

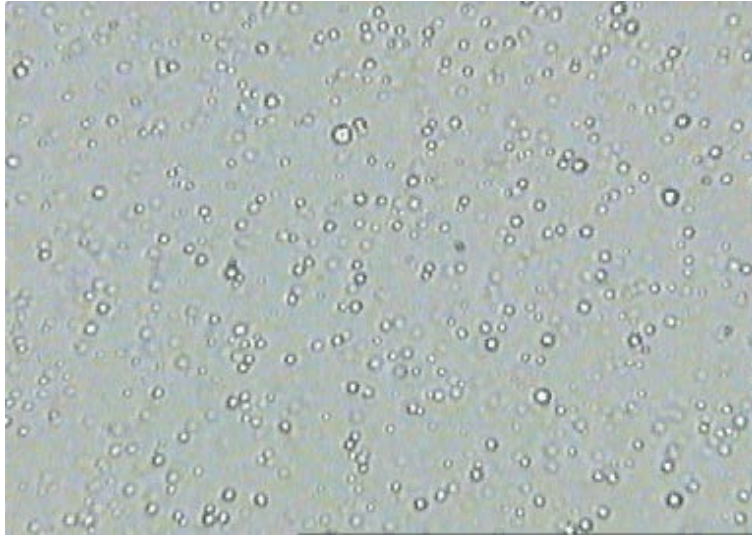
Discussion on
“Buyer-Supplier Networks and Aggregate
Volatility from Firm Level Data”
by T. Mizuno, W. Souma and T. Watanabe

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“Granular” versus “Linkage”

One may not be able to compare these ideas on an equal footing.



Brownian motion of fat particles (0.5 - 3.0 μm) in milk

Only brownian particles (large firms) are visible, but their motion is inseparable from motion of invisible water molecules (small-to-medium-sized firms) surrounding them.



The origin of macroeconomic fluctuations?

>Granular Hypothesis: a **naïve way** to explain...

>Linkage Hypothesis: giving a **much deeper insight** into...

Coarse Graining in the Present Study

Microscopic (Firm-level)

PageRank



Mesoscopic (sector-level/community-level)

