

The Challenge of Estimating the Impact of Disasters: many approaches, many limitations and a compromise

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The recent upward trend in the direct costs of natural disasters is a reflection of both an increase in asset densities and the concentration of economic activities in hazard-prone areas. Although losses in physical infrastructure and lifelines are usually spatially concentrated in a few areas, their effects tend to spread geographically and temporally due to production chains and the timing and length of disruptions. Since the 1980s, several techniques have been proposed to model higher-order economic impacts of disruptive events, most of which are based on the input-output framework. However, there is still no consensus for a preferred model to adopt. Available models tend to focus on just one side of the market or have theoretical flaws when incorporating both sides. In this paper, the Generalized Dynamic Input-Output framework (GDIO) is presented and its theoretical basis derived. It encompasses the virtues of intertemporal dynamic models with the explicit intratemporal modeling of production and market clearing, thus allowing supply and demand constraints to be simultaneously analyzed. Final demand is endogenized to study the impact of displacement and unemployment post-disaster. The key roles of inventories, primary inputs, labor force and physical assets in disaster assessment are explored and previous limitations in the literature are addressed. I show that the dynamic Leontief model, the sequential interindustry model and the traditional input-output model are all special cases of the GDIO framework.