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Assessing the indirect effects due to natural hazards on a mesoscale

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Measuring indirect economic costs and other effects from natural hazards, especially floods in alpine and other mountainous regions, are a necessary part of a comprehensive economic assessment. Their omission seriously affects the relative economic benefits of structural or non structural measures of flood defence. Surpassing controversial, IO-model-based economic estimates, analysing indirect economic effects lead to the key question of identifying and evaluating the drivers of indirect economic effects and resilience to system effects in the regional economy, i.e. at the meso-level. This investigation takes place for the catastrophic floods in summer 2005 in the provinces of Tyrol and Vorarlberg, Austria, which caused an estimated € 670 Mio direct loss on private and public assets and severe interruptions in lifeline services. The paper starts out with differentiating the concept of indirect economic costs from direct costs, examing different temporal (short vs. long-term) and spatial (macro-, meso- vs. microeconomic) system boundaries. It surveys common theories of economic resilience and vulnerability at the regional economy level. Indirect effects at the regional economy level can be defined as interferences of the economic exchange of goods and services triggered by breakdowns of transport lines and critical production inputs. The extent and persistence of indirect effects of natural hazards is not only by parameters of the extreme event, such as duration and amplitude of the flood, but much more by resilience parameters of the regional economy such as size of enterprises, the network structure (linkages) of the regional economy, availability of insurance and relief funds, and the stock of inventory. These effects can only be dissected by means of expert judgement and event studies. This paper presents the results of a survey conducted among business practioneers, members of chamber of commerce, civil protection agencies to identify and scale the drivers of indirect costs triggered by floods on a local and regional scale. We develop a risk point scale and explain how it can be nested into IO-model-based economic tools such as the HAZUS indirect economic loss calculator