Inter-industry relations table



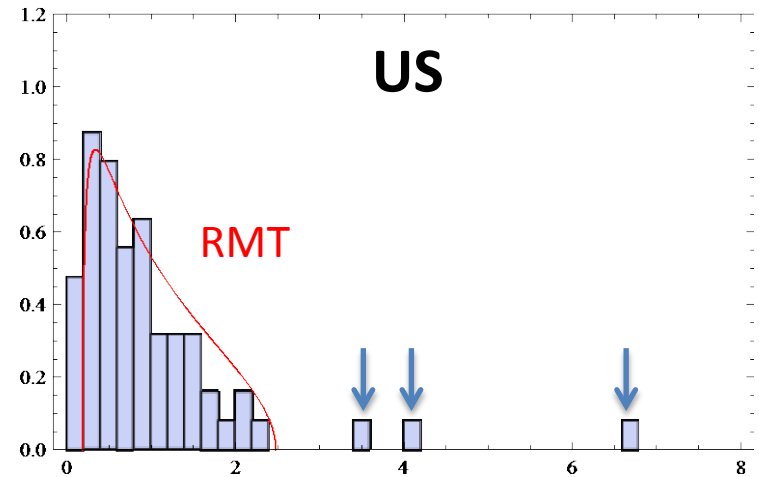
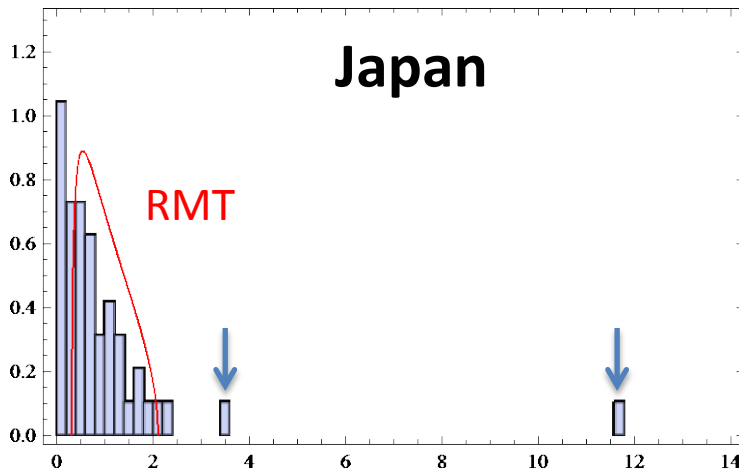
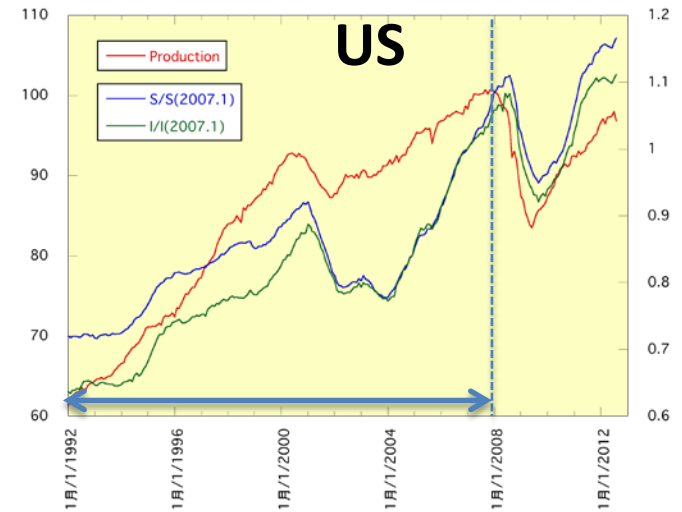
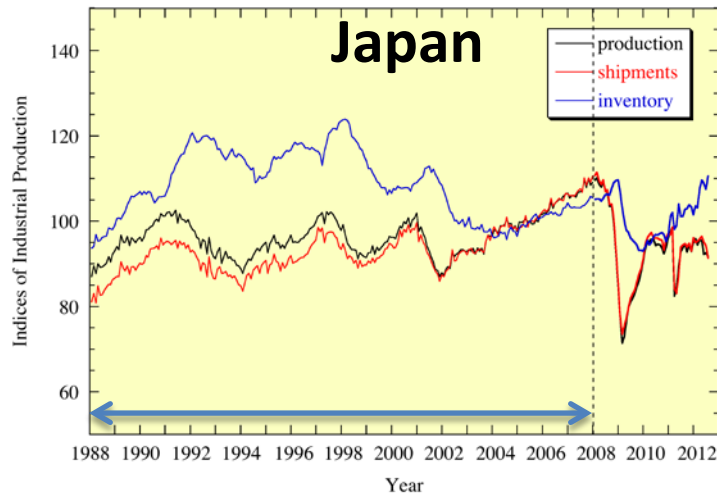
Macroscopic (National level)

GDP

One may be able to construct an inter-industry relations table which is microscopically founded.

PCA on IIP in Japan and US

This analysis gives an alternative evidence for the propagation of shocks through the production network.

