

Not Black or White: Minding the Green Swan

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Overview

There remains little scientific debate (and diminishing social and political debate) that anthropogenic greenhouse gas (GHG) emissions have stressed the limits of our natural climate system to recycle or absorb them and that rising temperatures are foreshadowing more severe weather, sea-level rise, drought, floods, erosion, and other disruptions of natural systems. These disruptions, in turn, may have larger socioeconomic and geopolitical implications, in the form of agricultural supply chain failures, forced migrations from coastal or drought-stricken areas, increased inequality, and political instabilities. Leading scientists have outlined the dramatic changes needed to avoid the worst of these climatic instabilities by stabilizing global temperature increases to 1.5-2.0 degrees.ⁱ The nations of the world agreed to take steps matching these science-based scenarios as signatories to the Paris Agreement in 2015. Nevertheless, emissions globally continue to exceed these pledged levels.

That climate change presents significant *risks* also is widely accepted and no longer just a subject for parliamentary debates; these risks have become a subject in the mainstream of financial and economic analysis and planning. Climate risks include *physical* risks, which are those posed by climate change itself – extreme weather, flooding, drought, etc. (and the reverberations of those events through the economy). Climate risks also include those presented by *the transition* to a lower carbon economy that seems inevitable. Transition risks flow from the assumption that governmental policy and/or changing consumer and societal preferences driven by concerns about climate change will negatively impact certain geographic

regions, industries, workers, and asset owners.

Discussions about and efforts to analyze and address climate risk have been robust at the microeconomic level, such as by asset managers and debt providers seeking to assess their exposure to these risks. However, climate risk is also being assessed at a systemic and macroeconomic level by economists and financial system regulators. Former Bank of England head Mark Carney, for example, has spoken extensively on the risks to financial system stability posed by climate change.ⁱⁱ Led by the Banque de France in 2017, eight central banks and supervisors formed the Network of Central Banks Supervisors for Greening the Financial System (NGFS), which now has more than thirty members.ⁱⁱⁱ Most recently, the Bank of International Settlements (BIS) (the central bank of central banks) raised the stakes of the debate around the most extreme potential impacts of climate change with its release of *The Green Swan: Central banking and financial stability in the age of climate change*.^{iv}

Microeconomic Climate Change-Related Risk is Increasingly Being Recognized

At the *enterprise* level, the relationship between exposure to climate change risk and value is becoming a mainstream subject of attention. Driven initially by investors seeking to create a portfolio of “socially responsible” investments, companies deemed to be in a business (like solar power) consistent with addressing climate change enjoyed an advantage in attracting that capital. More recently and broadly, a significant portion of the global investment community has used “environment, social, and governance” (ESG) criteria to inform their strategies.^v Climate change

and carbon emissions have become the top issue of focus among ESG investors and are now top-tier considerations for a range of traditional institutional investors and credit ratings agencies. In January 2020, Larry Fink, the CEO of BlackRock, the world's largest asset manager, declared that "climate risk is investment risk" and that BlackRock would take a number of steps to limit its climate risk exposure.^{vi} This increasing focus on corporate/enterprise level climate risk has led to increasing demands for corporate disclosure of climate-related risks through voluntary reporting regimes and some jurisdictions, such as the UK, are moving to make such disclosure mandatory.^{vii} Even without formal requirements in place, companies and their investors are driving voluntary disclosure efforts, most notably through Task Force on Climate-related Financial Disclosures (TCFD) launched by the Financial Stability Board in 2015.^{viii}

Systemic, Macroeconomic Climate Risk and the Green Swan

At the macroeconomy level, the aggregated physical and transition climate risks imbedded at the enterprise level are part of why the BIS calls climate change "an unprecedented challenge to the governance of global socioeconomic and financial systems." Some risks from climate change are largely foreseeable, such as the impact on both asset values and people from sea level rise, impacts on labor and agricultural productivity from rising temperatures, and the diversion of fiscal resources toward adaptation investments to deal with these impacts. And younger generations and consumers, potentially sooner than later, may assert their political will and buying power to dramatically shift political and economic systems.

But there are climate risks that portend significant consequences for global financial and geopolitical systems that are of a different character.

Nassim Nicholas Taleb in 2007 introduced the now famous idea of the "black swan": events that are unexpected and rare; that have extreme impacts; and that can only be fully understood in hindsight (a viral pandemic or housing market collapse, perhaps). A fulsome understanding of climate risks, however, requires that we consider a different bird – *the green swan*. In addition to foreseeable and more

gradual impacts, climate change could spawn extreme and highly disruptive events that are not of the predictable nature of rising seas and that "manifest themselves as economic shocks" on both or either the demand side or supply side of the economy^{ix}.

