Comment on “The Economics of Biodiversity Loss” by Stefano Giglio, Theresa Kuchler, Johannes Stroebel and Olivier Wang

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Abstract

In their contribution to the 2024 ECB Forum, Stefano Giglio, Theresa Kuchler, Johannes Stroebel and Olivier Wang provide a novel and interdisciplinary approach, drawing on ecological insights, to model the macroeconomics of biodiversity loss. They then empirically test the model via the use of data on Credit Default Swap (CDS) spreads and a Biodiversity News Index. This comment revisits the context of the debate as well as their results and relates them to other recent analyses on biodiversity and finance economics.

1 Biodiversity loss: trends and international context

Biodiversity – encompassing species, ecosystems and genetic diversity – is being lost at unprecedented rates. Populations of vertebrates (mammals, birds, reptiles, amphibians and fish) have shrunk on average by 69% since 1970. Declines in species richness and abundance negatively affect ecosystem function, productivity and resilience (Cardinale et al., 2018; Oliver et al., 2015). In addition, many of the world’s terrestrial, freshwater and marine ecosystems have been destroyed or degraded. Humans have significantly altered 75% of land cover and 66% of the ocean is subject to increasing cumulative impacts (IPBES, 2019). And these trends are projected to continue under business-as-usual scenarios.

These declines are alarming as biodiversity provides invaluable ecosystem services critical to all aspects of human wellbeing and our economies. They include a range of services that are not priced in the market - what Professor Dasgupta in referred to in his Review of The Economics of Biodiversity as invisible and silent. Examples include pollination services critical for food, clean water provisioning and climate regulation, amongst many others. Already though, the majority of ecosystem services are declining, including declining global trends in crop pollination, soil fertility, natural filtration of pollutants from air and water, protection from coastal storms and other hazards. More specifically, the IPBES 2019 global assessment

[1] OECD Environment Directorate. This content should not be reported as representing the official views of the OECD or its member countries. The opinions expressed and arguments employed are those of the author.

reported a decline in 14 of 18 categories of ecosystem services since 1970, particularly regulating and maintenance services.

Recognising this crisis, at the international level 196 Parties to the UN Convention on Biological Diversity agreed, in 2022, on the Kunming-Montreal Global Biodiversity Framework. The Framework sets out four goals to 2050 and 23 targets to be achieved by 2030, with an overarching mission to halt and reverse biodiversity loss by 2030. A number of these targets recognise to the need to align incentives and finance with biodiversity objectives, notably:

- Target 14 to ensure the full integration of biodiversity and its multiple values into policies, regulations… within and across all levels of government and across all sectors, … progressively aligning all relevant public and private activities, and fiscal and financial flows with the goals and targets of this framework;

- Target 15 to take legal, administrative or policy measures to encourage and enable business, and in particular to ensure that large and transnational companies and financial institutions:

    (a) Regularly monitor, assess, and transparently disclose their risks, dependencies and impacts on biodiversity, including with requirements for all large as well as transnational companies and financial institutions along their operations, supply and value chains, and portfolios; … To progressively reduce negative impacts on biodiversity, increase positive impacts, reduce biodiversity-related risks to business and financial institutions, and promote actions to ensure sustainable patterns of production;

- Target 18 to reform incentives harmful for biodiversity, and scale up positive incentives for biodiversity; and

- Target 19 to increase the level of financial resources from all sources (domestic, international, public and private), moblising at least USD 200 billion per year by 2030.

To help support and move the dial in this context, numerous initiatives have emerged in the last few years, such as the launch of the Task-Force on Nature Related Financial Disclosures in 2021, with disclosure recommendations released in 2023; and the NGFS (Network for Greening the Financial System) framework to help central banks and supervisors identify and assess sources of nature-related transition and physical risks, also released in 2023. Complementing these are numerous reports such as action-orientated policy guides to complement the Dasgupta Review (OECD, 2021), and supervisory frameworks to assess nature-related financial risk (OECD, 2023), to name a few.

