Laboratory 5 : Builder

August 29, 2016

Objectives

In this laboratory you will explore the issues in building a very simple economy, which uses debt to purchase objects. The goal is to create a simulation where workers will continually build and buy houses (each worker can buy a single house), using loans.

The code for the experimental Builder Agent used in the simulation can be found in the file *src/agent/Builder.java*. Note this code is experimental.

The Builder Agent tries to build houses. It does this by taking a construction loan from a bank, and using that money to pay workers. There are no materials involved, just labour costs.

When the house is built it is listed on the House market for a price above the builder's total loan costs. Workers in the simulation can buy houses if the bank will grant them a loan. By default houses have a TTL(Time to Live) of 120 months, which can be changed in the Builder.java file. When this expires, the house is destroyed, and if the worker has paid off their debt, they can attempt to buy another one.

1. Checks if sufficient workers are available to hire and that there are ¡ 2 houses on the market
2. Tries to get a loan to build a house
3. If sucessful, hires workers, "builds" the house and lists on market
4. Fires all workers
5. Go to step 1

Tips

** Don't forget to save the simulation after you have created it, so that you can reload it. **

How long is it reasonable to expect to run an artificial economy given the frequency of financial crises in the real one?

1 Setup the Experiment

Figure 1: Configure Workers

1. Add a single Vanilla Bank to the Threadneedle simulation.
2. Add a single Builder (BR) to the simulation.
3. Add 10 Workers to the simulation, configure them as shown in Figure **??** Make sure you set the salary to 10
4. *Save the simulation.*
5. Run the simulation.

Click on the Builder Icon. The Output:Labour controls the amount of labour required to build a single house in units of labour months. The builder will hire a maximum of 8 workers. How long will it take to build a house?

Why are house prices increasing? (Hint, look at the code.)

Why does the builder stop building? How much are the workers getting paid?

Analysis

Assume worker salaries are 1/month. By default the builder employs 8 workers.

How much does the builder list the first house for?

How much does a worker need to borrow in order to buy this house as a multiple of their annual salary?

2 Experiment 2

Comment out the inflation line, "inflation += 1". How long does the simulation run?

Why does it stop?

3 Experiment 2: How long can the Agents keep building without crashing the banking system?

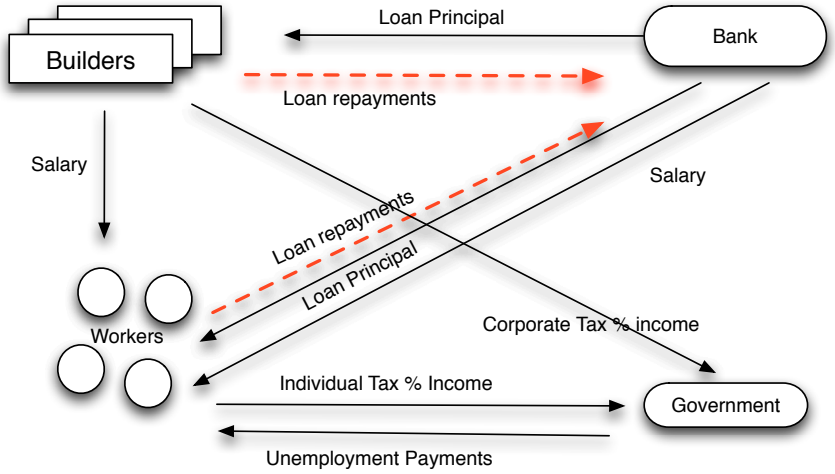

Figure 2: Configure Workers

Within the constraints of builders building houses and workers buying them, you may have as many builders and workers as you wish. Farms or other widget makers can also be modified. You can modify the Builder code, for example to have different TTL's for the house, or to change profit calculation etc.

Keeping inflation turned off, create a steady state simulation where builders build and workers borrow continuously. You will need to adjust TTL and Labour:Output in order to ensure that houses expire as soon as workers have finished paying them off. You may have as many builders and workers as you like.

Now turn inflation back on, and keep the simulation you just created. You may adjust anything in the simulation including unemployment, taxes, and government behaviour if you like.

What is the longest you can run the simulation for before the banking system crashes?