial markets and damage the economy."[47] While post-crisis financial reform legislation codifies the terms "financial stability" and "systemic risk" into law, it delegates significant discretionary authority to regulatory agencies to define the meaning of those terms and the measures to be taken to address them.[48] The approach taken by regulators to mitigate systemic risk and preserve financial stability is known as "macroprudential regulation."[49]

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[46] S. Rep. 111–176 at 42 (2010).

[47] Id., at 2.

[48] See Daniel K. Tarullo, "Financial Stability Regulation," at 3, Oct. 10, 2012 (noting that "Dodd-Frank creates a legal and institutional framework within which financial stability regulation is to be developed but, with a couple of notable exceptions, it does not delineate the steps that should actually be taken to promote financial stability"); see also id., at 9 (observing that the Office of Financial Research "defines financial stability descriptively rather than analytically, 'that the financial system is operating sufficiently to provide its basic functions for the economy even under stress'").

[49] Macroprudential regulation is loosely defined as "an effort to control the social costs associated with excessive balance sheet shrinkage on the part of multiple financial institutions hit with a common shock." Samuel G. Hanson, Anil K. Kashyap & Jeremy C. Stein, "A Macroprudential Approach to Financial Regulation," 25 *J. of Econ. Perspectives* 1, 5 (2011).

The first source of macroprudential regulation in the Dodd-Frank Act is the Financial Stability Oversight Council (FSOC), a multiagency council tasked with identifying emerging systemic risks and providing for their comprehensive regulation.[50] FSOC has the authority to designate a nonbank financial company to be supervised by the Federal Reserve and subject to enhanced regulation if the "material financial distress at the US nonbank financial company, or the nature, scope, size, scale, concentration, interconnectedness, or mix of the activities . . . could pose a threat to the financial stability of the United States," based upon a set of factors.[51] Nonbank financial companies designated by FSOC to be subject to enhanced supervision and prudential standards are commonly referred to as systemically important financial institutions (SIFIs).

The second source of macroprudential regulation is section 165 of the Dodd-Frank Act, which requires the Federal Reserve to craft "enhanced prudential standards" for the largest bank holding companies and any designated nonbank SIFIs.[52] Section 165 authorizes the Federal Reserve to establish these prudential standards in order to "prevent or mitigate risks to the financial stability of the United States that could arise from the material financial distress or failure, or ongoing activities, of large, interconnected financial institutions[.]"[53]

Investments in assets that drive climate change, including fossil fuels and industries that engage in deforestation, involve systemic risks that we can begin to address using macroprudential regulation under section 165 of Dodd-Frank.

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[50] See Simon Johnson & Antonio Weiss, "The Financial Stability Oversight Council: An Essential Role for the Evolving US Financial System," at 3–5, Peterson Inst. for Int'l Econ. Policy Brief 17–20 (May 2017), https://www.piie.com/system/files/documents/pb17-20.pdf.

[51] 12 U.S.C. §§ 5323(a)(1), (a)(2). These factors include leverage; off-balance-sheet exposures; the nature, scope, scale, concentration, interconnectedness, and mix of the company's activities; the amount of assets; and the amount and types of the company's liabilities.

[52] See 12 U.S.C. § 5365. There are currently no companies identified as nonbank SIFIs.

An amendment to the law has changed the provision's applicability, but it clearly applies to all bank holding companies with $250 billion or more in total assets and could apply to bank holding companies with $100 billion or more in assets. It is important to note that the measure of "total consolidated assets" has been interpreted to include assets under management. See Bd. of Governors of the Fed. Reserve Sys., Definitions of "Predominantly Engaged in Financial Activities" and "Significant," Nonbank Financial Company and Bank Holding Company, 78 Fed. Reg. 20,756, 20,774 (Apr. 5, 2013).

[53] See 12 U.S.C. § 5365(a)(1). This provision has been interpreted to provide the Federal Reserve with a financial stability mandate. See Bd. of Governors of the Fed. Reserve Sys., "Enhanced Prudential Standards for Bank Holding Companies and Foreign Banking Organizations," 79 Fed. Reg. 17,240, 17,263 (Mar. 27, 2014); see also Saule T. Omarova & Margaret E. Tahyar, "That Which We Call A Bank: Revisiting the History of Bank Holding Company Regulation in the United States," 31 Rev. of Banking & Fin. Law 113, 129 (2011-2012) (arguing that "the post-crisis reform is reinventing the [Bank Holding Company Act . . . as the basic infrastructure for systemic risk regulation across the entire financial services sector"); see also Tarullo, "Regulating Systemic Risk," supra, at 4–5 (citing section 165 as a provision where "financial stability is used as a stated goal motivating a new regulatory or supervisory authority without itself being the standard used in the realization of that authority").

