

The double materiality of biodiversity-related financial risks: an input-output approach for the Mexican economy

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There is no reason to believe that the financial sector is somehow exempt from the impacts of global environmental change in economic systems both at the national and the global scales. Understanding the links between ecology and finance, however, is a difficult task, as they are mediated, first, by the interaction between financial and productive sectors and, second, by the latter interacting with nature. An emerging concept useful in this context is that of the “double materiality,”TM organising biodiversity-related financial risks into two main categories: “physical risks”TM refer to the ways in which finance depends on nature by its exposure to productive activities depending on ecosystem services, whereas “transition risks”TM refer to the ways in which finance impacts nature by funding activities that inflict negative environmental impacts, therefore subject to adaptation strategies to reduce or avoid them. This paper contributes to the understanding of this double materiality by implementing an input-output approach at the national scale for the Mexican economy. Mexico is an exceptional case study because it is one of the few megadiverse countries in the world, its middle-income economy is highly tertiarised and integrated with the global economy, both productively and financially, and because adequate sources of information are available from Mexico’s statistical office and the financial and environmental institutions.

Methodologically, our approach is based on a correspondence between the ENCORE database featuring categorical scores of sector-specific dependence on 25 ecosystem services and 13 categories of environmental impact with a 263-sector input-output database for the Mexican economy. We construct an economy-wide assessment of “total”TM scores for ecosystem dependence and environmental impact taking into account each sector’s direct dependence and impact and the indirect effects as diffused throughout the economy’s network of supply chains. We then relate this assessment with the sectoral distribution of the national credit portfolio and complement with output and employment data to evaluate the extent to which these are exposed directly and indirectly to ecosystem services and environmental impact. Notably, by taking into account the contribution of supply chains, the input-output computation is instrumental in explaining each economic sector’s ecosystem dependence and environmental impact: While several of them may be directly independent to particular ecosystem services or having a null impact on some environmental categories, all of them exhibit some degree of indirect dependence and impact when considering their reliance on the economy’s production network.

The main results indicate that 48-66% of the total output, 33-53% of total jobs, and 54-83% of the national credit portfolio exhibit a high dependency on at least one ecosystem service, where the pair of values indicate direct and total effects, respectively. Similarly, we find that 49-66% of output, 33-49% of jobs, and 54-68% of credits are associated with economic activities that are highly harmful in at least one category of environmental impact. Remarkably, “high” and “very high” scores of ecosystem dependence are dominated by water-related ecosystem services, both for the economy as a whole and for the activities concentrating the national credit portfolio (public administration, some professional and financial services, power generation, oil mining and construction); whereas “high” and “very high” scores of environmental impact concentrate in primary activities (agriculture and mining) and in some manufacturing (food processing, chemicals and cement, steel and aluminum), and are dominated by emissions of greenhouse gasses and several other pollutants, including solid waste, and the use of water and land.

We accompany our analysis with an assessment of the strengths and limitations of methods and procedures, and suggest some policy measures promoting a better understanding and management of biodiversity-related financial risks by central banks and other institutions in the financial sector. Important avenues for further research include the calibration of dependence and impact scores to better represent local contexts in terms of production technologies, ecological conditions, and environmental legislation and, more generally, the exploration of ways to reduce financial exposure to activities with negative impacts on the environment.