Climate Change May Trigger Financial Tipping Points. Here's How Leaders Can Prepare.

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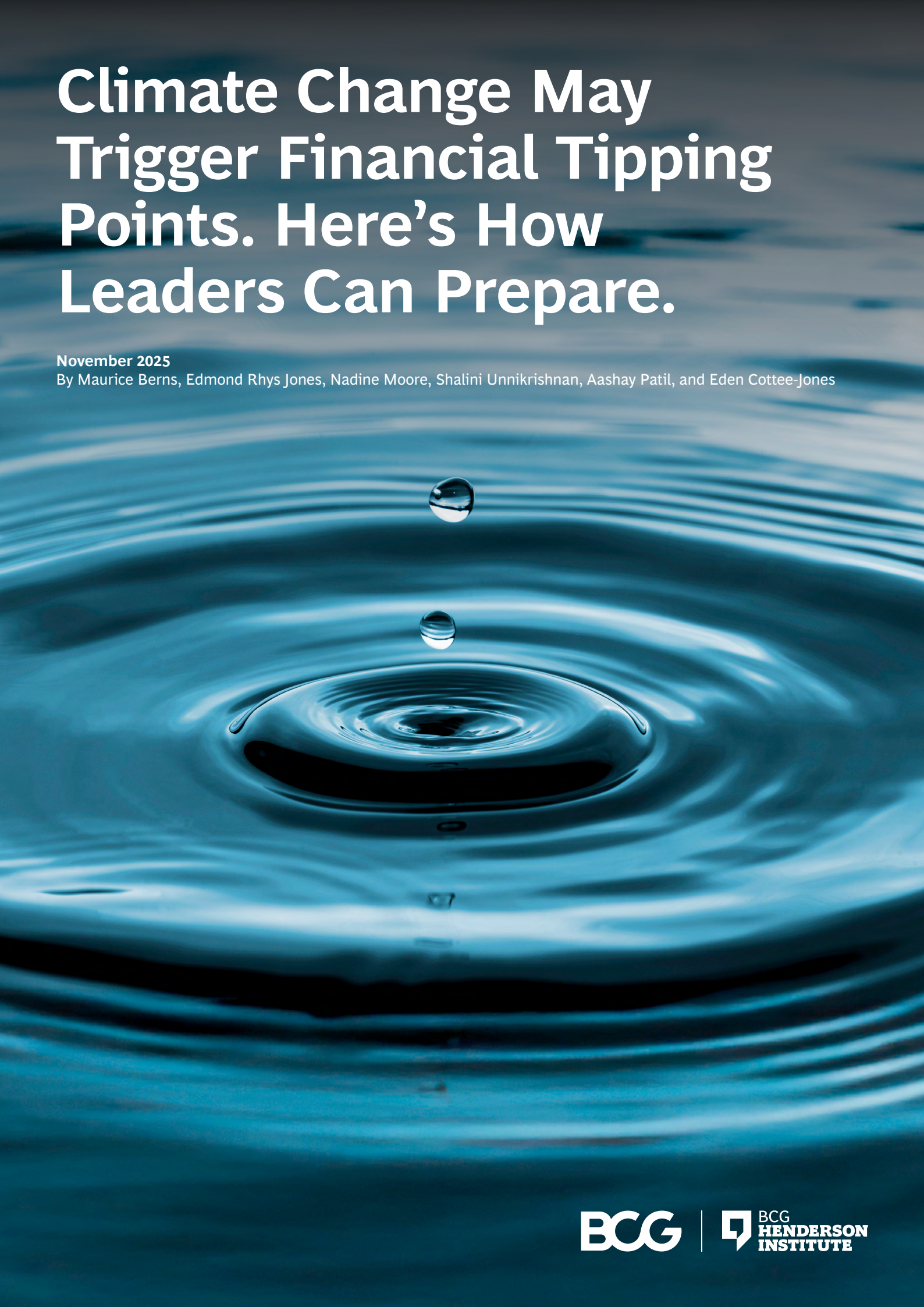

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CEOs looking to climate proof their businesses need to look beyond physical infrastructure. The financial systems that bind firms and consumers together through sales contracts, futures markets, insurance pools, and other mechanisms are also facing the effects of climate change. When these systems work well, they distribute risk and dampen volatility. However, under pressure, they can reach a tipping point—potentially leading to shocks, contagion, and disruptive transitions.