By failing to use this authority to address the systemic risks of climate change, the Federal Reserve is arguably neglecting this important mandate. See Honohan, supra, at 2 (arguing that the "secondary mandates, whether explicit or implicit, of central banks arguably warrant attention to large systemic issues like climate change and inequality, to the extent that these can be significantly influenced without detracting from the primary goals of monetary policy").

MACROPRUDENTIAL REGULATIONS WOULD ADDRESS KEY SYSTEMIC RISKS FROM CLIMATE CHANGE

A macroprudential approach to the financial risks of climate change would:

- Address the concentration of climate change-driving financial activities in the largest financial institutions;
- Measure and mitigate potential climate change-driven losses across institutions' balance sheets; and
- Seek to manage a transition away from those risks in a manner that protects both financial institutions and the economy at large.

Regulators would incorporate the risks of climate change-causing activities and climate-driven events into prudential regulations on the basis of their potential implications for financial stability.

A comprehensive macroprudential framework for climate financial regulation would subject insurance companies and asset managers to federal supervision and regulation by the Federal Reserve through designation as non-bank SIFIs by the FSOC. Those nonbank SIFIs, and the largest bank holding companies, would then be subject to the following regulations by the Federal Reserve under section 165 to mitigate climate financial risks.[54]

Capital

Climate change is increasing the riskiness of certain financial assets,[55] but capital rules and regulations do not capture that risk. A capital ratio measures the portion of an institution's assets that are funded through liabilities with flexible repayment terms, which do not require repayment in times of stress.[56] Banks must maintain a minimum ratio of this loss-absorbing capital relative to their assets, known as a risk-based capital ratio, while other institutions use measures like "solvency" that are conceptually similar. Capital requirements measure the value of an institution's assets using a system of "risk weights." For example, a 100 percent risk weighting means a dollar-for-dollar representation of an asset in the

[54] The standards could either be issued unilaterally by the Federal Reserve, or pursuant to a recommendation from FSOC that the prudential standards applied to those firms by the Federal Reserve address the financial risks of climate change.

[55] See Rhodium Group, supra, at 10 (noting that climate change has made commercial real estate more vulnerable to high wind and flooding exposure and higher energy costs).

[56] Liabilities that qualify as "capital" include, but are not limited to, common equity and retained earnings.

denominator of the capital ratio. Banking regulations require banks to have a minimum ratio of loss-absorbing capital equivalent to 6 percent of their risk-weighted assets.

Capital regulation is a central component of macroprudential regulation,[57] and is the first standard required by section 165.[58] While the studies of data and modeling are limited in this regard,[59] capital rules can be updated to increase risk weights on the basis of climate risk to reflect the potential for capital-intensive losses based on financial climate risks.[60] Risk weights should be increased for loans and investments in climate change-driving assets, as well as credit exposures to sectors that are vulnerable to the effects of climate change.[61] These risk weights should apply, at a minimum, to all financing of the industries that encompass the 100 producers that, as of 2017, accounted for 71 percent of global industrial greenhouse gas emissions.[62] They should also apply to agribusinesses operating in areas that are sensitive to deforestation, to better reflect the true costs and risks from the climate impacts of these investments.

Stress Testing

Under section 165, the Federal Reserve, in coordination with the appropriate primary financial regulatory agencies and the Federal Insurance Office (FIO), conducts "stress tests" of non-bank SIFIs and large bank holding companies to ensure that they have the necessary capital to absorb losses as a result of adverse economic conditions.[63]

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[57] See Hanson, Kashyap & Stein, supra, at 7–12.

[58] See 12 U.S.C. § 5365(b)(1)(A)(i). In addition to section 165, the Federal Reserve also has authority under the Bank Holding Company Act to issue regulations and orders, including capital requirements, for bank holding companies, and authority under the Federal Deposit Insurance Act to require a bank holding company to cease and desist its engagement in any unsafe or unsound practices. See 12 U.S.C. §§ 1844, 1818(b)(1), (3).

The Federal Reserve can also establish capital requirements for a small group of insurers who own thrift banks. See 12 U.S.C. §§ 1467a, 5412.

Finally, under the Securities Exchange Act and the Commodity Exchange Act, the SEC and Commodity Futures Trading Commission (CFTC) can establish capital requirements for legal entities that deal securities and derivatives, respectively, including subsidiaries of nonbanks like asset managers and insurers. See 15 U.S.C. § 78o-10(e)(1)(B); see also 7 U.S.C. § 6(e).

[59] See Network for the Greening of the Fin. Sys., supra, at 26–27.

[60] See George Hay, "Fiddling with Bank Capital Can Help the Planet," Reuters BreakingViews, Sept. 27, 2019, https://www.reuters.com/article/us-natixis-climate-breakingviews/breakingviews-fiddling-with-bank-capital-can-help-the-planet-idUSKBN1WC11P.

[61] See, e.g., Marcelo Ochoa, Dana Kiku & Ravi Bansal, "What Do Capital Markets Tell Us About Climate Change?," 2016 Meeting Papers 542, at 42, Society for Economic Dynamics (2016), https://ideas.repec.org/p/red/sed016/542.html.

