The Giving Game: Simulation scenarios

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11th of April 2015

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Contents

1. Introduction

All scenarios will start with a subgroup size of 2 of the population. During the simulation this size can be changed. The simulator will be able to tell us the largest subgroup possible. The community percentage (the amount of transactions that take place in a subgroup) will be set at percentage of 95. Eventually during the simulation this percentage should go up to a 100 if we want to have a perfect community without any communication with the outside. This goal is probably with most selection rules hard to reach, thus we start with a percentage of 95 to allow some communication with the outside. If 95 is reached we can conclude that there is a community but that it is an imperfect community. (The terms perfect community and imperfect community will be explained in the thesis. These terms are also open for change if there is a better suiting term.)

2. Definitions

Parameters

N: The number of agents used in the simulation

M: The number of goods used in the simulation

Perish period: The perish period is the amount of transactions it takes before a good perishes. For sustainable goods the perish period is 0, because sustainable goods exist forever. For perishable goods the perish period is greater than 0. For example, when a good has a perish period of 3 then this good can be given away 3 times before it perishes.

Production delay: The production delay is the time between the perish of a good and its reproduction. The time until the production is decreased by one after every iteration over all agents who are currently holding a good.

Nominal value: The nominal value is an indication of how much a good is worth. The nominal value does not change during the simulation.

Like factor: The like factor is a number between 0 and 1 which defines how much agent P likes agent Q. The higer the number the more P likes Q the more likely it is that P will give to Q if the like factor is used in the selection rule.

Selection rule: The selection rule is an algorithm that decides/calculates the next agent who should receive a good.

Selection rules

Random rule: The receiving agent is randomly chosen.

Balance rule: The receiving agent is chosen on the basis of the balance between the giving agent and the receiving agent. The receiving agent Q is chosen if the balance between the giving agent P and Q is the highest.

Goodwill rule: The receiving agent is chosen on the basis of the balance between the giving agent and the receiving agent. The receiving agent Q is chosen if the balance between the giving agent P and Q is the lowest.

Simulation types

Parallel: The transactions are executed at the same time.

One by one: The transactions are executed one after another.

3. Norm scenarios

Norm 1

Norm 2

4. Random rule

Scenario 1: RR1

Parameters:

N: 100

M: 3

Perish period: [0, 0, 0]

Production delay: -

Nominal value: [1, 2, 3]

Like factor:

Scenario 2: RR2

Parameters:

N: 100

M: 3

Perish period: [1, 2, 3]

Production delay: [1,2,3]

Nominal value: [1, 2, 3]

Like factor:

The choices for these values of the goods are based on the idea of having a small, medium and large product.

Scenario 3: RR3

Parameters:

N: 100

M: 4

Perish period: [1, 2, 0, 0]

Production delay: [1, 2, -, -]

Nominal value: [1, 2, 1, 2]

Like factor:

The choices for these values of the goods are based on the idea of having a smaller and a larger product.

Hypothesis

I think that all three scenarios will lead to the same results. I dont think we will see a community effect and all of the transaction will be equally distributed over all the agents even though a computer cant be fully random. It will be just like throwing a dice. Throwing a dice thousands of times will lead to every side being up approximately the same amount of times.

5. Balance rule

Scenario 1: BR1

Parameters:

N: 100

M: 3

Perish period: [0, 0, 0]

Production delay: -

Nominal value: [1, 2, 3]

Like factor:

Hypothesis

I think that eventually the transactions will only take place between 2 agents, because the balance will be the largest between these two. A community effect will arise with a subgroup of size 2.

Scenario 2: BR2

Parameters:

N: 100

M: 3

Perish period: [1, 2, 3]

Production delay: [1 ,2, 3]

Nominal value: [1, 2, 3]

Like factor:

The choices for these values of the goods are based on the idea of having a small, medium and large product.

Hypothesis

I think that eventually the transactions will only take place between a few agents. A community effect will arise with a subgroup of at least 3 agents, because there are 3 producers. Eventually the subgroup will have a maximum size of 6 assuming the producers will have the highest balance with a non-producing agent.

Scenario 3: BR3

Parameters:

N: 100

M: 4

Perish period: [1, 2, 0, 0]

Production delay: [1, 2, -, -]

Nominal value: [1, 2, 1, 2]

Like factor:

The choices for these values of the goods are based on the idea of having a smaller and a larger product.

Hypothesis

I think that eventually the transactions will only take place between a few agents. I think that for the sustainable goods a similar result will arise as in RR1. For the perishable goods I think that a similar result will arise as in RR2. It will be interesting to see if these two subgroups will merge together or wil opperate separately from each other.

6. Goodwill rule

Scenario 1: GR1

Parameters:

N: 100

M: 3

Perish period: [0, 0, 0]

Production delay: -

Nominal value: [1, 2, 3]

Like factor:

Hypothesis

Lets say

Scenario 2: GR2

Parameters:

N: 100

M: 3

Perish period: [1, 2, 3]

Production delay: [1 ,2, 3]

Nominal value: [1, 2, 3]

Like factor:

The choices for these values of the goods are based on the idea of having a small, medium and large product.

Hypothesis

I think that eventually the transactions will only take place between a few agents. A community effect will arise with a subgroup of at least 3 agents, because there are 3 producers. Eventually the subgroup will have a maximum size of 6 assuming the producers will have the lowest balance with a non-producing agent.

Scenario 3: GR3

Parameters:

N: 100

M: 4

Perish period: [1, 2, 0, 0]

Production delay: [1, 2, -, -]

Nominal value: [1, 2, 1, 2]

Like factor:

The choices for these values of the goods are based on the idea of having a smaller and a larger product.

Hypothesis

I think that eventually the transactions will only take place between a few agents. I think that for the sustainable goods a similar result will arise as in RR1. For the perishable goods I think that a similar result will arise as in RR2. It will be interesting to see if these two subgroups will merge together or wil opperate separately from each other.

General overview

The nominal values, perish times and perish delays can be any number. Making these values larger will probably not lead to different results. This can be tested by creating a simulation with larger values, but for now this does not have the priority. It is more important to see the behaviours of the agents with more 'basic' values.

For now I decided to use about 3 goods with 100 agents. This number might be a little too small, because it will take some time for the goods to be traded between all agents. This number can be increased if the simulator takes too long to produce meaningful results. For example if we decide to use 5 goods the nominal values will be [1,2,3,4,5] and the perish time and production time will have the same values. Further research will have more different variables to see how much these variables affect the results. But for now the most basic variables will be used to create a foundation of results and see if we need to expand the scenarios or change something about the simulation/model.

The three scenarios are the same for every selection rule at this point. I want to establish a baseline first and in later simulations extend the experiments.

Each selection rule should also have a scenario where there are as many goods as there are agents. This way we can see if any of the selection rules are affected by the number of goods. For every parameter we should experiment with a low value and with an extremely high value to see how these parameters affect the simulation.