Assignment 3

Donghyun Kang

OCT 23 2018

1. Simulation in Sociology, Moretti (2002)

(a) The author discusses the role of simulation as a tool for exploring theory. She also highlights the importance of establishing validity of the simulative model of the theory. That is, validity is the degree to which the theoretical constructs and their computational implementation are representative of the real-world. What are some potential weaknesses in validity that the author describes with regard to multi-agent systems and cellular automata?

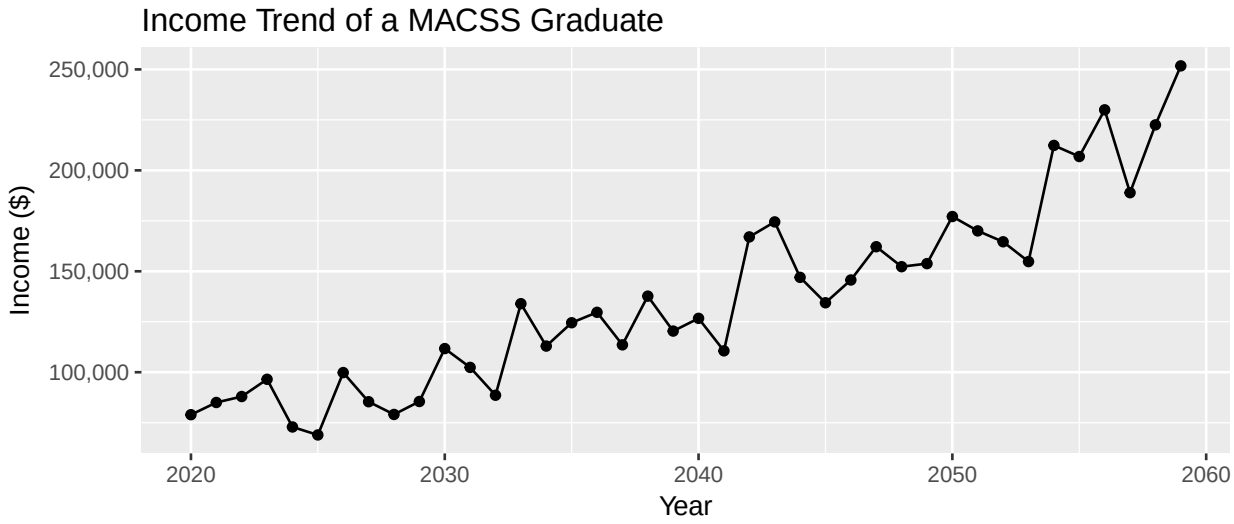
- First, regarding multi-agent models, the author explains that many of current modeling strategies employ "bounded rationality" assumption proposed by Simon (1957), which is a weak version of economic rationality; the notion of bounded takes into consideration that information is not perfect and the cognitive capacity of agent is limited so it renders more realistic modelling of behaviors comparing to the conventional economic rationality. But the author suggests that the model should 1) learning and adaptation of agents; 2) psychological elements such as emotions, motivations, desire, consciousness within agents; 3) the knowledge of agents, even though these aspects are not easy to translate into formal models
- The validity issue in cellular automata models basically is related with the fact that they are restricted with respect to time and space. (Note that automata models can be conceived as a special case of multi-agent model of which the agents are embedded in lattice.) First, the author admits that cellular automata models often posit that a single global clock, which does not allow individual heterogeneity in terms of time dimension. This can render the outcome of simulation dubious; for example, some agents can modify their states at different moments. Second, the automata models can be limited because of the assumption about special structure. When the automata models assume that only proximate units can interact with each other, it excludes the possibility social interactions that can take place beyond the geographic contiguity through media, beyond the geographic contiguity.

(b) The author highlights "dynamic feedback" as a key characteristic that computer simulation is good at modeling. Given an example of model that the author cites from Sociology that exhibits the characteristic. Come up with an example of a research question on a political science topic wherhe the underlying system exhibits this type of feedback.