Many current models suggest that financial systems respond to stress in a linear fashion: for example, as temperatures rise, prices rise. But the relationship may break as these pressures intensify, leading to nonlinear and highly disruptive changes that fundamentally transform operating environments, resulting in repriced assets, redistributed risks, and altered incentives.

When Hurricane Katrina hit Louisiana in 2005, the cost in lives and damage was extraordinary; at the same time, the financial mechanisms supporting sectors like real estate also passed a tipping point. For example, the surge in insurance losses forced insurers out of business and out of the market, leaving households without coverage.

Leaders who prepare for such risks by following a strategy of "anticipate, innovate, and collaborate" will be better placed to shape the future—and create new value. Solutions include using advanced analytics tools to better manage risks, introducing new products and services that reflect the increased volatility, and working across industries and through public-private partnerships to share risk.

Why the Real Economy Is Vulnerable

Analysis of the financial impact of climate change has historically focused on the effect on economies on the macro side, and on individual businesses on the micro side.

Less attention has been paid to the middle: the financial systems through which risks and costs are distributed across consumers, businesses, and governments.

These structures and mechanisms are the plumbing of the real economy and include systems such as insurance, credit, commodity futures, or freight derivatives. For example, farmers rely on affordable credit for seeds and fertilizers, agribusinesses rely on futures markets to lock in crop prices, and shippers hedge rates through forward freight agreements. When these systems are affected by a tipping point, it can have far reaching economic impacts, as some recent examples remind us. (See **Exhibit 1**.)

EXHIBIT 1

Climate-Induced Financial Tipping Points Are Not a New Phenomenon

	Impacts	System response
Hurricane Andrew, Florida, 1992 **$50B+** damages	• Many insurer insolvencies occur due to a surge in loss ratio from an average of 50%–60% to more than 1,000% • Insurers lose $30B+ as Florida imposes a policy cancellation/nonrenewal moratorium	• Insurance industry adopts advanced catastrophe modeling • Specialized catastrophe reinsurers emerge • The first major public-private reinsurance backstop in the US is established
Wildfires, California, 2017–2018 **$45B+** damages	• $30B+ of damage claims on California's utility companies lead to financial distress • Utility companies see a 16-fold rise in wildfire liability insurance costs and restricted coverage • Many utility companies see their credit ratings downgraded due to wildfire risk	• The $21B California Wildfire Fund is created as a reinsurance backstop, funded by ratepayers and utilities • Mandatory fire safety certification for utility companies is introduced
Drought and falling water levels, Gatún Lake and the Panama Canal, 2023–2024	• There is a 20%+ fall in ship transits through the Panama Canal • Losses include $170M in toll revenue for the Panama Canal Authority • Losses also include $235M for shippers forced to find alternative routes	• Maersk subsidiary acquires the Panama Canal Railway Company to provide an alternative route between the Pacific and the Atlantic • $10.1B is invested in infrastructure upgrades to provide climate adaptation and resilience

Sources: Swiss Re; Insurance Journal;Insurance Information Institute; Pacific Northwest National Laboratory; Panama Canal Authority; media sources; BCG Henderson Institute analysis.

The Real Estate Ripple Effect

In advanced economies, the domestic real estate market relies on a tightly linked chain of financial systems.

Households rely on mortgages to purchase homes, mortgage lenders rely on property insurance to underwrite credit risk, and insurers in turn use global reinsurers to distribute that risk. Without insurance, mortgages cannot be issued, putting pressure on property values and risking disruption of housing markets. Further downstream, this can reduce tax revenues, making it difficult, among other things, to finance climate adaptation measures. That can lead to more property damage during storms—a vicious cycle.

Severe storms threaten a financial ecosystem. In Florida, successive hurricanes and the expectation of stronger, more frequent storms are already tightening insurers' capacity to absorb risk. The rising number of claims means providers are taking a loss from homeowners' insurance.

- Insurer insolvencies have increased—six insurers failed in 2022 alone—and major private players have exited or withdrawn coverage.
- Policy nonrenewal rates rose 275% between 2018 and 2023, and the firms that remain have raised premiums considerably—a hike of more than 70% since 2018.

