

Aggregation operators for the measurement of systemic risk[☆]

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Abstract

The policy objective of safeguarding financial stability has stimulated a wave of research on systemic risk analytics, yet it still faces challenges in measurability. This paper models systemic risk by tapping into expert knowledge of financial supervisors. We decompose systemic risk into a number of interconnected segments, for which the level of vulnerability is measured. The system is modeled in the form of a Fuzzy Cognitive Map (FCM), in which nodes represent vulnerability in segments and links their interconnectedness. A main problem tackled in this paper is the aggregation of values in different interrelated nodes of the network to obtain an estimate systemic risk. To this end, the Choquet integral is employed for aggregating expert evaluations of measures, as it allows for the integration of interrelations among factors in the aggregation process. The approach is illustrated through two applications in a European setting. First, we provide an estimation of systemic risk with a of pan-European set-up. Second, we estimate country-level risks, allowing for a more granular decomposition. This sets a starting point for the use of the rich, oftentimes tacit, knowledge in policy organizations.

Keywords: systemic risk, aggregation operators, Fuzzy Cognitive Maps, Choquet integral

JEL codes: E440, F300, G010, G150, C430

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