The green swan certainly shares DNA with its black cousin. But the climate change-conjured green swan -- which could manifest in catastrophic weather events, non-linear economic and geopolitical reactions to a physical event or abrupt transitional policies, or other forms – is its own breed. The green swan: Is characterized by non-predictability via the data and models typically used to anticipate risk; its effects are likely to be extreme and non-linear; and it will not respect geopolitical boundaries. But the impacts of a green swan may also be persistent if not irreversible and could impose losses to both financial and natural capital. This is the nature of the beast.

Governmental Policies based on Correcting Market Pricing Failures may be Inadequate to Avoid a Green Swan Event

While by its very nature the green swan is unpredictable, we do know what will cause it: an unsustainable accumulation of greenhouse gases in the atmosphere. Traditional policy responses to mitigating the risks posed by anthropogenic climate change are often based on microeconomic principles. A long list of leading economists has warned that climate change is the result of the fundamental market failure of not pricing greenhouse gas emissions. Pigovian carbon pricing seeks to disaggregate economic productivity from emissions through economic substitution of low-carbon products and services for their high-carbon alternatives. Costs of capital would go down for preferred assets and activities as the market disfavors carbon-intensive incumbents. Some even argue that the economic activity spurred by the growth in low-carbon industries and practices will more than offset the transition losses felt by carbon-intensive legacy industries.

There is little doubt that carbon pricing would work to correct the market failure of climate change and reduce future emissions – and added climate risk (though whether it would lead to net growth in the near term is

debatable). There are several reasons, however, why this microeconomic pricing remedy is not a full answer to mitigating climate risk. Most obviously, too few nations yet have the socio-political support to impose carbon pricing, and even those that do face a collective action problem that discourages aggressive first movers. And the longer we wait before we impose corrective pricing policies, the price levels necessary to mitigate even gradual and predictable climate impacts go up, which in turn will increase transition risk. Finally, even a well-designed carbon pricing regime imposed today will do little to address the risks associated with greenhouse gases already accumulated in the atmosphere.^x

Preparing for and Seeking to Mitigate a Green Swan Event Requires Multi-Dimensional Action and Central Banks are a Key Dimension

While important and desirable, the impact of carbon pricing on green swan risk is unclear. The magnitude and breadth of a green swan “shock” will have impacts at the intersection of natural, political, social, and financial systems. It is across these systems that the green swan swims and perhaps suggestive of why some reference the need for a “multidimensional combat against climate change”.^{xi}

Under a carbon-pricing based policy response to climate risk, the envisioned role for central banks and supervisors is mostly to manage the systemic impacts of an accelerated transition from a high carbon to low carbon economy. But “multidimensional combat” against the most severe risks of climate change suggests that central banks and supervisors have a role. The NGFS has outlined how both physical and transition climate risks could create feedback loops that threaten financial system stability.^{xii} For example, an extreme weather event could lead to business disruption, commodity price increases, property loss, or the need for asset replacement, which in turn could lead to insurance, credit, and equity market losses, and then to credit tightening and reduced growth (“financial contagion”). Transition risks include policy measures that could lead to reduced corporate profits or stranded or devalued assets, which in turn could lead to losses in credit and

equity markets, and then back through to monetary policy responses.^{xiii}

Climate Change and Green Swan Risk Fall within the Purview of Central Banks – But May Require Novel Actions.

Management of transition events and protecting the stability of financial systems are at the core of central bank functions. The linkage between the climate stability and financial stability suggests that climate change is an appropriate concern of central banks and supervisors as a severe event could *destabilize* across that linkage. As stated by the NGFS – “climate-related risks are a source of financial risk. It is therefore within the mandates of central banks and supervisors to ensure the financial system is resilient to these risks.”^{xiv} And to add weight to the argument for steps to build such resiliency, BIS foreshadows that absent such efforts and in the event of a destabilizing green swan event leading to large scale financial disruption in the banking and insurance sectors, central banks could be called upon as the “climate rescuers of last resort”, called upon to purchase assets stricken by carbon-based devaluation or physical damage.^{xv} And while we might see here familiar echoes of the Great Recession, its impacts were “conveniently” translatable into financial capital terms. Losses from a green swan event, however, would be from both *financial* and *natural* capital accounts, and the latter would be difficult to replenish only with the former.

