

The impact of production and infrastructure shocks to the Japanese inter-regional economy: A non-linear input-output programming approach

Topic: Input-Output analysis of disasters II

Author: Michiya Nozaki

Co-Authors: Jan Oosterhaven

The impact of production and infrastructure shocks to the Japanese inter-regional economy: A non-linear input-output programming approach

Michiya Nozaki (Visiting Researcher, Chuo University) & Jan Oosterhaven (University of Groningen)

Abstract

This paper develops a methodology to predict and to thus possibly mitigate the economic impacts of major catastrophes, such as earthquakes and tsunamis. The short-run impacts are assumed to be determined by the attempts of economic actors to return to the pre-catastrophe economic situation as closely and as quickly as possible. We propose to model these behavioural reactions by a non-linear program that minimizes the weighted sum of the logarithms of the deviations between the post- and the pre-catastrophe size of all economic transactions in the economy at hand, subject to a Walras-Leontief production function per regional industry, a minimal size of regional final demand by product and a positive trade balance. The non-linear program is considered to be representative of the short-run equilibrium of the economy at hand, when its base scenario solution closely resembles the base year interregional input-output table of the country at hand.

The methodology will be tested by means of the comparison of the base scenario with a series of scenarios with regional production shocks and interregional infrastructure shocks to the Japanese interregional, interindustry economy of 2005. The impacts of these shocks will be evaluated by means of the changes in, respectively, regional value added and the output price by regional industry.

Keywords: catastrophe analysis, non-linear programming, input-output analysis, infrastructure shocks, Japan