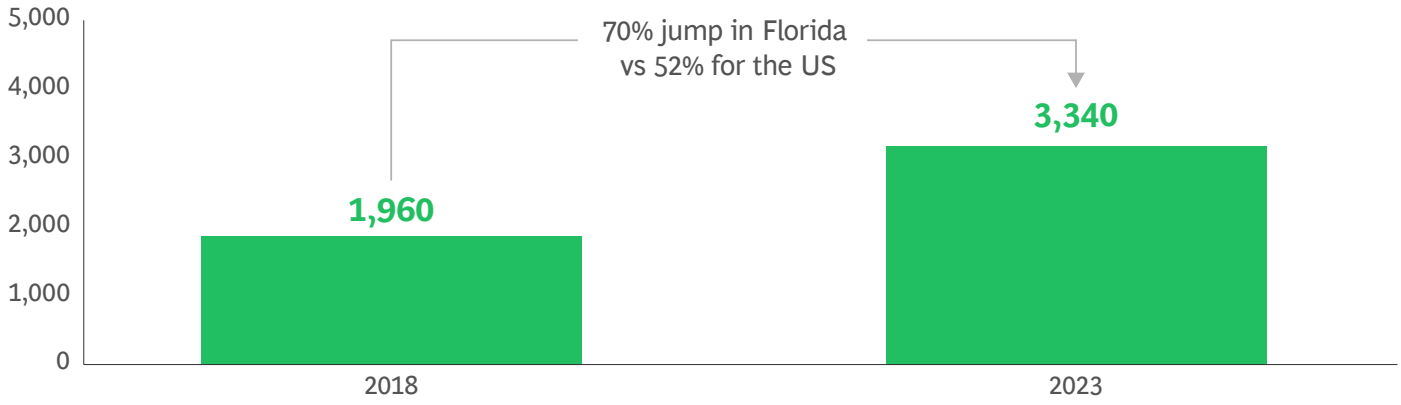
Insurers purchase reinsurance to protect themselves from catastrophic losses. But reinsurance pricing in Florida has risen nearly 60% between 2018 and 2024, reaching levels only previously seen after Hurricane Andrew in 1992 and Hurricane Katrina in 2005. This means increased costs for underwriters to provide coverage, forcing more firms to increase premiums or exit the market. Homeowners, lenders, and local governments are all feeling the strain as insurance affordability declines, as the slideshow illustrates. (See **Exhibit 2**.)

EXHIBIT 2

Spiralling Insurer Premiums and Non-Renewal Rates are a Cause for Concern in Florida

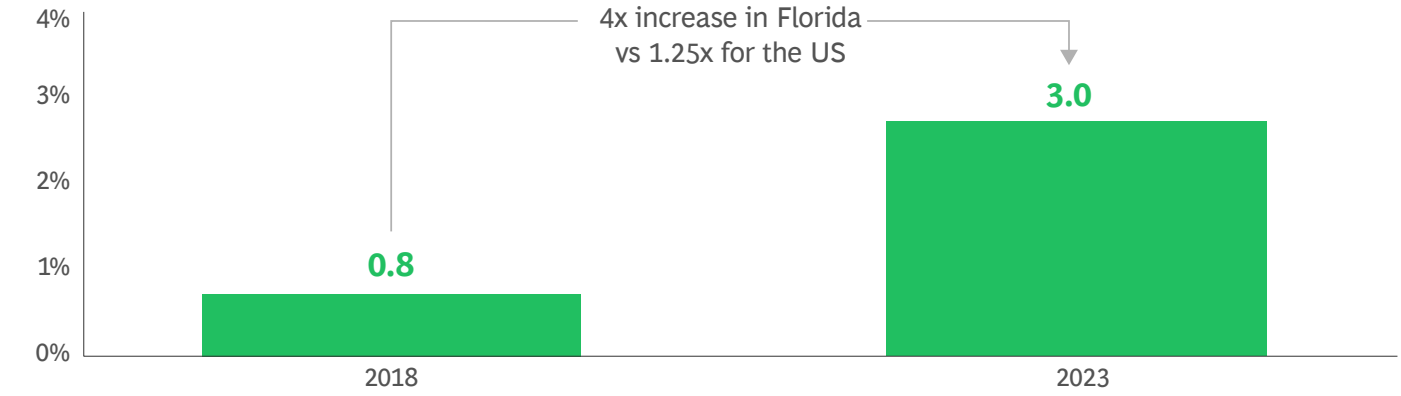
Insurance premiums are rising faster in Florida than the US average