For example, in 2016 the Federal Reserve proposed significant risk weights for certain types of investments, tied to bank holding companies' liability under environmental laws, in the range of 300 percent to 1,250 percent. See Bd. of Governors of the Fed. Reserve Sys., "Regulations Q and Y; Risk-Based Capital and Other Regulatory Requirements for Activities of Financial Holding Companies Related to Physical Commodities and Risk-Based Capital Requirements for Merchant Banking Investments," 81 Fed. Reg. 67, 220, 67,227-28 (Sept. 30, 2016), https://www.gpo.gov/fdsys/pkg/FR-2016-09-30/pdf/2016-23349.pdf.

[62] See Carbon Disclosure Project, "CDP Carbon Majors Report 2017," at 8 (2017), https://www.cdp.net/en/reports/downloads/2327.

[63] See 12 U.S.C. § 5365(i)(1)(A). Bank holding companies between $100 billion and $250 billion in assets will still be stress tested every other year. These firms must also conduct their own internally-run stress tests and report results to their regulators.

While the Federal Reserve has tested a range of recession scenarios and incorporated specific stringent scenarios for the largest global banks, supervisory stress tests have not incorporated climate-related losses, and regulators have not sufficiently modeled basic climate risks.[64] At a minimum, regulators should incorporate a series of scenarios involving climate shocks and transition pathways into agency-run supervisory stress tests.[65]

In addition to climate stress testing, the loss projections resulting from those tests should be integrated into companies' minimum capital ratios and capital planning processes. This would ensure that companies' capital allocation decisions accurately reflect the financial risks posed by fossil fuel and deforestation financing activities, and the climate change that results from that financing.

Margin

Section 165 of the Dodd-Frank Act allows the Federal Reserve to implement any other macroprudential standards that it "determines are appropriate."[66] This provides the Federal Reserve with broad authority to use prudential standards to limit fossil fuel investments on the basis of their prospective risks to financial stability. Transactions that involve securities and derivatives require institutions to post a certain amount of assets, known as margin, to their counterparties to protect against their projected credit exposure. So-called "haircuts" establish the value of the margin collateral that must be posted.

The purpose of margin requirements is to limit the portion of securities purchases that can be made using borrowed money, a practice that limits the amount of leverage that can build up within these financial markets.[67] In the climate context, adding leverage to financial contracts that involve fossil fuel assets adds debt that both hastens potential defaults and amplifies the size of losses if issuing companies experience stranded assets, financial distress, or bankruptcy.

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[64] See Network for the Greening of the Fin. Sys., supra, at 14.

[65] See Int'l Monetary Fund, "Global Financial Stability Report: Lower for Longer," at 91, Oct. 2019 (recommending that "policymakers should incorporate ESG principles, and climate-related financial risks in particular, into financial stability monitoring and assessment and into microsupervision (such as stress testing)"); see also Network for the Greening of the Fin. Sys., supra, at 24.

[66] 12 U.S.C. § 5365(b)(1)(B)(iv).

[67] See Hanson, Kashyap & Stein, supra, at 15–16 (margin requirements are a "broad-based regulation" to "impose similar capital standards on a given type of credit exposure").

Stringent margin requirements should be imposed on transactions that involve securities and derivatives tied to, at a minimum, the big 100 corporate emitters, deforestation-related agribusinesses, and fossil fuels and other climate-damaging commodities.[68] Ideally, they would apply both to the calculation of credit exposures of such transactions and to the haircuts applied to collateral. Such rules would help to reduce the likelihood, and the cost, of a "climate Minsky moment" hitting financial markets.

Ideally, they would apply both to the calculation of credit exposures of such transactions and to the haircuts applied to collateral. Such rules would help to reduce the likelihood, and the cost, of a "climate Minsky moment" hitting financial markets.

Portfolio Limits

The broad discretionary grant of the "deems appropriate" authority in section 165 can also be used to institute more sweeping restrictions. This authority should be invoked to cap the overall size or growth of the allowable amount of climate change-related assets in lending and investment portfolios.[69] Alternatively, limits could be set on loan and investment portfolios, such as total portfolio CO2 emissions or entire sector exclusions, to limit climate financial risks.[70]

Divestiture

Section 121 of Dodd-Frank empowers the Federal Reserve to determine that a bank holding company or nonbank SIFI poses a "grave threat to the financial stability of the United States."[71] With the FSOC's approval, the Federal Reserve can take a host of actions, including imposing limitations on an institution's activities, prohibiting activities,

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[68] The Federal Reserve also has the authority under the Securities Exchange Act to set margin requirements on the purchases of certain securities, such as stocks, in certain private transactions. See 15 U.S.C. § 78g. It can also delegate this authority to the SEC and CFTC.