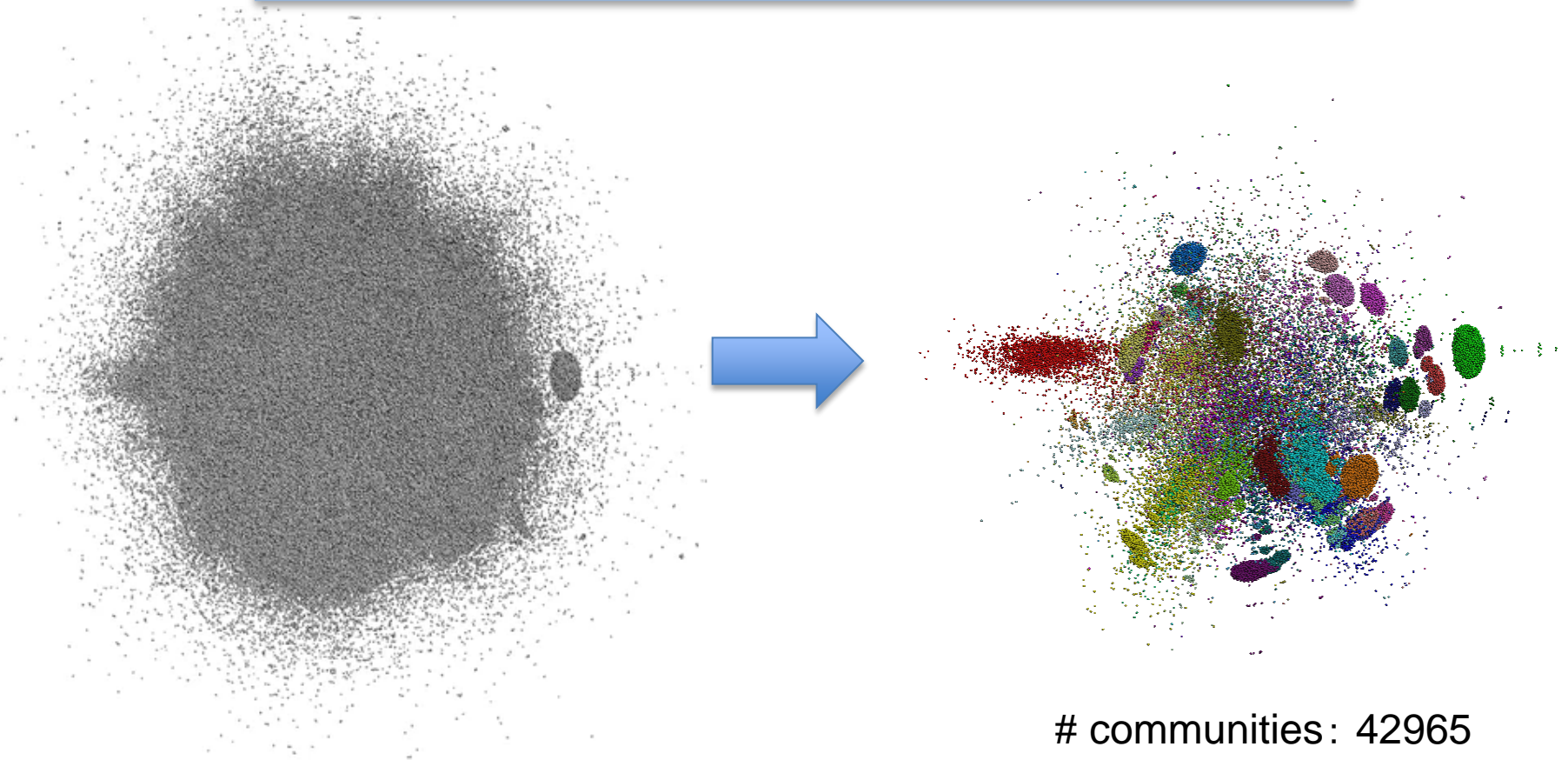


Community Structure in Interfirm Network

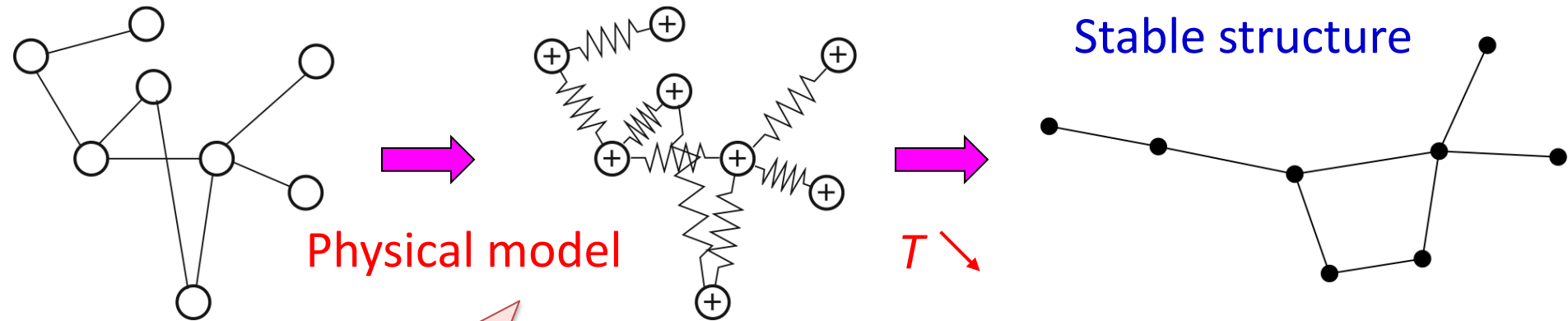
Data compiled by Tokyo Shoko Research Inc.