AVERAGE HOMEOWNERS INSURANCE PREMIUM IN FLORIDA ($)[1]



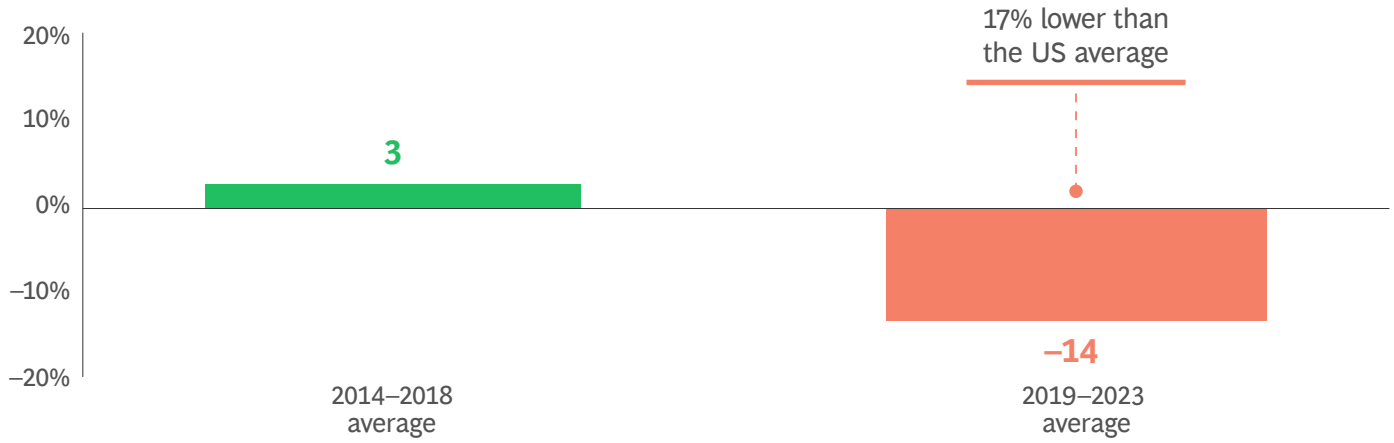
Insurance nonrenewal rates have risen significantly in Florida

NONRENEWAL RATE IN FLORIDA (%)[2]



In Florida, insurers' profitability has taken a hit

UNDERWRITING PROFIT IN FLORIDA (% OF PREMIUM)[3]



Sources: Insurance Information Institute; National Association of Insurance Commissioners; JP Morgan; US Senate Committee on the Budget, *Next to Fall: The Climate-Driven Insurance Crisis Is Here—And Getting Worse*, staff report, December 2024; National Association of Insurance Commissioners (NAIC);BCG Henderson Institute analysis.
[1]Premium based on the homeowners form 3 (HO-3) package policy for owner-occupied dwellings.
[2]Refers to the % of homeowners insurance policies not renewed by insurers in a particular year.
[3]Computed as a ratio of underwriting profits (premiums collected minus claims and operating expenses) and net earned insurance premiums; includes data from 2,634 property/casualty insurers in the US who file annual financial statements and exhibits with NAIC.

The system is adjusting, but in ways that highlight the scale of stress. Private coverage in the state has fallen to such an extent that the not-for-profit government-backed provider, Citizens Property Insurance Corporation, is now Florida's largest insurer. The organization has shifted from being the insurer of last resort to one of first resort for many Floridians.

Despite these adaptations, there is a significant possibility that the system as currently constituted will be unable to absorb the rising risks of a warming climate indefinitely. Since 1980, the number of billion-dollar natural disasters hitting the US has increased fourfold, with the Atlantic hurricane season growing longer and producing more high-intensity storms. If these trends continue, the pressures on Florida's property insurance market could breach critical thresholds. This is not predetermined, however, and will depend on the actions of regulators, insurance, and reinsurance players. Possible futures include:

- A larger, more permanent role for public insurers.
- A more fragmented, high-cost system dominated by niche providers.
- A hybrid of the two, with entrepreneurial firms using advanced technology to fill market gaps and new products, such as catastrophe bonds (with which investors lose their money in the event of a natural disaster) or parametric insurance (with which payouts are automatically linked to amounts or ranges of rainfall, temperature, or other factors).