Separately, under the Securities Exchange Act and the Commodity Exchange Act, the SEC and CFTC can establish margin requirements for legal entities that deal securities and derivatives, respectively, including subsidiaries of nonbanks like asset managers and insurers. See 15 U.S.C. § 78o-10(e)(1)(B); see also 7 U.S.C. § 6(e).

[69] See Sarah Rogerson, "Forest 500 Annual Report 2018: The Countdown to 2020," at 27, Global Canopy (2019) (recommending financial institutions implement financing policies to limit the growth of assets tied to deforestation).

The Federal Reserve has separate authority under the Federal Deposit Insurance Act to restrict the asset growth of bank holding companies, subject to Federal Reserve-imposed conditions. See 12 U.S.C. § 1818(b)(1), (3).

The SEC also has authority under the Investment Company Act to restrict the composition of mutual funds, exchange-traded funds, and other funds. See, e.g., Securities & Exchange Comm'n, Investment Company Liquidity Risk Management Programs, 81 Fed. Reg. 82,142 (Nov. 18, 2016).

[70] See Oliver Wyman, supra, at 16.

[71] 12 U.S.C. § 5331(a).

or forcing asset divestiture.[72] While this authority contains some built-in procedural complexity, a Federal Reserve determined to mitigate climate risks should use it to force the largest, most systemic bank holding companies, insurers, and asset managers to divest of their climate change-causing assets.[73]

Activities-Based Regulations

Under section 120 of Dodd-Frank, the FSOC can also make recommendations to all federal financial regulators[74] to apply prudential standards for specific activities that "could create or increase the risk of significant liquidity, credit, or other problems spreading" across the financial system, or in low-income, minority, or underserved communities.[75] This section 120 authority is non-binding, meaning that it should not solely be relied upon to address systemic risk.[76] However, the FSOC could use this provision as a last resort—a way to "name and shame" agencies into regulating activities that fall within their jurisdictions.

For example, the FSOC could urge the SEC to use its authority to suspend or revoke the ability of a credit rating agency to rate any class or subclass of securities, as a way to compel the rating agencies to enforce standards of due diligence in the rating of securities that are tied to climate change.[77] This would ensure that the credit rating agencies have policies and practices in place to properly evaluate the financial risks of climate change, price in those risks, and ensure that they are reflected in the credit ratings of securities, especially those issued by fossil fuel companies and commodities companies responsible for deforestation.

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[72] See 12 U.S.C. § 5331(a)(3)-(5). The Federal Reserve has other authorities to unilaterally restrict bank holding companies' activities. For example, section 4 of the Banking Holding Company Act gives the Federal Reserve authority to prohibit bank holding companies' physical commodities ownership and investment where those activities "pose a substantial risk to the safety or soundness of depository institutions or the financial system generally." 12 U.S.C. § 1843(k)(1). Banks have used this commodities authority to directly own and hold significant stockpiles of oil products, natural gas products, coal, electricity, and agricultural products. See generally Permanent Subcomm. on Investigations, US Senate, "Wall Street Bank Involvement with Physical Commodities," Nov. 2014, https://www.hsgac.senate.gov/imo/media/doc/REPORT-Wall%20Street%20Bank%20Involvement%20With%20Physical%20Commodities%20(12-5-14).pdf.

[73] Separately, section 5 of the Bank Holding Company Act empowers the Federal Reserve to force a bank holding company to divest of any subsidiary that "constitutes a serious risk to the financial safety, soundness, or stability" of a bank. 12 U.S.C. § 1844(e). This is a lower legal threshold than section 121, and could be used to force a bank holding company to sell lines of business that have substantial investments in climate change-driving business. See, e.g., Dan Freed, "Wells Fargo Energy Investment Unit Sought Risky Deals, Faces Losses," Reuters, Apr. 12, 2016, https://www.reuters.com/article/us-wells-fargo-energy-idUSKCN0XA09K.

[74] In addition to the Federal Reserve, the Office of the Comptroller of the Currency (OCC) and the Federal Deposit Insurance Corporation (FDIC) regulate banking entities. The Securities and Exchange Commission (SEC) regulates securities markets, and the Commodity Futures Trading Commission (CFTC) regulates commodities and derivatives markets. The Consumer Financial Protection Bureau (CFPB) is responsible for consumer protection in the context of most, but not all, financial products.

[75] 12 U.S.C. § 5330(a).

[76] See Kress McCoy & Schwarcz, supra.

[77] See 15 U.S.C. § 78o–7(d)(2)(B)(i).