Number of nodes (firms): 780,544

Number of links (buyer-supplier relations): 3,196,282



Visualization of Network

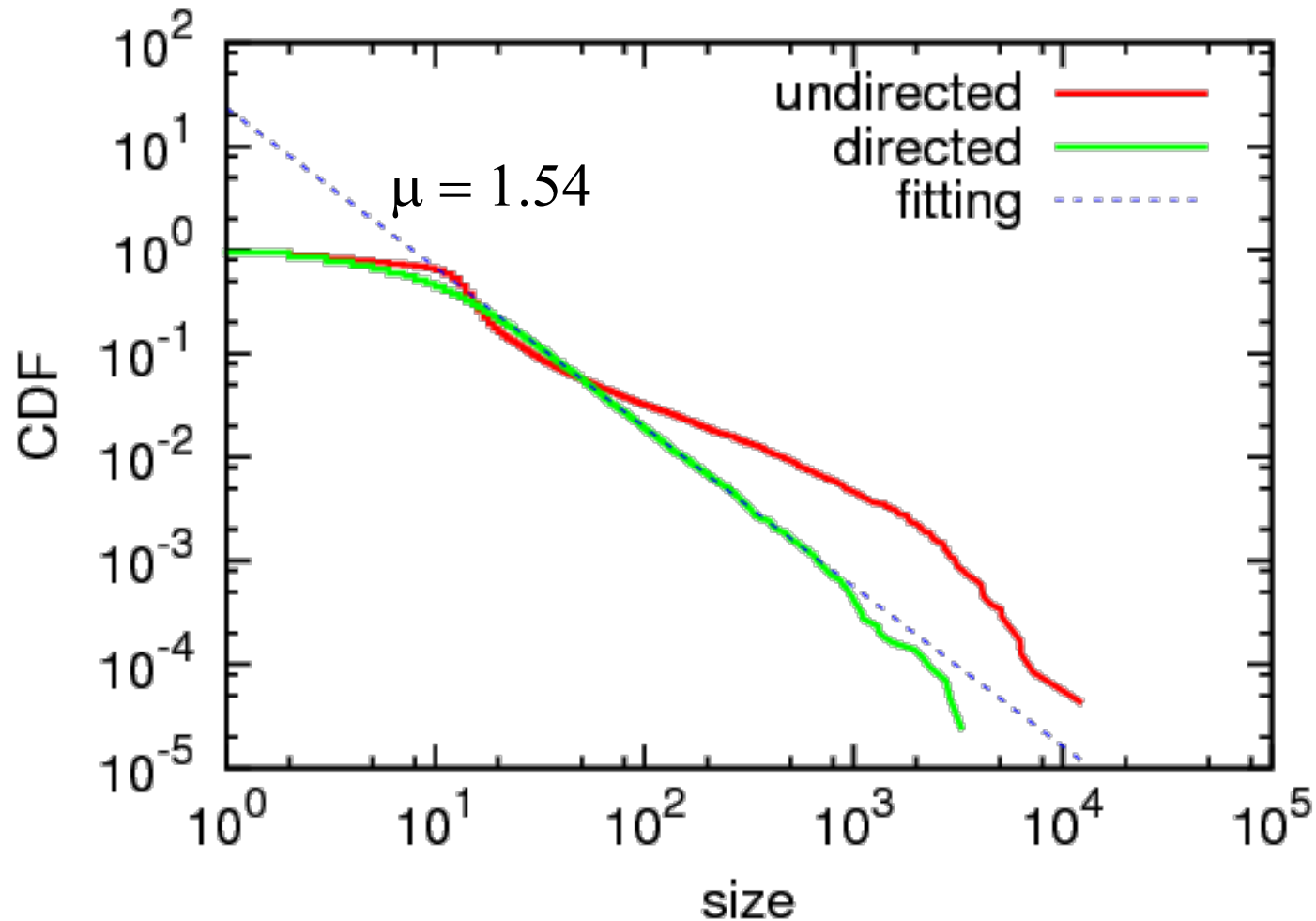


- Linked nodes are attracted by a **spring**.
- All nodes repel each other through **Coulomb** potential.



We expect that the configuration in the ground state gives an optimized visualization of a given network structure.

Community Size Distribution



Information on the direction of links play an important role in detecting communities.

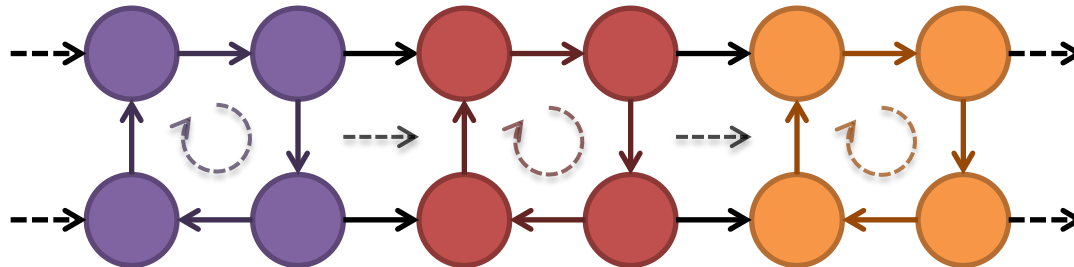
Directed versus Undirected