In an extreme scenario, widespread uninsurance among homeowners, which leads mortgage markets to collapse and results in a severe downturn in real estate, is possible. Investors with real estate portfolios would be heavily impacted, as would the tax revenues for governments.

New tools emerge to fill a gap. Small changes in high-risk markets such as Florida may accelerate rapidly toward climate-induced tipping points. For business leaders, a clear understanding of their exposure to these dynamics is critical. New AI-powered models can process more data than ever before across adjacent markets and sectors, detecting patterns and emerging risks so that leaders can identify vulnerabilities and allocate capital accordingly.

Insurtech companies are already using these new technologies to find profitable niches which previously would have been too risky. Machine learning algorithms can absorb data on weather, land value, fuel sources, and human activity to provide much more accurate predictions about physical climate risks, allowing startups to offer wildfire insurance and reinsurance even in high-risk areas like California. It's only a matter of time before large institutions harness the same technologies to level the playing field.

These changes also don't have to be carried by insurers alone. By looking at risk management more holistically, rather than simply depending on insurance, providers can develop new solutions to spread the risks. For example, they can work with builders to adopt climate-resilient measures and provide incentives such as discounts on premiums.

Collaborating across industries or in public-private partnerships can also help ensure long-term sustainability. For example, the UK's Flood Re program, a collaboration between private insurers and the national government, provides a reinsurance backstop for homes at risk of flooding. It delivers affordable coverage to private insurance companies that otherwise would not have been plausible. The program allows greater market access and stability for those insurers with far lower risk while homeowners in flood-prone areas receive coverage at affordable prices. With collaboration between US firms and regulators, this could be a model for the US, where insurers are grappling with similar reinsurance issues.

The World's Cocoa Crop Under Pressure

Climate pressures are making planting seasons increasingly unpredictable and are exacerbating the spread of parasites and diseases, causing disruption in the financial systems underpinning global agricultural commodity markets.

Affected regions see reduced export revenues and more farms defaulting on loans. Combined, this raises borrowing costs across the economy—with the result again that climate adaptations are harder to finance, leading to more damage.

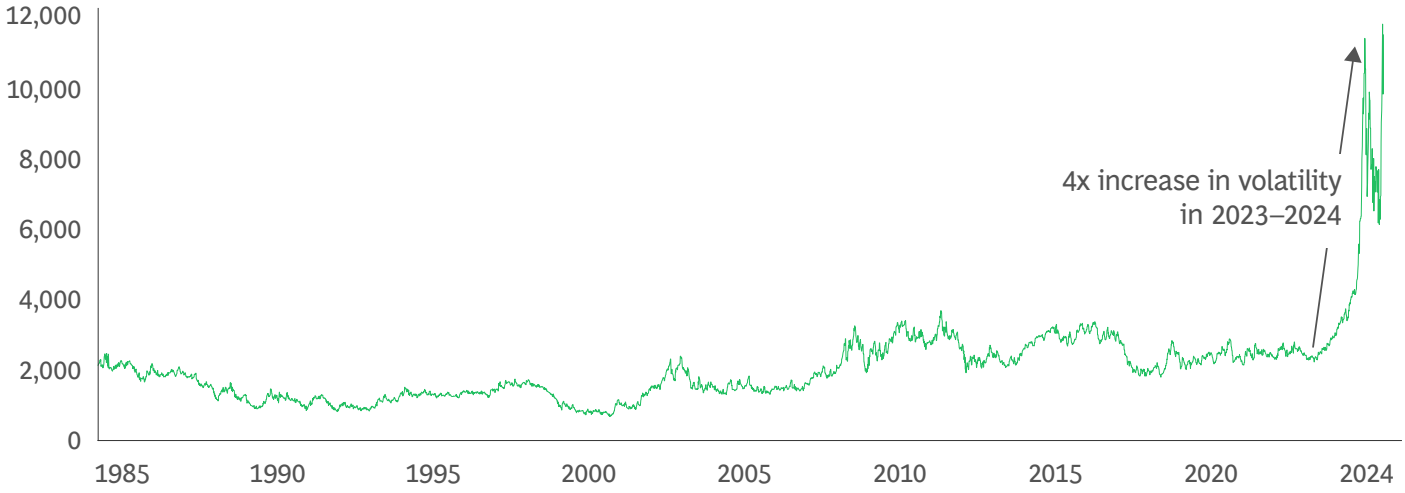
Crop disease upends the trading system. A recent example is the 2023–2024 turmoil in cocoa markets. Ghana and Côte d'Ivoire, which together account for 70% of the global cocoa supply, were forced to destroy thousands of hectares of crops to prevent the spread of swollen shoot virus, which thrives in dry, warm conditions that have intensified in the region due to climate change. Despite local production only falling by 13%, it was enough to trigger a sharp systemic shock across global cocoa finance, as the slideshow illustrates. (See **Exhibit 3**.)

