

Complexity Economics: Problem Set Lab 6 (Group 3)

Consider the following setting:

- There is a population of n agents in a (real, not online) social network, connected by a network structure that resembles a Barabási-Albert-Network with parameter $k = 5$.
- Every agent is endowed with an initial wealth of EUR $K_0 = 100$.
- Neighboring agents engage in economic interactions. These interactions shall not be modelled in detail. They shall instead be approximated by payments of a random share of every one agent's wealth to a random neighboring agent. (This may be interpreted as representing this agent buying the other agent's labor for production of goods and services consumed in this period.) In addition, a share $\omega = 0.99$ of each agent's wealth is redistributed randomly across all agents as a tax-financed subsidy.
- How does the wealth distribution evolve? Does it converge against some limit distribution?

Please proceed as follows:

1. (60 min)
 - (a) Discuss in the group how this system could be investigated using a python program.
 - (b) Write a python program to study the problem (one python program per group).
2. (30 min)
 - (a) Discuss the results together with the three other groups.

Additional notes

- Claudius and Torsten will be around. If you have any questions or if you are stuck anywhere, please feel free to ask or talk to us.
- Consider commenting your code extensively. This will make it easier to understand the code later on.
- If you have lots of time left, try the running the simulation with different network structures:
 - Complete network
 - Multiple-ring network with size-16 neighborhoods (agents arranged in a ring, connected to the 16 nearest neighbors, 8 on either side)

or for different values of ω .