

An Adaptive Regional Input-Output Model and its Application to the Assessment of the Economic Cost of Katrina

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This paper proposes a new modeling framework to investigate the consequences of natural disasters and the following reconstruction phase. Based on Input-Output tables, its originalities are (1) the taking into account of sector production capacities and of both forward and backward propagations within the economic system; and (2) the introduction of adaptive behaviors. The model is used to simulate the response of the economy of Louisiana to the landfall of Katrina. The model is found consistent with available data, and provides two important insights. First, economic processes exacerbate direct losses, and total costs are estimated at \$149 billion, for direct losses equal to \$107 billion. When exploring the impacts of other possible disasters, it is found that total losses due to a disaster affecting Louisiana increase nonlinearly with respect to direct losses when the latter exceed \$50 billion. When direct losses exceed \$200 billion, for instance, total losses are twice as large as direct losses. For risk management, therefore, direct losses are insufficient measures of disaster consequences. Second, positive and negative backward propagation mechanisms are essential for the assessment of disaster consequences, and the taking into account of production capacities is necessary to avoid overestimating the positive effects of reconstruction. A systematic sensitivity analysis shows that, among all parameters, the over-production capacity in the construction sector and the adaptation characteristic time are the most important.

Key words: Natural disasters, Economic impacts, Reconstruction, Input-Output model

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