EXHIBIT 3

The Cost of Doing Business Puts Cocoa Markets at Risk

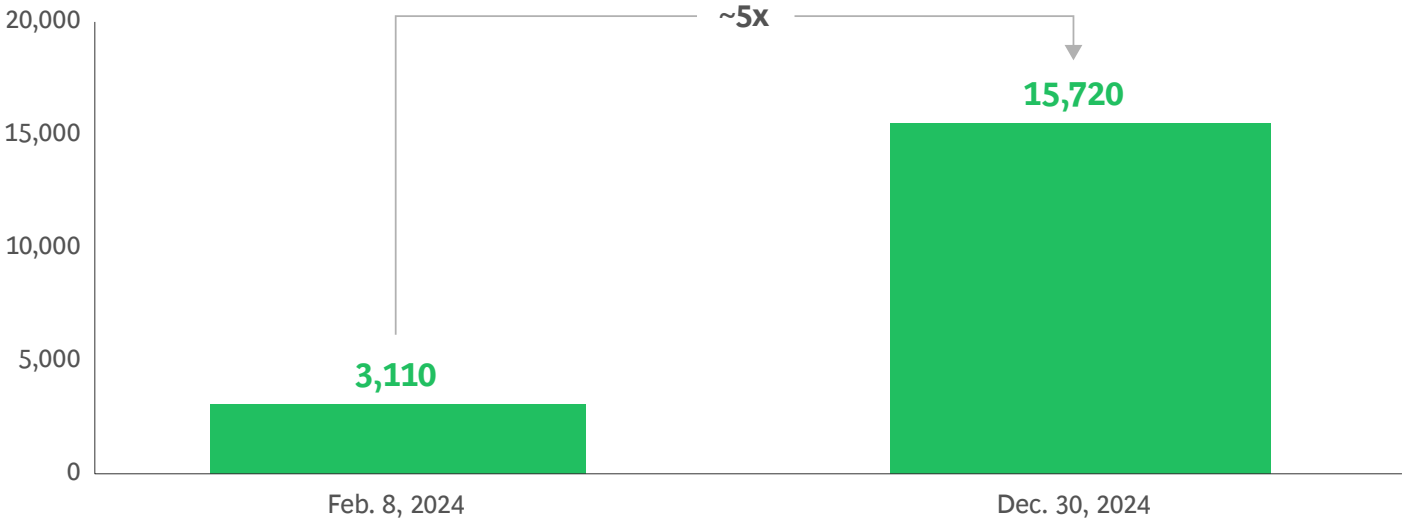
The price of cocoa futures reached record levels in 2024

COCOA FUTURES PRICE IN THE US ($ PER TON)[1]



Margin requirements at exchanges rose by more than 400%

INITIAL MARGIN REQUIREMENT FOR A 3-MONTH FORWARD US COCOA FUTURE ($)[2]



Source: Intercontinental Exchange.
[1]Daily closing price at the Intercontinental Exchange.
[2]Initial margin requirement is the cash or collateral required to open a futures position on the exchange. A 3-month forward US cocoa future is significant for price discovery, with the 3-month timeframe aligning seasonal production cycles.

Cocoa futures prices nearly tripled, while volatility (measured by standard deviation in price movements) quadrupled compared to historical norms. The shock cascaded through the trading system. Margin requirements for a three-month cocoa forward on the Intercontinental Exchange surged by more than 400% over ten months. While some commodity traders benefited from the volatility, order values collapsed by 75% due to the exit of smaller hedge funds and traders who struggled with the increased requirements, concentrating trading among a few large players and creating a liquidity crisis.