Responding to Likely Objections

THE FINANCIAL RISKS OF CLIMATE CHANGE ARE MANAGEABLE

While there is substantial evidence that climate change is a systemic risk to the financial sector, some argue that the risk is manageable and will be slow in developing. It is worth noting, however, that financial losses are dependent upon temperature,[78] a factor that is unpredictable. In fact, climate models are more likely to underestimate than to overestimate the amount of long-term future climate change, especially in the case of trends in extreme events.[79] As discussed above, the climate reaches tipping points that lead to changes in state, feedback loops, and other unpredictable dynamics that accelerate or increase the severity of the impacts of climate change.[80] Examples of tipping points that appear to have already been reached include retreating "grounding lines" that accelerate ice melting in parts of Antarctica and deforestation "diebacks" that turn boreal forests from carbon sinks into carbon sources.[81]

It may be suggested that climate change will merely cause financial institutions to either spread climate risks to other parties through financial contracts, or to merely disinvest in, or exit altogether, certain markets most likely to be affected by physical risks.[82] This view assumes that the climate will behave in ways that are linear, when, as we have seen, it is unpredictable and only becoming more so.[83] Even long-term risks can have near-

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[78] See Ochoa, Kiku & Bansal, supra, at 13 ("because both the frequency and the size of future damages depend on the level of temperature, so does the magnitude of the price of temperature risks").

[79] See "Fourth Nat'l Climate Assessment," supra, at 102.

[80] See id., at 100.

[81] See Timothy M. Lenton, Johan Rockström, Owen Gaffney, Stefan Rahmstorf, Katherine Richardson, Will Steffen & Hans Joachim Schellnhuber, "Climate Tipping Points—Too Risky to Bet Against," 575 Nature 592 (2019).

[82] As the risks of climate change become increasingly clear, private institutions will undoubtedly seek to shift the financial burden to other actors, such as US taxpayers. For example, in the United States $600 billion of property is located within one mile of the coast, currently covered under the National Flood Insurance Program, but which will not be viable in coming decades absent intensive adaptation investments. See Int'l Ass'n of Ins. Supervisors & Sustainable Ins. Forum, supra, at 17. In addition, one study suggests that mortgage lenders in areas hit by billion-dollar climate events do not stop lending in those areas following such events, but rather shift mortgage risk via securitization to the taxpayer-backed government sponsored enterprises (GSEs). See Amine Ouazad & Matthew E. Kahn, "Mortgage Finance in the Face of Rising Climate Risk," NBER Working Paper No. 26322 (Sept. 30, 2019). A macroprudential approach to climate risk must address the possibility that certain financial actors, including bank holding companies and insurers, have taken steps to "hedge" their perceived risks from climate change, and follow risks wherever they migrate (for example, should banks sell climate-exposed assets to "shadow banking" entities like private equity funds). A comprehensive climate change program would also address environmental justice and equity, although some of those issues are better dealt with through other investment programs and policies that are outside the scope of macroprudential regulation.

[83] See, e.g,, Geoff Dembicki, "Four Ways the Climate Crisis Could Trigger a 2008-Style Economic Crash," Vice, Dec. 3, 2019, https://www.vice.com/en_us/article/ne8amk/four-ways-the-climate-crisis-could-trigger-a-2008-style-economic-crash.

term consequences as investors suddenly decide to re-price assets for a low-carbon future.[84] For those reasons, it is possible, if not probable, that the financial risks of climate change are understated.

Treating the financial risk of climate change as a long-term, linear decline that can be managed in a predictable and orderly manner fundamentally misunderstands the unstable nature of the earth's ecosystem. As one expert put it: "This is not a world of calculable risk in a closed system, but of radical uncertainty in an evolving system that depends wholly on the biosphere."[85] As a result, "the doctrine that we need to apply is the precautionary principle, which declares that you act urgently to prevent ruin."[86]

CLIMATE CHANGE IS NOT THE RESPONSIBILITY OF FINANCIAL REGULATORS

Some financial policymakers have said that climate change is "something that is entrusted to other agencies," and "it's just not clear that it's really in our ambit."[87] Other regulators have argued that it is "beyond our mandate to advocate or provide incentives for a particular transition path."[88] As demonstrated above, the systemic nature of climate financial risks makes oversight of the financing of climate-change drivers central to regulators' responsibility to preserve financial stability.[89] The inevitable conclusion is that, by not addressing the consequences of this financing, US regulators are neglecting their duty and authority of preserving financial stability.

A traditional view of bank supervision posits that regulators' only job is ensuring that supervised entities have risk management policies and procedures in place to manage risks, without questioning underlying credit and business decisions. Yet some regulators are rethinking this model.[90] In one example, the Federal Reserve recently reviewed

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[84] See Rudebusch, supra, at 3 (noting that "prices of equities and long-term financial assets depend on expected future conditions, so even climate risks decades ahead can have near-term financial consequences").

[85] Innes, supra.

[86] Id.

[87] Lydia DePillis, "Most Economic Forecasts Have a Big Blind Spot: Climate Change," CNN Money, Aug. 17, 2018, https://money.cnn.com/2018/08/17/news/economy/climate-change-economic-forecasts/index.html.

[88] Kevin J. Stiroh, "Emerging Issues for Risk Managers," Introductory Remarks at the GARP Global Risk Forum, Fed. Reserve Bank of N.Y., Nov. 07, 2019, https://www.newyorkfed.org/newsevents/speeches/2019/sti191107.

