Climate Change, State stability and Sovereign Credit Risk

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There is a growing mass of compelling evidence that indicates climate change has direct and indirect linkages to State stability and the rate and scale of climate change will increase over time. In a 2007 report by the CNA Military Advisory Board, they [1] identified climate change as a "threat multiplier", recognizing that climate change can exacerbate political instability, where food, water, and resource shortages already exist – often in the world's most dangerous and fragile regions. Climate change acting as a threat multiplier amplifies existing risks by exacerbating stressors on the critical resources underpinning state sovereignty and national security, including water, energy, food, and employment, which can degrade a nation's capacity to govern, and contribute to a wide range of destabilizing trends. As a result, it increases the likelihood of State [2] failure and disruption leading to an increased likelihood of conflict and war. These destabilizing trends add a new risk factor in the equations developed for assessing sovereign credit risk, because they introduce a new set of risk drivers into classic unilateral and bilateral default and credit risk models that potentially can lead to losses at financial institutions due to business interruptions, and bankruptcies [3] caused by extreme weather events.

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Moreover, according to a 2012 report by the Centre for Climate Security[4], research shows that Drought conditions in Russia and China, and subsequent global wheat shortages, contributed to higher food prices in Northern Africa and may have helped catalyse and broaden the appeal of the Egyptian uprisings in 2011, causing Egypt to suffer its worst economic crisis since the 1930s. [5][6][7][8]

A Sovereign's geographic location can be directly linked to the likelihood of climate surprises or climate shocks occurring. As such, quantifying the intensity, frequency, and range of disruptive climate events on State stability is of the utmost importance in assessing the credit risk of sovereign bonds. These physical risks, caused by short-term extreme weather events, driven by the variability in the long-term pattern of climate processes, and the expansion of the geographical ranges of drought's, floods, and wildfires into geography's and regions that had not regularly experienced such phenomena, in addition to the central assumption that past history is no longer a robust gauge of future developments of climate change, compromise the State's ability to meet the basic needs of its population for food, water, energy, and employment. As a result, it erodes State sovereignty[9] and the State's ability to govern and increases the likelihood of social instability, potentially leading to State failure and collapse. Consequently, the sovereign risk associated with those socio-economic dynamics also rise and has a direct impact on a Sovereign's credit risk. Therefore, they play a crucial role in the process of sovereign risk assessment.

Equally important, the financial crisis of 2007 has illustrated the importance of the correct quantification of counterparty credit risk that arises from bilateral OTC derivative contracts. According to [10] Basel Committee on Banking Supervision *"The majority of these losses came not from counterparty defaults but from fair value adjustments on derivatives"*. Furthermore, according to the Basel regulatory text CRE53 for calculation of Credit risk, risk-weighted assets (RWA), section 53.47 titled Wrong Way Risk[11]. Banks must identify exposures that give rise to wrong-way risk. This risk arises where the credit quality of the counterparty is adversely correlated with macroeconomic factors that may also impact the exposure of transactions. The counterparty may, for example, be in the same industry or located in a geographical location that is vulnerable to the effects of climate change. This risk takes into account the unfavourable positive dependency between the exposure and credit quality of the counterparty[12]. This type of relationship increases counterparty credit risk[13]. Risk is defined as the product of the likelihood and consequence of an outcome. If a counterparty **A** has an exposure to another counterparty **B** operating in a geographic region or industry vulnerable to climate change, then the likelihood that counterparty **B** experiences a shock [14] credit event due to an extreme weather event rises–leading to potential losses to counterparty **A** arising from counterparty's **B** credit quality changes, including rating **migrations and default**, as a result the consequence of the outcome (Expected Loss) to counterparty **A** also increases, consequently increasing the wrong-way risk and associated risk for counterparty **A**.

In conclusion, climate risk introduces a new set of risk drivers into classic default and credit risk models. For this reason, strategic investors must implement risk management approaches that focuses on examining target countries vulnerabilities and risks associated with global, regional, and localized effects of climate change and include the envelope of high-end possibilities lurking at the fringes (unprecedented) instead of assessing middle of- the-road probabilities on the basis of historic experience. Likewise, they must measure the expected and unexpected losses that might arise in their fixed income portfolios driven by the increased intensity and frequency of extreme weather conditions and events by not downplaying the extreme possibilities at the high-end of the uncertainty range, and build robust risk management frameworks that adequately deal with low probability, high consequence outcomes, which can dominate calculations of total risk by, First; carrying out risk analysis to identify transactions and portfolios that expose them directly or indirectly to climate risk and apply Environmental, Social, and Governance (ESG)[15] risk factors into sovereign risk analysis. Second; understand where the vulnerabilities are, the geographic concentrations of transactions and what kind of hazard's they are exposed to in terms of geographic ranges of extreme weather events. Third; Apply expert risk assessment of the climate risk factors driving short term weather events over a specified horizon, under different climate scenario assumptions and parameters, taking into account the geographic ranges of the underlying risk exposures. Fourth; develop a granular view of the risks and the approaches to measure climate change *"Event risk"* and exposures driven by large changes or jumps in the prices of the underlying risk processes, and translate that into a description of the number of expected climate events and severity of losses if events occur. Fifth; generate the loss distribution expected from each climate risk event under various climate scenarios over a specified horizon and translate that into standard risk metrics and exposure maps for shareholders and regulators. Lastly; assess necessary measures to mitigate physical and transitional climate risks and reduce vulnerabilities associated with extreme weather events.

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