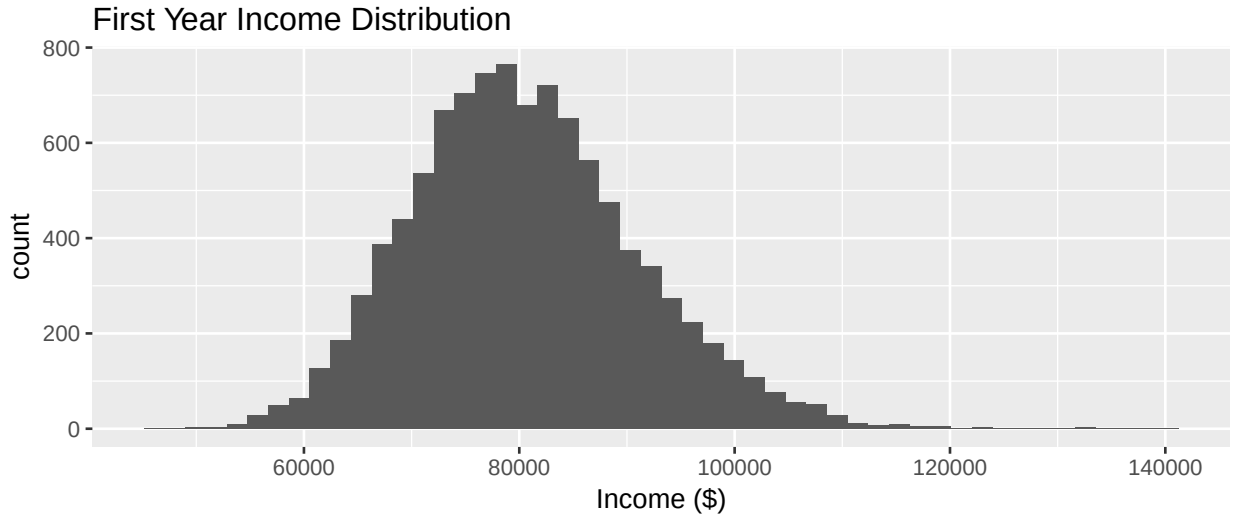
- The author highlights "dynamic feedback" as a key characteristic that computer simulation is good at modeling. Given an example of a model that the author cites from Sociology that exhibits the characteristic. Come up with an example of a research question on a political science topic where he the underlying system exhibits this type of feedback.
- The dynamic feedback refers to the output of a certain system changes the input in the long run. Put it differently, dynamic implies the diachronic property of a given system; the feedback means that the output of the system causes the change of the input as a form of a loop. The author gives some examples from Sociology. For example, the author cites Reynolds (1994) to introduce the application of a genetic algorithm in terms of explaining the cultural evolutions. The concept of evolution by definition includes the dynamic feedback process because the selection of a given time period will be the input of the next time period. Moreover, Hanneman et al. (1995) developed a system dynamics model to translate the concepts proposed by Weber, Simmel, and Closer to better understand the conflict theory.
- As for a research question on political science, I would like to suggest is the somewhat extended version of what Robert Axelrod has done when he studied the evolution of cooperation. I especially think it will be fruitful if we can think of the interaction between the certain geographical structure of cities and the possibility of cooperation or conflict (e.g., the protests) with multi-agent models. For example, I think whether the concentric layouts of a city (for example, Chicago) or the sprawled structures a city (cities like LA) facilitate/or hamper the collective actions will be an interesting research topic.

2. Simulating your income

(a)