[89] See Saule Omarova, "New Tech v. New Deal: Fintech as a Systemic Phenomenon," 36 *Yale J. on Regulation* 735, 749 (2019) (describing the "New Deal regulatory paradigm" as entrusting "responsibility for ensuring financial stability to public actors operating on a macro-level").

[90] See, e.g., Remarks by FDIC Vice Chairman Thomas M. Hoenig to the Conference on Supervising Large Complex Financial Institutions, Federal Reserve Bank of New York, Mar. 18, 2016 (calling for full-scope examinations and statistical sampling in large banks examinations), https://www.fdic.gov/news/news/speeches/spmar1816.pdf.

banks' involvement in physical commodities and proposed new substantive regulations in response to recent catastrophic environmental events and lessons learned from the financial crisis.[91] The Federal Reserve's response to the catastrophic risks of physical commodities is a tacit acknowledgement that, to be effective, supervisors and regulators are in fact required to understand the risks inherent in the businesses to which financial institutions provide capital.

Not addressing the financial risks of climate change is itself a policy choice.

It must also be acknowledged that not addressing the financial risks of climate change is itself a policy choice. Even regulators who have acknowledged the potential risks climate change could pose to financial stability have cautioned that supervision should be limited to a "risk management perspective, not a social engineering one."[92] Embracing the reality of near-unanimous climate science—that climate change is caused by greenhouse gas emissions driven by fossil fuel consumption and exacerbated by deforestation—is not "social engineering" in any sense of the term. Ignoring the risks—environmental, economic, and financial—of a climate crisis is a choice based upon ideology and politics and requires rejecting the mountain of empirical data before us.

THE FINANCIAL INDUSTRY CAN MANAGE ITS OWN CLIMATE RISK

While some may argue that private industry is better situated to address climate risks, experience shows us that, left to their own devices, financial institutions do not effectively self-regulate, particularly as it relates to catastrophic risks.[93] Financial institutions have fundamental incentives to maximize short-term profits, share price, and bonus payouts over the long-term well-being of the climate.[94] Research also suggests that modest voluntary industry actions relating to the environment, often referred to as "greenwashing," can actually have the effect of forestalling more substantive government regulations.[95]

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[91] See 79 Fed. Reg. 3,329 (Jan. 21, 2014); see also 81 Fed. Reg. 67,220 (Sept. 30, 2016).

[92] Stiroh, supra note 83.

[93] See Permanent Subcomm. on Investigations, supra, at 237 (noting that a "comparison of the level of Morgan Stanley's capital and insurance reserves against estimated costs associated with 'extreme loss scenarios,'" found that, "like its peers, 'the potential loss exceeds capital and insurance' by $1 billion to $15 billion"); see also Schwarcz & Schwarcz, supra, at 1611 ("Some insurers, for instance, do surprisingly little to mitigate catastrophe risks that have not occurred in the recent past (consistent with the availability heuristic, a commonly understood behavioral bias.)").

[94] See Anat R. Admati, "A Skeptical View of Financialized Corporate Governance," 31 *J. of Econ. Perspectives* 131 (2017).

[95] See Neil Malhotra, Benoit Monin & Michael Tomz, "Does Private Regulation Preempt Public Regulation?" 113 *Am. Political Science Rev.* 19, 30–32 (2018).

Industry surveys indicate that financial institutions are failing to take appropriate and timely action to get ahead of a climate crisis.[96] Financial institutions lag the rest of corporate America on policies and practices regarding financing commodities that drive deforestation.[97] Some banks are making commitments to fund more clean energy projects, but their "clean financing is in any case swamped by the volumes they funnel into fossil fuels."[98] The biggest banks in particular are falling short of the rest of the banking industry's modest efforts to combat climate change.[99]

Relying upon financial institutions to self-correct, rather than taking regulatory action driven by the public interest, echoes the failure to address the run-up to the subprime mortgage crisis.

Relying upon financial institutions to self-correct, rather than taking regulatory action driven by the public interest, echoes the failure to address the run-up to the subprime mortgage crisis. Regulators learned the pitfalls of relying on industry-run projections when the risk measurement and capital calculations that had been outsourced to banks' and credit rating agencies' proprietary modeling failed spectacularly.[100] As observers sounded alarms about predatory lending practices that were happening in their communities in the lead-up to the financial crisis of 2008, some bank executives viewed the collapse in housing prices as "wholly unanticipated,"[101] while other executives recognized that they were taking outsized risks and rationalized that "as long as the music's playing, you've got to get up and dance."[102]

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96 See, e.g., Bank of England, supra, at 23 ("While many banks identified the potential impacts from physical risk factors on property and real estate, few identified the potential impacts from the transition."); see id., at 33 ("Many [banks] also suggested the short tenure of loans to vulnerable industries indicated that these could be exited relatively quickly if the counterparty's credit risk increases. However, if multiple banks look to exit loans simultaneously this could create feedback effects exacerbating the risks of stranded capital and leading to a disorderly adjustment to carbon-intensive energy supply."); see also Int'l Ass'n of Ins. Supervisors, supra, at 22 ("A 2016 analysis found that nearly 60% of the 116 insurers surveyed recognise climate risk as an issue; however two fifths of these insurers are taking no action to adjust their portfolios.").