These disruptions were soon felt more broadly. Ghana, which is highly dependent on cocoa exports, saw an increase in farm loan defaults and a spike in nonperforming loans, pushing domestic interest rates to ten-year highs. Higher borrowing costs rippled across the economy, straining the country's broader finances. A minor production dip in one crop destabilized not just commodity markets, but also had expensive consequences for households, businesses, and the government.

Volatility within food value chains is **already at an all-time high**, but similar climate risks threaten other crops, including staples like rice. Geographies that dominate the growth and export of a foodstuff are vulnerable to climate-induced tipping points if the mechanisms for managing volatility fail. A wave of climate-related defaults on farm loans would likely increase costs for lenders and force some to retreat from commodity finance altogether. In "down" years, farmers rely on credit and insurance to stay in business—losing this ability would mean more defaults, with many unable to survive.

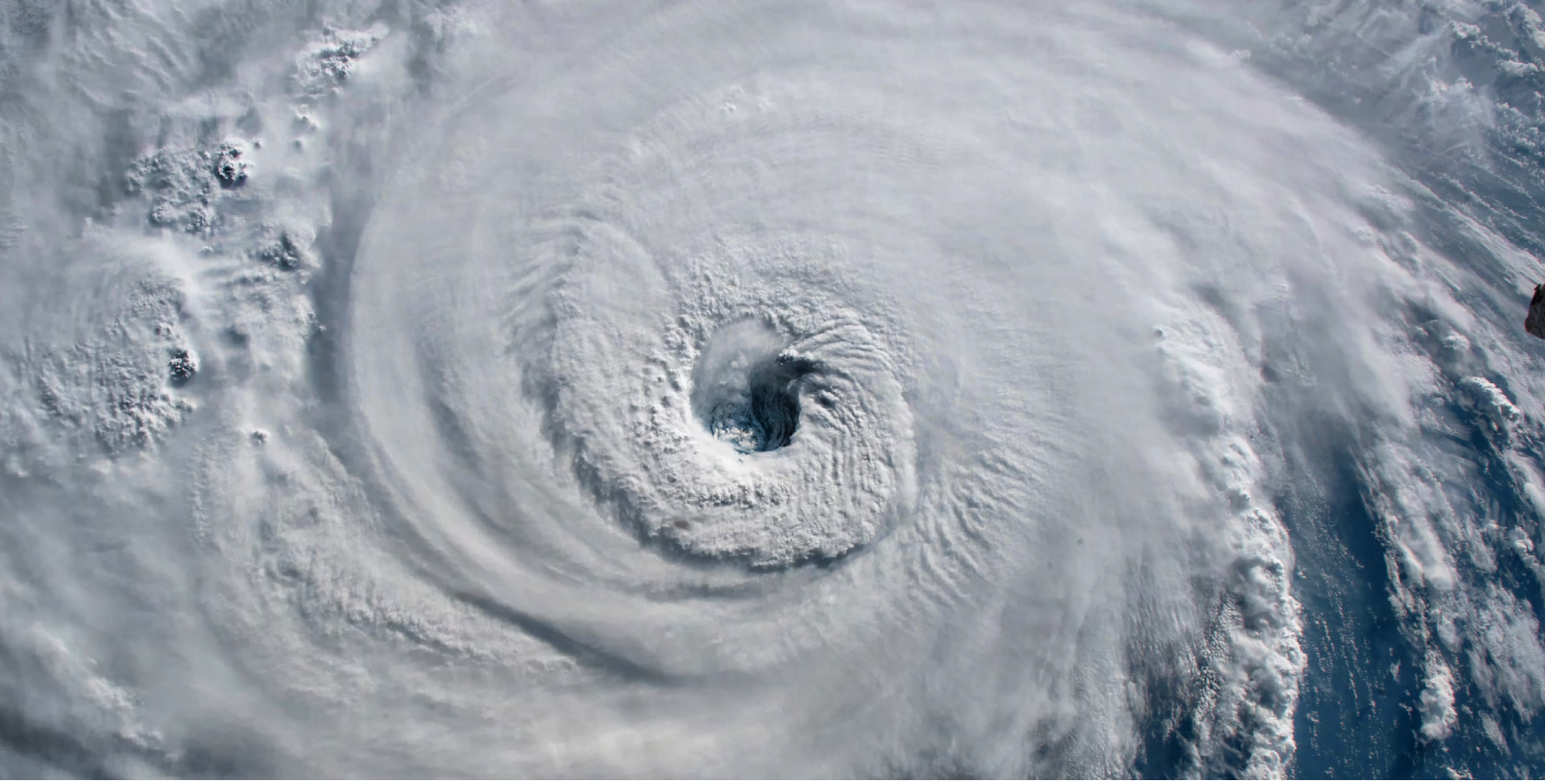
If the current situation continues, some agricultural commodity markets could be irreversibly altered, as it becomes much harder for stakeholders to produce and sell certain crops. In an extreme scenario, there may be no incentive to produce certain crops at all. This would lead some farmers to completely withdraw from production, causing a severe supply shock and a negative impact on the entire economy.

