Misfortunes Never Come Singly: Managing the Risk of Chain Disasters

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Abstract

The paper studies optimal disaster prevention and growth policies in an environment where the arrivals of primary disasters trigger subsequent shocks through contagion effects. To model the interrelated disasters, we use the Hawkes process, which is a novelty in general equilibrium economics. We derive analytical solutions for the optimal growth path and an optimal mitigation policy. We find that the existence of interrelationships between different shocks makes optimal disaster spending stochastic, which is in contrast to the previous literature that advocates a constant share of income for disaster mitigation. An efficient abatement policy depends positively on the arrival rate of the primary shock and jumps upwards when an initial disaster occurs. Such behavior is consistent with the evidence on economy-wide aid during the recent COVID-19 pandemic. We extend the analysis by including Brownian uncertainty and random catastrophe magnitude in the Hawkes process, which shows the versatility of our approach.