

## 4<sup>th</sup> Interdisciplinary Workshop on Firm-Level Supply Networks: Reconstruction and Dynamics

June 24 - 25, 2024

Complexity Science Hub, Josefstaedter Strasse 39, 1080 Vienna

### Abstract

Supply chains underpin much of the functioning of the economy, including critical sectors such as food, medicine, defense, and engineering. Increased complexity, the adoption of lean management principles, and interdependence have resulted in increased vulnerability to disruptions that often spread through global networks, halting the flow of materials and services. Supply chain risk has been identified as a top business risk factor in a variety of industrial sectors and has been prioritized by numerous governments. The climate crisis and increased geopolitical instability are expected to exacerbate the challenges faced by supply networks.

To tackle these challenges, we need a better understanding of supply networks at the firm and product levels. This will require better maps of the global supply networks and new modeling approaches to analyze them. In the 4<sup>th</sup> Interdisciplinary Workshop on Firm-Level Supply Networks, we bring together leading experts and early career researchers in economics, complex systems, and supply chain management, to discuss recent advances in the analysis of granular supply network data.

We will devote the first day of the workshop to specific real-world applications of firm-level supply networks, including sessions on CO<sub>2</sub> accounting, human rights, the dynamic evolution of supply networks, and international trade. The second day of the workshop will be devoted to mapping supply networks, discussing state-of-the-art reconstruction methods (e.g., maximum entropy, machine learning) and data sources (e.g., payment data).



## Monday, June 24

- 08:30 - 09:00**      **Registration at CSH, coffee and pastry**
- 09:00 - 09:15**      **Welcome Remarks**
- Stefan Thurner** (CSH President)  
**Alexandra Brintrup, Christian Diem, François Lafond, Anton Pichler, Peter Klimek** (Organizing Team)
- 09:15 - 10:45**      **Session 1: CO2 emissions accounting with firm-level supply network data** (Session Chair: Anton Pichler)
- 09:15 – 09:35      **Antoine Mandel:** Network-Based Allocation of Responsibility for GHG-Emissions
- 09:35 – 09:55      **Johannes Stangl:** Using granular supply network data to measure progress towards the energy transition at the firm-level
- 09:55 – 10:15      **Yuya Katafuchi:** Construction of Enterprise-Level Global Supply Chain Database and its Application to Scope 3 Emissions
- 30-minute Discussion**
- 10:45 - 11:15**      **Coffee and pastry break**
- 11:15 - 12:45**      **Session 2: Preventing tax fraud & human rights violations with firm-level supply network data** (Session Chair: Peter Klimek)
- 11:15 – 11:35      **Angelos Alexopoulos:** A Network and Machine Learning Approach to Detect Value Added Tax Fraud
- 11:35 – 11:55      **Gabriel Felbermayr:** The EU self-surplus puzzle: an indication of VAT fraud?
- 11:55 – 12:15      **Jan Hurt:** Supply Chain Due Diligence Risk Assessment for the EU: A Network Approach
- 30-minute Discussion**
- 12:45 - 14:00**      **Lunch at CSH**
- 14:00 - 15:30**      **Session 3: Firm-level Supply Networks for Policymaking** (Session Chair: Stefan Thurner)
- 14:00 – 14:20      **Josefina Monteagudo:** The “SCAN” methodology to monitor supply chain distress and strategic dependencies



- 14:20 – 14:40 **Emmanuel Dhyne:** Production network and monetary policy transmission – The ChaMP network
- 14:40 – 15:00 **Louise Guillouet:** The Market Microstructure of Industrial Ecosystems in the Digital and Green Transitions: How Can Production Networks Help Design Better Industrial Policies
- 30-minute Discussion**
- 15:30 - 16:00** **Coffee and pastry break**
- 16:00 - 17:30** **Session 4: International trade networks & global supply chains**  
(Session Chair: François Lafond)
- 16:00 – 16:20 **Isabelle Méjean:** Frictions and Adjustments in Firm-to-Firm Trade
- 16:20 – 16:40 **Andreas Moxnes:** Growing Together and Apart: Scale Economies and Specialization
- 16:40 – 17:00 **Glenn Margerman:** Finding Markets via Firm Embeddings: A machine learning approach to relevant markets
- 30-minute Discussion**
- 19:00 - 21:00** **Workshop dinner, Glacis Beisl, Breite Gasse 4, 1070 Vienna**
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## Tuesday, June 25

- 08:30 - 09:00** **Registration at CSH, coffee and pastry**
- 09:00 - 10:30** **Session 5: Dynamic firm-level supply networks**  
(Session Chair: Christian Diem)
- 09:00 – 09:20 **Jari Saramäki:** Lessons from Temporal Networks
- 09:20 – 09:40 **Davide Luzzati:** Empirical dynamics of temporal production networks and aggregate fluctuations
- 09:40 – 10:00 **Tobias Reisch:** Towards a Statistical Understanding of the Evolution of Production Networks on the Firm Level
- 30-minute Discussion**
- 10:30 - 11:00** **Coffee and pastry break**
- 11:00 - 12:30** **Session 6: Firm-level supply network reconstruction 1**  
(Session Chair: Alexandra Brintrup)



- 11:00 – 11:20 **Leonardo Ialongo:** Network Reconstruction Approaches to improve Forecasting of Economic Shock Scenarios
- 11:20 – 11:40 **Thomas Choi:** Firm-Level Governance of Direct and Indirect Transactions in Multi-Tier Supply Chains
- 11:40 – 12:00 **Sara Al Mahri:** The Power of LLMs and Knowledge Graphs in Enhancing Supply Chain Visibility

**30-minute Discussion**

**12:30 - 13:00** **Coffee and pastry break**

**13:00 - 14:30** **Session 7: Firm-level supply network reconstruction 2**  
(Session Chair: François Lafond)

- 13:00 – 13:20 **Johannes Lumma:** Aggregate Fluctuations in Production Networks - Evidence from Payments Data
- 13:20 – 13:40 **Peter Klimek:** Reconstructing Temporal Interfirm Networks at Scale using Open Web Data
- 13:40 – 14:00 **Ge Zheng:** Large Language Models for Link Prediction in Complex Supply Networks

**30-minute Discussion**

**14:30 - 15:30** **Lunch & End of Workshop**