97 See Rogerson, supra, at 24.

98 Rainforest Action Network, supra, at 6.

99 See Emily Chasan, "Biggest Banks Sit Out Industry Climate-Goals Pledge," Bloomberg, Sept. 23, 2019, https://www.americanbanker.com/articles/biggest-banks-sit-out-industry-climate-goals-pledge.

100 See Erik Gerding, "Code, Crash, and Open Source: The Outsourcing of Financial Regulation to Risk Models and the Global Financial Crisis," 84 *Wash. L. Rev.* 127, 155-57 (2009).

101 Fin. Crisis Inquiry Comm'n, supra, at 3.

102 Michiyo Nakamoto & David Wighton, "Citigroup Chief Stays Bullish on Buy-outs," *Fin. Times*, July 9, 2007 (quoting former Citigroup CEO Charles Prince).

REGULATING THE FINANCIAL RISKS OF CLIMATE CHANGE WOULD BE TOO COSTLY

It is important to consider the issue of cost, and the potential winners and losers in any policy transition. It is true that it will take time for the benefits of policy transformation to be realized, while any potential implementation costs will occur soon.[103] Yet we know that the potential losses from failing to actively manage the financial risks of climate change far exceed the economic costs of mitigation over the long run.[104] Regulatory foot-dragging will only increase the costs of climate change;[105] in particular, it will increase the severity of climate damage as well as the disorderly nature of any transition.[106]

> **Effective financial regulation offers a tool to manage an orderly transition to a clean-energy economy and a means of protecting manufacturing jobs and vulnerable communities from the fallout of a climate-driven financial crisis.**

As with any asset bubble, when the carbon bubble pops, certain communities will pay the highest price. For example, manufacturing and construction jobs are particularly vulnerable to recessions,[107] and younger, less-educated, and minority families suffered the greatest wealth declines during the financial crisis.[108] Rather than costing jobs in these industries and communities, effective financial regulation offers a tool to manage an orderly transition to a clean-energy economy and a means of protecting manufacturing jobs and vulnerable communities from the fallout of a climate-driven financial crisis.

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[103] See Network for the Greening of the Fin. Sys., supra, at 20.

[104] See Carbon Disclosure Project, "Major Risk or Rosy Opportunity: Are Companies Ready for Climate Change?" at 22 (2018) (finding that the "financial services industry accounts for 72% of the total potential financial impact figure ($677 billion) and dwarfs the cost to manage the same risks ($2.2 billion)"), https://www.cdp.net/en/reports/downloads/4588.

Showing that scaling back the financing of climate change-driving industries is not excessively burdensome, some large, global financial institutions have already taken steps to scale back their financing of coal generation. See Unfriend Coal, "Insuring Coal No More: The 2019 Scorecard on Insurance, Coal and Climate Change," at 3 (Dec. 2019) (finding that 17 insurance and reinsurance companies that control 9.5 percent of the primary insurance market and 46.4 percent of the reinsurance market have ended or limited their cover for coal projects, and that 35 insurers with combined assets amounting to $8.9 trillion, or approximately 37 percent of the insurance industry's global assets, have adopted some form of coal divestment policies), https://unfriendcoal.com/wp-content/uploads/2019/12/2019-Coal-Insurance-Scorecard-soft-version-2.pdf.

[105] See Ochoa, Kiku & Bansal, supra, at 15.

[106] See Bank of England, supra, at 26 ("Late, abrupt and significant policy action aimed at reducing greenhouse gas emissions would also significantly increase credit and market risks, particularly in carbon-intensive sectors.").

[107] See Christopher J. Goodman & Steven M. Mance, "Employment Loss and the 2007–09 Recession: An Overview" 5, *Monthly Labor Review*, Apr. 2011, https://www.bls.gov/opub/mlr/2011/04/art1full.pdf.

[108] See William R. Emmons & Bryan J. Noeth, "Household Financial Stability: Who Suffered the Most from the Crisis?" *The Regional Economist*, at 11, July 2012, https://www.stlouisfed.org/~/media/files/pdfs/publications/pub_assets/pdf/re/2012/c/financial_stability.pdf.

