Researchers at Aalto University investigate smart taxation schemes in order to make the financial system sustainable

Alexander Gurevich studies in his master’s thesis in complex systems titled “Comparing network-based taxation schemes to reduce systemic risk in banking systems” taxation designs, based on the impact of financial contracts on the systemic risk. These schemes are aimed to rearrange price signals expressed in interest rates for the transactions in order to make the economic actors build a robust system.

The widely used notion of risk has quite a large number of different quantifying definitions, depending on the purpose of its calculation. The first attempt taken by the scholars from the International Institute for Applied Systems Analysis to introduce systemic risk tax (SRT) separated idiosyncratic and systemic risks. The former is related to the risk of failure of a certain system’s component, whereas the latter describes the propagation of distress in the system.

Network theory, being a new rapidly developing discipline, has some results that may be helpful for measuring systemic importance of financial institutions. However, ad-hoc developed metrics also exist, measuring the fraction of assets in the system exposed to the failure of the considered financial institution. The proposal of the SRT is to levy the difference in systemic risk after and before the transaction measured by the above-mentioned metrics, thus creating incentives for actors to make less risky (in a systemic sense) deals.

In his thesis, Gurevich compares different network-based metrics as candidates for the SRT in the credit interbank network. He tests them using agent-based model simulations, which could be considered as a videogame model: agent-based modelling is a computational simulation of the economy by creating economic agents, defining rules for their behaviour and letting
these virtual agents act. The model used simulated the entire economy with firms, banks, workers and government.

As a result, Alexander Gurevich under the supervision of Prof. Jari Saramäki has concluded, that acyclic and cyclic DebtRank measures are the best candidates for the SRT among the tested ones.

For the practical use, both metrics face problems: for their calculation, the information on the entire banking system information is needed. On the one hand, this information is usually unavailable, and on the other hand, one cannot be taxed based on others’ actions (i.e. third parties deals). For this purpose, the truncated version of DebtRank involving only close counterparties was proposed and tested. It has demonstrated a great performance close to the original DebtRank.

Another direction of Gurevich’s thesis research was the introduction of the equity relations in the agent-based model. This research did not produce essentially new results except the impact of SRT on the interlayer risk oscillation: under this tax, risk begins relocation between credit and equity layers in the antiphase.

“I think, that the idea of a smart tax rebuilding a system in a more sustainable way is something splendid: previous research has shown, that this tax dramatically decreases systemic risk without a significant impact on the economic activity. In this work, we have begun the discussion, how one can solve practical issues arising”, Alexander comments.