All of this suggests a prioritization on anticipatory (mitigative) actions by central banks and supervisors to improve and protect financial system stability. BIS, NGFS, the Bank of England, and other leading organizations suggest several measures central banks could take consistent with current mandates and practices. These include:

- Integrating climate risk into forward-looking economic stability analyses;
- Integrating climate risk into assessments of financial institution strength (the Bank of England, for example, has released a proposed methodology for conducting “climate stress tests” for UK banks^{xvi}, and the

Netherlands Bank has run climate stress tests assuming a dramatic carbon pricing policy scenario^{xvii});

- Incorporating ESG criteria into their own portfolio management;
- Pushing for internationally applicable and robust corporate climate risk disclosure,^{xviii} and
- Engaging in “green quantitative easing” whereby central banks purchase “green” corporate and other “green” bonds in order to lower capital costs for projects deemed to drive decarbonization.^{xix}

These measures are likely to be controversial among many central banks today. Even agreed upon changes to how banks see and execute within their mandates are challenging. Yet to make matters worse, even the types of evolutionary changes listed above would perhaps be inadequate. BIS proposes a *qualitatively* different path of action by central banks and supervisors. “Multidimensional combat” to address climate change could step beyond traditional siloes and proactively engage across monetary, fiscal, socioeconomic, and geopolitical spheres. Central banks could be advocates for: carbon pricing; longer term assessments of asset and corporate value in light of climate risks; stronger coordination between fiscal, regulatory, and monetary policy; greater transnational monetary and fiscal coordination of actions to mitigate climate risk; and the integration of natural capital into national and corporate accounting.^{xx} The threat to financial system instability posed by the climate destabilizing character of a green swan arguably requires more from central banks, as well as from the financial institutions they oversee and customers to whom those institutions provide capital.

Conclusion

The inertial forces holding us back from steps needed to mitigate the most severe risks of climate change are not unique to central banks and supervisors. The feedbacks from a changing climate do not necessarily register an urgency sufficient to displace our attention to other pending matters of seemingly greater immediate priority; sea levels rise slowly, and by its very nature the green swan does not reveal itself until it is upon us. This disconnect between

when actions must be taken to mitigate or avoid future climate damage and when those damages occur is what Mark Carney has termed “the tragedy of the horizon”.^{xxi} And even if immediately engaged, central banks and supervisors cannot alone mitigate climate risk. Yet of all the social and political actors needed for a truly multidimensional response to climate risk, it is for central banks and supervisors that one could perhaps draw the straightest line from *threat* (climate change) to *mission* (systemic stability).

ⁱ See Intergovernmental Panel on Climate Change, *Summary for Policymakers* (2018)

ⁱⁱ <https://www.bankofengland.co.uk/speech/2019/mark-carney-speech-at-european-commission-high-level-conference-brussels>

ⁱⁱⁱ Network of Central Banks and Supervisors for Greening the Financial System (NGFS). “Origin and Purpose.” <https://www.ngfs.net/en/about-us/governance/origin-and-purpose>

^{iv} Bolton P. et al., January 2020 (“BIS”).

^v According to the United Nations sponsored Principles for Responsible Investment (PRI), asset owners and managers controlling close to \$80 trillion are incorporating ESG criteria into their decision making. <https://unpri.org/pri/about-the-pri>

^{vi} <https://blackrock.com/us/individual/lary-fink-ceo-letter>

^{vii} <https://www.cdsb.net/mandatory-reporting/947/are-we-headed-towards-mandatory-climate-disclosure>

^{viii} <https://www.fsb-tcfd.org/>

^{ix} Batten S, *Climate Change and the Macro-Economy: a Critical Review*. Bank of England (2018).

^x Theoretically, meaningful carbon pricing could create a market for technologies that remove carbon dioxide from the atmosphere, but those technologies are in relatively early stages of development.

^{xi} See BIS at 8 (referencing Stiglitz J (2019))

^{xii} *A Call for Action – Climate Change as a Source of Financial Risk*. NGFS (2019).

^{xiii} NGFS at 13-17.

^{xiv} NGFS “Progress Report” (2018).

^{xv} BIS at 9.

^{xvi} <https://www.theguardian.com/business/2019/dec/18/uk-banks-insurers-climate-crisis-stress-tests-bank-of-england>

^{xvii} BIS at 36.

^{xviii} Likely based on the Task Force on Climate Related Financial Disclosure (TCFD).

^{xix} “Green QE” is not meant to be stimulative as much as mitigative but is subject to the lack of a consistent taxonomy as to what type of debt should be considered “green”.

^{xx} BIS Chapter 4.

^{xxi} Speech to Lloyd’s of London, September 2015.