THE FINANCIAL INDUSTRY CAN BLOCK GOVERNMENT ACTION

Many of the financial stability authorities in Dodd-Frank are untested. While these, and other financial authorities, are understood to offer regulators a wide range of discretion and fewer avenues for legal challenge, the financial industry may still consider seeking legal recourse to block government action—or at least threaten to do so. There are risks to any institution that decides to sue its own regulator.[109] More importantly, however, there would be significant reputational repercussions for any bank, insurer, asset manager, or financial industry trade association that might contemplate standing in the way of climate progress. The hypocrisy of signing a letter defending the Paris Agreement on the one hand,[110] while suing to block macroprudential climate regulation on the other, could become a political and public relations liability for any institution. Climate activists are already targeting financial institutions through both media and direct action campaigns, resulting in significant reputational risks stemming from companies' involvement in climate change.[111]

In addition, there is always a potential that businesses may sue to block all manner of regulation. Officials who abandon their responsibilities in the face of prospective legal challenges are effectively ceding their authority to the whims of the industries that they are meant to oversee—and doing so without so much as a fight. Given the urgency of the climate crisis, now is the time for bold, undaunted government action.

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[109] See Lee Reiners, "If Banks Sue the Fed Over Stress Tests, Will They Win?" The FinReg Blog, Duke Law Global Fin. Markets Ctr., Oct. 7, 2016 (noting the potential regulatory blowback and poor optics for banks suing their regulator), https://sites.duke.edu/thefinregblog/2016/10/07/if-banks-sue-the-fed-over-stress-tests-would-they-win/.

[110] See Andrew Winston, "US Business Leaders Want to Stay in the Paris Climate Accord," *Harvard Bus. Rev.*, May 30, 2017, https://hbr.org/2017/05/u-s-business-leaders-want-to-stay-in-the-paris-climate-accord.

[111] See, e.g., Zack Colman, "Climate Groups Turn Up the Heat on Big Banks, Insurers," POLITICO, Jan. 13, 2020, https://www.politico.com/news/2020/01/13/climate-groups-protest-098251. In several high-profile cases, these pressure campaigns have already led companies to revise their business practices. See Sinead Cruise, Lawrence White, Ross Kerber, "BlackRock Vows Tougher Stance on Climate After Activist Heat," Reuters, Jan. 14, 2020, https://www.reuters.com/article/us-blackrock-fink/blackrock-vows-tougher-stance-on-climate-after-activist-heat-idUSKBN1ZD12B.

Conclusion

A comprehensive plan for addressing the climate crisis can and should incorporate a role for financial regulation. Strengthened by the legal authorities set forth in Dodd-Frank, regulatory agencies can immediately help move financial markets, and by extension the economy as a whole, toward the goal of net-zero carbon emissions.

The path will not be an easy one. The current administration is disinclined to take any action to address the threat of climate change. It has likewise not shown any interest in the financial risks of climate change,[112] to say nothing of its responsibility to address systemic risk more generally.[113] The financial industry, moreover, is known to hold particular sway in the policymaking process.[114] Nonetheless, a future administration, or any independent regulatory agency, that is not captured by industry has authorities that could be helpful in addressing the risks of climate change.

Serious macroprudential regulation will not solve all of the challenges of our changing climate, but it will complement and help smooth other policy paths. Take, for example, proposals to effectively nationalize the fossil fuel industry.[115] Unless climate risks are properly priced through macroprudential regulation, buying out investors in industries propped up by the carbon bubble will serve as bailouts—providing a windfall to the very companies currently financing the climate crisis at the expense of the public.

In this sense, macroprudential regulation mitigates the moral hazard problem posed by the industries and financiers driving climate change.[116] Under the status quo, the worst polluters are being treated as if they are "too big to fail." Instead, it is our planet, not the big banks or Big Oil, that we cannot afford to let fail.

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[112] The issue of climate change has not been mentioned in any of FSOC's annual reports since 2017.

[113] Evidence includes the recent de-designations of all four nonbanks SIFIs, the shift from an approach including designations to an activities-only approach, see Kress, McCoy & Schwarcz, supra, and the decline in the FSOC's budget and staffing from 2016 to the present, compare US Dep't of the Treasury, FY 2016 Budget in Brief, at 91 (reporting a budget of $9.8 million and 31 staff), with US Dep't of the Treasury, FY 2019 Budget in Brief, at 77 (reporting a budget of $6.9 million and 18 staff).

[114] See, e.g., Ryan Grim, "Dick Durbin: Banks 'Frankly Own The Place,'" Huffington Post, May 30, 2009, https://www.huffpost.com/entry/dick-durbin-banks-frankly_n_193010.

[115] See, e.g., Carla Skandier, "Quantitative Easing for the Planet," Next Syst. Project, Aug. 30, 2018, https://thenextsystem.org/learn/stories/quantitative-easing-planet.

[116] See Tarullo, "Financial Stability Regulation," supra, at 2 (Moral hazard is "the expectation that, when faced with the prospect of either variant of a major blow to the financial system, government authorities will provide funds or guarantees to the firm to keep it functioning," which means that creditors "may not price into their credit or investment decisions the full risk associated with those decisions.").

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