

## **The economic-wide consequences of large-scale floods. An application of a European interregional input-output model**

Topic: Input-Output Analysis of Desasters

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In recent history, flooding of both river and coastal systems is the most frequent and damaging natural hazard. Besides large economic losses within the flooded regions, surrounding non-flooded regions can endure economic losses as well. As a result of these extended regional linkages, a comprehensive risk assessment is required to understand which impacts flooding may cause to the economy as a whole. In this paper, we make first steps with applying a methodology consisting of a hybrid interregional input-output model to assess the economic consequences of large-scale floods for the European economy. The proposed methodology consists of multiple steps. First, a direct loss assessment is conducted in several flood-prone regions, based on simulated floods. Second, the direct losses in capital and labor are translated into the loss in production per sector. Third, the recovery of this production shock is modeled using a hybrid interregional input-output model, combining non-linear programming and input-output modelling. This combination makes it possible to find (1) the possible production losses in the affected regions and other European regions, (2) the required production in Europe to satisfy additional reconstruction demands from the affected regions and (3) the required production in other regions that is necessary to take over lost production in the affected region. Consequently, when knowing how much production is lost (or gained) in each region, the economic consequences can be assessed. Finally, the model outcome is loss estimation expressed in terms of expected annual damage. To assess these consequences, interregional supply and use tables are used, consisting of 256 different European NUTS2 regions. This data makes it possible to model the indirect losses for both the affected region and the rest of Europe in detail. Results show that regions outside the affected area can have benefits or losses, depending on the economic relation with the affected region. Consequently, depending on the size of the flood, the overall consequences for Europe can both be positive and negative. This study shows the large potential of interregional modelling and the added value of combining different economic loss estimation approaches into an integrative framework.