2 Authors contributions

As Groom and Turk (2021) note in their paper “Reflections on the Dasgupta Review on the Economics of Biodiversity”, if one discards the decades of work in environmental economics at least since Dasgupta and Heal (1974) and Dasgupta and Heal (1980) from the category of ‘mainstream’ growth economics, mainstream theories of economic growth have essentially ignored the demands economic activity places on the biosphere and the constraints that the biosphere places on economic activity. In their contribution, Giglio, Kuchler, Strobel and Wang develop a novel and interdisciplinary approach, integrating ecological insights with economic modelling, to examine the biodiversity-economy interactions. More specifically, they incorporate species diversity in their model to capture the non-linear relationships and interdependencies between different species and their roles within an ecosystem, delivering ecosystem services that complement other factors of production. Among their main findings is that initial losses of biodiversity may only have small effects on output, but each loss reduces the economic resilience to future losses. Their approach also emphasises that different species are differentially important for overall ecosystem service production, and thus economic activity.

Using Credit Default Swap spreads and the Biodiversity News Index, they empirically test the model by examining whether biodiversity loss is reflected in asset prices, with findings showing that CDS spreads increase following negative biodiversity news, and more so for countries with more depleted ecosystems. This suggests that investors recognise biodiversity loss as a financial risk and implies that companies may wish to integrate biodiversity considerations into their risk management frameworks so as to mitigate these risks.

In addition, the authors also highlight further possible applications of the model, namely to inform optimal land use decisions, as well as the use of Pigouvian taxes and biodiversity offsets to help address biodiversity loss.

3 A nascent but burgeoning financial economics literature

The lack of biodiversity-related empirical research in the finance economics literature thus far may, in part, be explained by several factors. Climate change has been predominant in this literature, facilitated in part by a relatively easy metric namely tCO2e; in contrast analysis on biodiversity is hampered by the much greater complexity and multi-dimensionality of the issue, requiring multiple indicators to reflect its different components, whether it is species (animals and plants), ecosystems (terrestrial, marine and aquatic) or genetic diversity. Reducing biodiversity to a single metric is a much more challenging – if not infeasible - endeavour. However, we are now beginning to witness the emergence of a nascent but rapidly flourishing literature on biodiversity in the context of the finance sector, as new metrics continue to be developed. Notable examples include Giglio et al (2023); Hoepner et al (2023); Garel et al (2024) and Coqueret et al (2024). Giglio et al (2023) examine the effects of risks related to biodiversity loss on economic activity and asset values and find that biodiversity risks already affect equity prices. Hoepner

et al (2023) investigate the impact of three environmental criteria - biodiversity, water and pollution prevention - on infrastructure firms' credit risk and find that firms with better biodiversity risk management have more favorable financing conditions (lower credit default swap slopes). Garel et al (2024) use a new measure of a firms negative impact on biodiversity, the corporate biodiversity footprint, to study whether it is priced in an international sample of stocks. Their results indicate that investors have started to require a risk premium upon the prospect of future regulation to protect biodiversity. Coqueret et al (2024) examine whether investors are incorporating financial risks into their capital allocation with findings indicating that firms in sectors heavily depending or impacting on biodiversity display higher expected returns since 2021.

4 Broader policy implications and the need for further work

Overall, the authors' model develops a number of policy implications that strongly align with the broader environmental economics literature on biodiversity. For example, based on the non-linear relationship between species loss and economic activity, it strengthens the case for the precautionary approach to addressing biodiversity loss. As the model also underscores that not all species are equally important for economic activity, the paper also provides a foundation for further analysis, including with the respect to the optimal design of Pigouvian taxes and biodiversity offsets - key policy instruments that are able to help address the negative externalities associated with biodiversity loss.

One may anticipate that the next few years will continue to yield continued rapid emergence of data and analysis to further inform the biodiversity debate and in a way that is increasingly relevant to the specific needs of the diverse range of stakeholders affected by biodiversity loss. Given the economic and, by extension, financial ramifications of the biodiversity crisis, such an evolution is important and welcome. Just as the financial economics literature has made important contributions to inform the evidence base on climate change (Gasparini and Tufano, 2023), so too is the need for this field to contribute to the evidence base on biodiversity loss.

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