IMPACD:
An Integrated Macroeconomic Model of Pandemics, Climate Change, and Deforestation

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Abstract

We develop an integrated framework that incorporates the feedback effects between the economic incentives of deforestation, permanent loss of biodiversity, the damages and risks from global warming, and the increasing risks posed by emerging infectious diseases (EIDs). Within this framework we estimate the social cost of deforestation (SCD). We find that the major driver for the SCD is what we label the "barrier service effect"—that is, the social value of forest in shielding humanity from zoonotic EIDs. This barrier service effect amounts, today, to USD 11.18 per tCO_2, assuming a 30-year return period and a 4 percent post-pandemic loss of global output. Additional model runs yield a range of USD 2.76–42.39 for plausible return periods and post-pandemic global output losses and allow us to derive a simple intuitive rule for the barrier service effect, in terms of post-pandemic global output loss and the frequency of zoonotic pandemic events or pandemics. Our analysis could help policymakers and decision-makers address the external costs of deforestation.

JEL Codes: C61, D62, O4, Q23, Q54, Q57, Q58

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