FINANCIAL NETWORK MODELING

MODEL OVERVIEW
The Financial Services Sector performs several functions for the economy, including payment processing, investment, and risk management. Performing these functions depends on the ability of financial firms to create and draw on relationships with other financial firms. These relationships create a network of interdependencies across the financial system. The strength and stability of the system depends on the structure of this network. The National Infrastructure Simulation and Analysis Center (NISAC) has developed a set of models to help decision makers understand how possible disruptions to individual parts of the financial system can influence system-level function through network connections.

MODEL CHARACTERISTICS
- Models the spread of disruptions in a network of financial firms through their various relationships.
- Considers different kinds of relationships, depending on problem focus, such as payment flows or financial obligations.
- Models different business rules, leading to different patterns of disruption propagation, to help evaluate policy options.

OUTPUT
- Condition of each member of the network over time.
  - Condition description may consist of asset value, reserve account balance, or other measures, depending on the problem focus.

MODEL APPLICATIONS
- Demonstration analysis of default propagation following insolvency of a financial institution under varying capital requirements.
- Analysis of the effects of:
  - Operational disruptions on system-level liquidity in a wholesale payment system.
  - Settlement rules on shock propagation between wholesale payment systems linked by foreign exchange.

QUESTIONS ADDRESSED
Given a network of relationships among financial institutions and an event that makes one or more unable to fulfill their commitments, NISAC can answer the following types of questions:
- Would the disruption spread to connected institutions?
- Would it spread to pervade much or all of the system, or would it be localized?
- How long would the problem take to unfold?
- Are some institutions or events especially likely to trigger system-level problems?
- Would changes to the network structure, business rules, or supporting systems make large problems less likely?

ABOUT OCIA
The Department of Homeland Security, National Protection and Programs Directorate’s (NPPD) Office of Cyber and Infrastructure Analysis (OCIA) manages NISAC, which is a Congressionally mandated center of excellence in modeling, simulation, and analysis of critical infrastructure.

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