NETADIS
Statistical Physics Approaches
to
Networks Across Disciplines

Contagion accross credit networks

Author:
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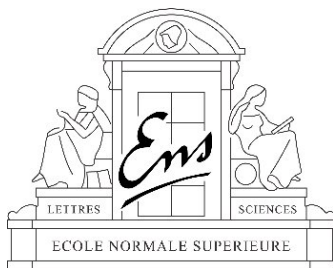
Supervisor:
Pr. Reimer KÜHN

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Personal background : education

- B.Sc., M.Sc. at the École Normale Superieure de Paris, France
- M.Sc. in quantum mechanics, specialized in statistical physics

Personal background : research experience

- previous research projects in granular media, climate science and out-of-equilibrium statistical physics

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Project background

- Hatchett & Kühn 2006 : *Effect of economic interactions on credit risk* presents a simple model of economic interaction and study the contagion effects.

- The goal was to present a qualitative picture of the effects of interactions on firms' default risk, showing that a firm's default risk is highly dependent on its environment.

- Unlike many regulatory models, it is stochastic in nature

Model details

- We consider a group of firms that interact with each other

- When a firm defaults, its neighbours take a (random) loss

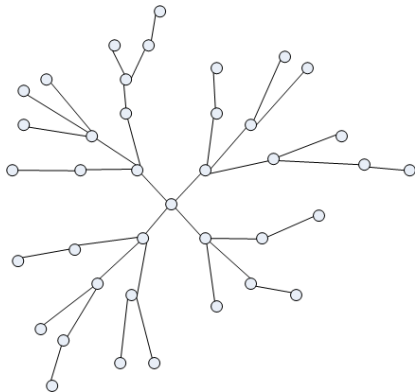- The bigger the loss, the higher the likelihood of default

Aim : Determine the fraction of defaulted firms at time t.
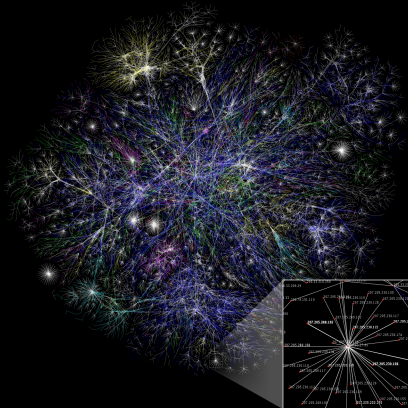
In the simplest case

In more interesting cases

We can solve this :

In even more interesting cases

We are trying to solve this :

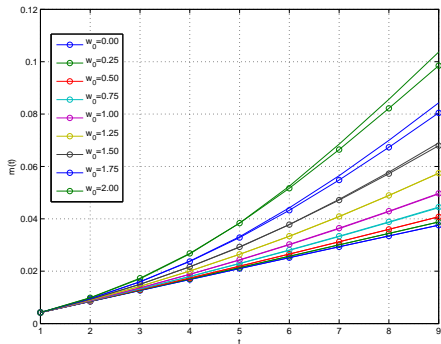## In even more interesting cases
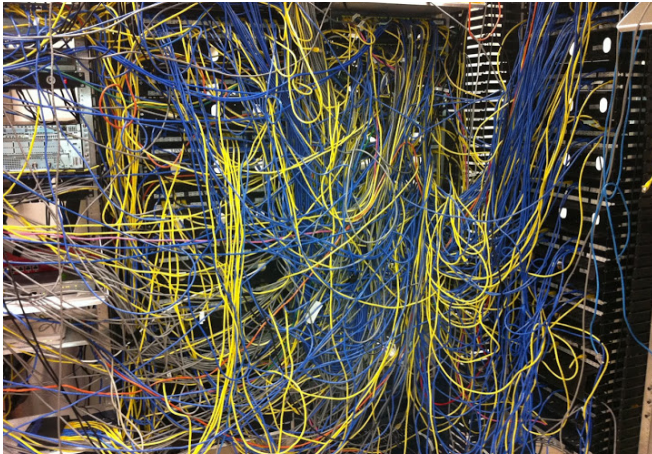
With some success !

Figure: Default probabilities for different mean interaction strength : simulation (circled) and theory. Network size is set at $N = 1000$.

In the future

We aim to tackle more complex network structures

Long-term goal

And eventually

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Schools

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- Secondment in Turin with Luca Dall'Asta

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- Networking (CFM)