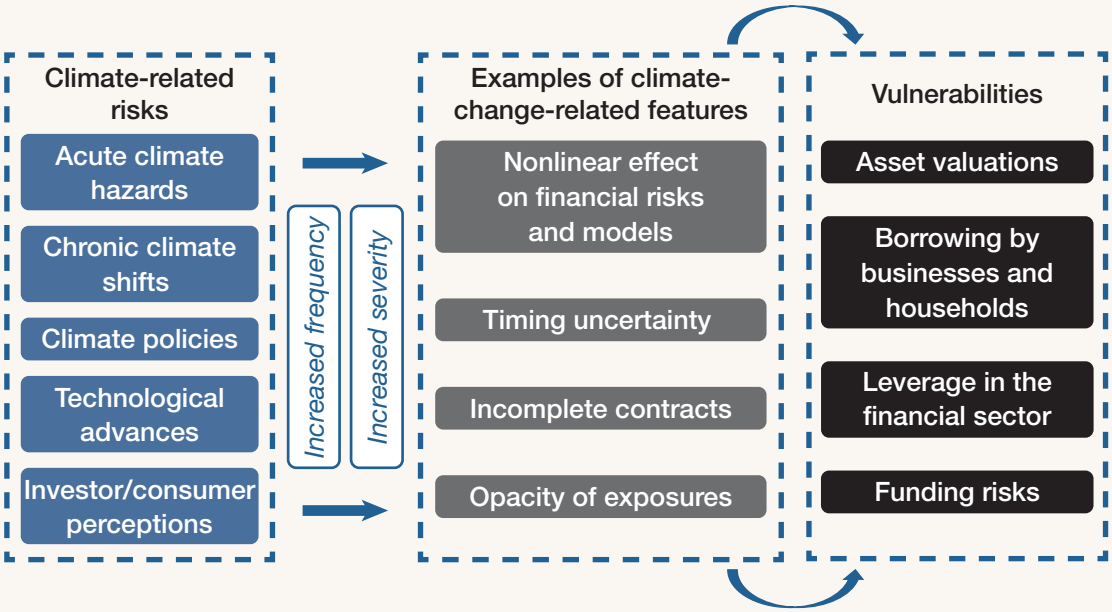
The Implications of Climate Change for Financial Stability

Climate change refers to the trend toward higher average global temperatures and accompanying environmental shifts such as rising sea levels and more severe weather events. Climate change adds a layer of economic uncertainty and risk that we have only begun to incorporate into our analysis of financial stability. Different sectors of the economy and geographic regions face different risks that will diverge from historical patterns. In this discussion, we focus on how climate change, which increases the likelihood of dislocations and disruptions in the economy, is likely to increase financial shocks and financial system vulnerabilities that could further amplify these shocks.

These climate risks are present over various horizons. The figure illustrates how these risks become financial stability risks. Acute hazards, such as storms, floods, droughts, or wildfires, can quickly alter, or reveal new information about, future economic conditions or the value of real or financial assets. Moreover, in the presence of rapid shifts in public perceptions of risk, chronic hazards (like a slow rise in sea levels) have the potential to produce similar abrupt repricing events. These repricing events and direct losses associated with climate hazards can result in an increased frequency and severity of financial shocks; the timing and repercussions of these shocks are difficult to predict in advance.

Possible Transmission from Climate-Related Risks to Financial System Vulnerabilities



Source: Federal Reserve Board staff.

Features of climate change can also increase financial system vulnerabilities, as illustrated in the figure. Opacity of exposures and heterogeneous beliefs of market participants about exposures to climate risks can lead to mispricing of assets and the risk of downward price shocks. Similarly, uncertainty about the timing and intensity of severe weather events and disasters, as well as the poorly understood relationships between these events and economic outcomes, could lead to abrupt repricing of assets. Climate risks thus create new vulnerabilities associated with nonfinancial and financial lever-

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age. In regions affected by severe events, households and businesses could become overlevered if the value of their assets or income prospects become impaired. Levered financial institutions may be exposed to losses from disasters made more likely by climate change that are not accurately reflected in current financial models; for example, financial models may lack sufficient geographical granularity to accurately connect local physical damages to financial exposures. The financial system is also vulnerable to amplification effects of these damages if contracts are incomplete and do not capture all damages and if poorly understood financial exposures cause spillover effects or financial contagion.

One example of how climate change is likely to increase financial stability risks is through real estate exposures. Some residential and commercial properties will be subject to acute hazards such as storm surges associated with rising sea levels and more intense and frequent hurricanes. Continued productive use of these properties would require investment and adaptation. As inundations or storm surges become more frequent, the expected value of exposed real estate may decrease, which may in turn pose risks to real estate loans, mortgage-backed securities, the holders of these loans and securities, and the profitability of nonfinancial firms using such properties.

With perfect information, the price of real-estate-linked assets and the valuations of claims linked to such assets—held by banks, insurers, investment funds, and nonfinancial firms—would already reflect these climate-related risks. However, given the uncertain timing and severity of future climate-related flooding and the associated opacity of asset exposures, investors in real-estate-linked assets may react abruptly to new information about a region's exposure to climate-related financial risks. A sharp repricing, in turn, could create incentives to fire sale such assets by leveraged financial and nonfinancial firms. These asset valuation changes would be amplified by financial and nonfinancial leverage, funding risks, and interconnections across holders of the collateral-based assets, thereby creating risks to financial stability.

Several policies or other factors could moderate climate-related financial vulnerabilities or the likelihood of large shocks. Within the financial system, increased transparency through improved measurement and disclosure could improve the pricing of climate risks, such as an increase in the frequency and severity of extreme weather events, thereby reducing the probability of sudden changes in asset prices. Continued research into the interconnections between the climate, the economy, and the financial sector could strengthen knowledge of transmission, clarify linkages and exposures, and facilitate more efficient pricing of risk. Outside the financial system, efforts to mitigate or adapt to the physical effects of climate change through technological advances and policy changes could also reduce climate risks in the long run.

Staff members throughout the Federal Reserve System continue to research the relationships among climate risks and economic and financial risks and, ultimately, to better identify the transmission channels through which climate risks could affect the financial sector. This work is conducted in close consultation with other U.S. agencies and international groups in an effort to strengthen the knowledge and understanding of this growing economic and financial stability issue.

The Federal Reserve is evaluating and investing in ways to deepen its understanding of the full scope of implications of climate change for markets, financial exposures, and interconnections between markets and financial institutions. It will monitor and assess the financial system for vulnerabilities related to climate change through its financial stability framework. Moreover, Federal Reserve supervisors expect banks to have systems in place that appropriately identify, measure, control, and monitor all of their material risks, which for many banks are likely to extend to climate risks.