# The effects of a production disruption in a linear programming input-output model

Topic: Input-Output analysis of disasters II
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There exist various approaches to use input-output analysis for measuring the direct and indirect effects of a disruption to an economic system stemming from natural disasters, bottlenecks in primary factors and energy resources, strikes, and restrictions due to regulation. The present paper brings together linear programming and input-output-analysis to introduce various scenarios of linear restrictions to an economy where there is only one technology to produce each good (Leontief technology). Thus, technological adaptation is not an option. However, other forms of adaptation, e.g. changing the composition of final demand and of the trade structure are considered. The effect of the disruption is computed as the difference between the base scenario and the solution of the linear program.

The analysed models stand in a long tradition of linear-programming-input-output approaches. While in older models the production or the value added of the overall economy was employed as the objective function to be maximized, in our approach it is final demand. However, final demand must not exceed the final demand before the disruption in any of the commodities produced. A more recent contribution that has some similarity with our model uses an information theoretic measure for model solution (Oosterhaven et al, 2013) and is therefore a non-linear programming model.

The suitability and interpretation of various modelling approaches are discussed, both from a theoretical stand-point and with the help of application studies based on real world input-output tables. The applications deal with the cut-back of the production of a group of industries and with the effect of a shortage of emission allowances in a cap-and-trade system.