Behavior of random walkers on a network

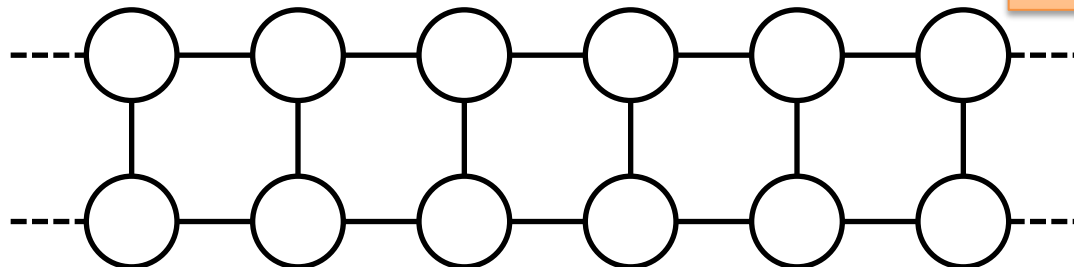


Detection of communities in the network

Directed Network



Undirected Network



Random walkers tend to stay longer in this part.

Summary

- Comparison between Granular Hypothesis and Linkage Hypothesis
- Alternative evidence for the propagation of shocks through the production network (PCA on IIP in Japan and US)
- Possibility of constructing an inter-industry relations table at a sector level.
- Possibility of identifying community structure of the network studied in this paper.