Identify trouble spots to ensure flexibility and resilience. For agricultural commodity businesses, volatility is nothing new, and they're not taking these challenges lightly. In high-risk markets, we're already seeing companies exploring parallel supply chains and shifting crop production to new geographies. Pulling together multiple data sources for analysis from satellite imagery, climate trends, and public records can help leaders estimate future growing conditions in new regions. Similarly, using network analysis techniques allows the mapping of trade flows and financial exposures. These actions are key to anticipating how production stress in one geography can cascade into price and liquidity shocks.

For financial institutions working in agribusiness, we expect to see more innovation in product offerings as volatility continues to rise. This could mean experimenting with index-based and parametric insurance terms—as described earlier—catastrophe bonds, or sustainability-linked derivatives, where costs are reduced if farmers meet sustainability or climate goals.

There are also opportunities to go beyond siloed offerings by developing a full stack of financing and risk management products aimed at farmers. This would expand the possibilities for farmers, banks, farm credit societies, insurers, and other players to collaborate in addressing these risks. For example, PepsiCo has partnered with global agricultural firm ADM to transition 2 million acres of US farmland in their shared supply chains to regenerative practices by 2030. To do this, they're engaging with farmers through a comprehensive toolkit of financial incentives, technical assistance, and multiyear cost-share payments.

Collaborations like this—which make funding more accessible or directly distribute climate-change-resistant seedlings, technology, or training— can build upon existing programs in markets like Ghana and Côte d'Ivoire to reduce shocks and provide more opportunities for advantage in the long term.



What Leaders Can Do Right Now

As the pace and intensity of climate change and extreme weather events increase, preparing for a climate-induced tipping point in financial systems is taking on a new importance.

Developing a strategy that incorporates the three pillars of "anticipate, innovate, and collaborate" will put businesses in a strong position to face the future. Leaders have to address each and answer some key questions:

1. **Anticipate. Are these tipping points a risk to my business?** Perform an overview assessment of the financial ecosystems your business relies upon, areas of previous stress or volatility, and the potential impact of a disruptive shock. This assessment can be enhanced using new tools like agent-based modeling, network analysis, and anomaly detection, offering insight into feedback loops, amplification effects, and emergent risks that traditional forecasts overlook. Using the best available data will improve the performance of these tools, regardless of challenges with data quality and modeling reliability.
2. **Innovate. What are my no-regret moves?** These could be actions that reduce your risk exposure—new hedging strategies, building resilient supply chains, or commissioning market analysis of what your competitors are already doing in this space. But it can also be about recognizing opportunities to improve your market position—developing new products and services that will thrive in a more volatile environment and identifying innovations from other firms that you could license or form partnerships around.
3. **Collaborate. How do I broaden my understanding of the risks?** A climate-induced tipping point in a financial system will mean impacts beyond your business. Now is the time to explore partnerships along your value chain and with your peers to get a better understanding of the overall risks and to share information and early warning signs. Work with regulators to communicate the challenges and to ensure tipping points are met with proactive planning.

The pressure on financial systems due to climate change will only increase, and with that, the risk of climate-induced tipping points. When these occur, leaders who only track sectoral metrics or rely on backward-looking, linear models will be caught off guard. However, those who plan ahead, by investing in the necessary tools, technologies, and resources, will be best placed to manage the transition—and to prevent today's warning signals from becoming tomorrow's crises.

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