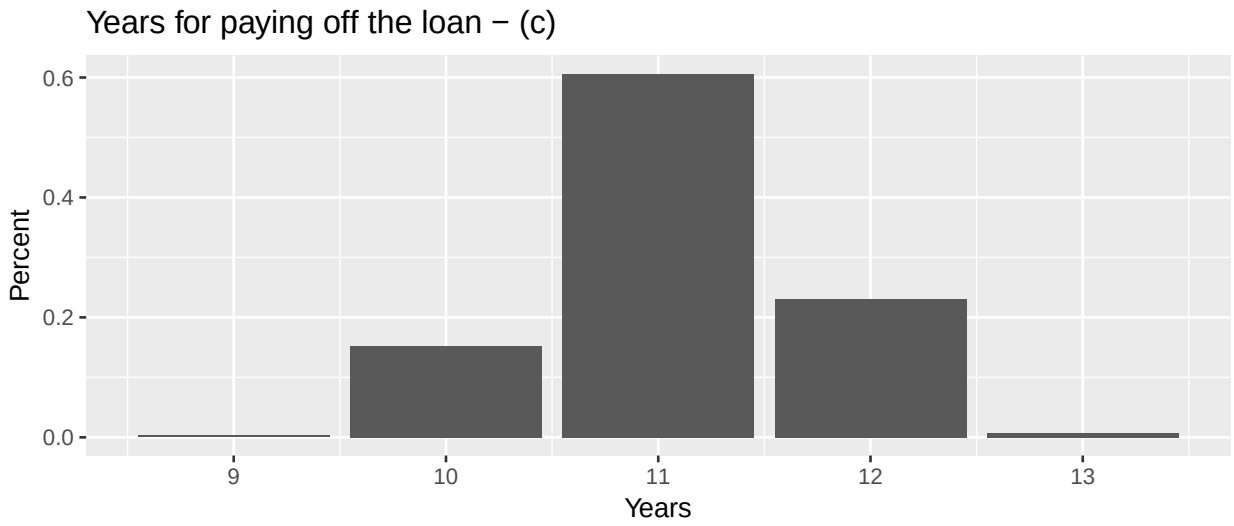


(b)



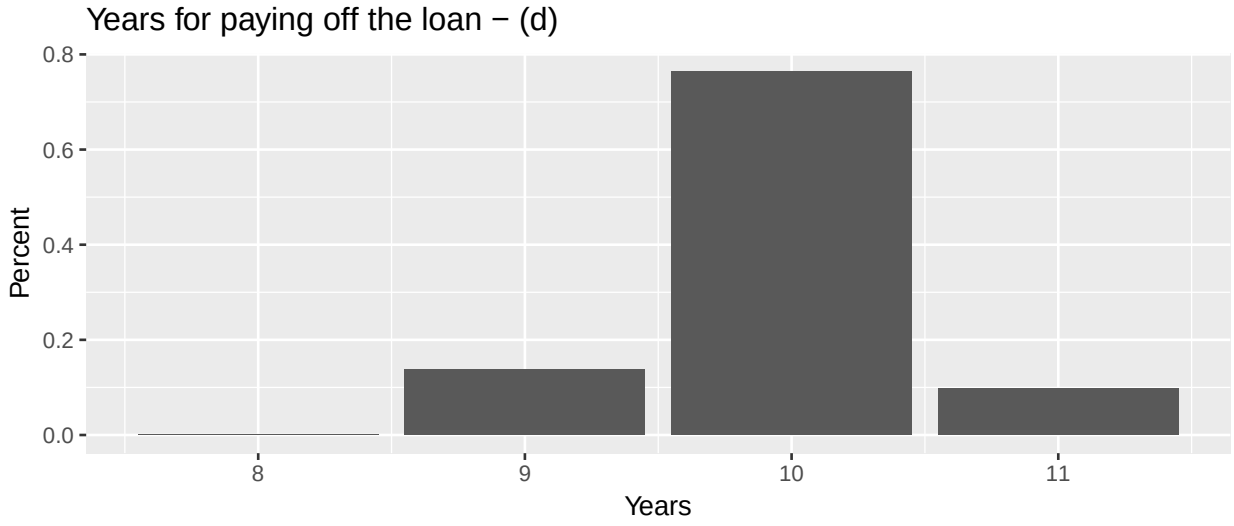
- The percentage of the class will earn more than $100,000 is 4.3%.
- The percentage of the class will earn less than $70,000 is 15.54%.
- The graphs seems to follow a normal distribution, which has a bell-curve shape.

(c)



- 15.52% of the simulations can pay off the loan in 10 years.

(d)



- 90.3% of the simulations can pay off the loan in 10 years.