



Graduate School of Information Science, University of Hyogo
11th International Research Seminar

SYSTEMIC RISK AND SHOCK PROPAGATION IN FIRM-LEVEL SUPPLY NETWORKS

Thu. 27 Mar. 2025 (13:00 ~ 14:00) JST

IN-PERSON/ONLINE SEMINAR

Recent crises and natural disasters (e.g., COVID-19, the Ukraine war, the 2011 Tsunami in Japan, and the 2011 flood in Thailand) have exemplified the vulnerability of corporate supply chains to exogenous shocks. Such events lead to large economic costs, significant financial losses for firms and banks, and can cause severe supply shortages of essential goods for populations across entire regions or countries. First, we introduce the economic systemic risk index (ESRI), which quantifies the economic systemic risk of individual firms in production networks by measuring the short-term drop in network-wide production following a firm's failure. We calculate ESRI for 91,595 firms in Hungary's supply network, derived from value-added tax data. Second, we extend this framework to specifically assess systemic risks for the food supply of entire countries by simulating product-level supply losses across administrative districts resulting from cascading disruptions between establishments. We demonstrate the method on a large portion of Austria's food supply network, comprising 23,001 establishments, 44,730 supply links, and 116 administrative districts. Finally, we highlight the necessity of using firm-level data to model how disruptions propagate through supply chains by showing that relying on aggregated industry-level supply networks can underestimate the economic losses of a COVID-19-like shock by up to 37%.

Register here (free)

<https://shorturl.at/1kUVB>

Contact: rashed@gsis.u-hyogo.ac.jp



Guest Speaker



Christian Diem

MSCA Postdoctoral Research Fellow
The Smith School of Enterprise and the
Environment & The Institute for New
Economic Thinking at the Oxford Martin
School University of Oxford, UK



Christian Diem is a Marie Skłodowska-Curie Actions (MSCA) Postdoctoral Fellow at INET Oxford and the Smith School for Enterprise and the Environment. In his MSCA project – funded by UKRI – he investigates how shocks in firm-level production networks propagate empirically and how the resulting empirical estimates can improve the performance of economic simulation models. He aims to better understand economic and financial systems with tools from economics, network science, and agent-based computer simulations. His work ranges from quantifying systemic risk in large-scale firm-level supply networks, reconstructing the Austrian food supply chain network, extending financial stress testing to include supply chain effects, and optimally rewiring interbank networks to reduce systemic risk. Christian's research has been featured on national TV, radio and major news papers in Austria. He is one of the lead organisers of the firmnets interdisciplinary workshop series on firm-level supply networks (<https://firmnets2022.csh.ac.at>). He acquired and contributed to projects funded by UKRI, the Austrian Research Promotion Agency (FFG), the Austrian National Bank (OeNB) and the Vienna Science and Technology Fund (WWTF). Christian holds a master's degree in Quantitative Finance and a PhD in Economics and Social Sciences both from the Vienna University of Economics and Business. Previously he was a Senior Scientist in the Network Economics, Supply Chains & Financial Markets Group at the Complexity Science Hub Vienna and worked in policy projects with the Austrian Federal Ministry of Agriculture.

For more details:

<https://www.inet.ox.ac.uk/people/christian-diem>

**Kobe Campus for Information Science,
Computational Science Center Building,
Large Lecture Hall (720), 7th Floor**
<https://www.u-hyogo.ac.jp/about/access/>