○Instructions for users

This program is the one used for the simulation in our study on the “Influence of Inefficiency in Government Expenditure on the Multiplier of Public Investment,” now submitting to computational economics., where the relationships between GDP and inefficiency in government expenditure as well as the amount of public spending, etc. were analyzed.

This program is written using Visual C++ of Microsft’s Visual Studio2010. When you used this program, please use the compiler of the same kind.

There are three folders named “code,” “parameter,” “Release” in ABM-Macroeconomics\_master.

The “code” includes a source file and header files. The “parameter” includes four parameter files. The “Release” includes four files including an execution file.

Questions on this program will be welcome to ogibayashi@ogi-lab.net.

How to run the program.

Instructions to run the program without using an application development environment

1. Set three folders named “Release,” “parameter,” “data” in any directory of your computer.

2. Copy the files in the folders of ABM-Macroeconomics\_master,, named “Release,” “parameter” to the corresponding folders in your computer. The “data” can be empty at the initial state.

3. Execute the execution file named Up\_code10.exe inside the “Release” of your computer.

4. The program will run, and the files of simulated results will be stored in “data.”

You can change the parameters for calculation according to the instructions explained later.

This procedure has been confirmed to work properly in the case of Windows emvironment.

Instructions to run the program using Microsoft’s Visual Studio.

１．Make a solution as well as a project in the Visual Studio 2010.

２．Make folders named “data” and “parameter” inside the directory for the solution

(i.e. the layer above the project).

３．Copy the four files in the folders of ABM-Macroeconomics\_master, named “parameter” to the corresponding folder on your computer.

４．Copy the header files and source files from the “code” of ABM-Macroeconomics\_master to the newly created project of your computer.

５． Add the header files and source files into the project.

６．Build the solution and project and run the simulation.

７．You can find the simulation results in the folder named “data”.

How to set parameter values.

1. Parameter files 01Experimental\_file.csv, 02Initial\_file.csv、03Variable.csv includes the parameter values relating to the present study

2. The parameter file 04Other\_file.csv includes the parameters relating to the environmental variables for calculation. Please do not change the set values.

3. Each parameter files contains parameter values to be set on the first low as well as the variable name for each value on the second low. At the renewal of parameter values, please change the values on the first low.

① 01Experimental\_file.csv

01Experimental\_file contains parameters for experimental levels of the present study. The users can change the value of these parameters.

　01: Upper limit of the number of loans

Stands for the maximum number of loans firms can hold at the same time of the periods. The Smaller number corresponds to the severer credit rationing. The number between 1 to 3 was used in the present study.

02: Threshold for the decision making on investment

Stands for the maximum number of flags at which a firm decide to invest.

This flag is increased by 1 when the products are all sold out at the period.

10 or 20 was used in the present study, with ten corresponding to firms being more active toward investment.

03: Timing of public investment-start-

Stands for the period at which the government starts to purchase goods as public investment. 120 was employed in the present study.

04: Timing of public investment-end-

Stands for the number of periods for public investment. 12 was used in the current study. This value 12 corresponds to the public investment ending at the 132nd period when it starts at the 120th period.

05: Amount of funds for investment

Stands for the amount of funds for public investment, which were changed three levels for each of the thresholds for the decision making on investment.

06: DeltaPurchaseRatio

Stands for the ratio of the funds for efficient public spending, which was changed between 0 to 1 with an increment of 0.1 in the present study.

The case where this value equals 1 corresponds to the extreme case of efficient public spending.

07: DeltaSubsidyRatio

Stands for the ratio of funds for inefficient public spending, which was set to be 1-DeltaPurchaseRatio in the present study.

The case where this value equals 1 corresponds to the extreme case of inefficient public spending.

② 　02Initial\_file.csv

02Initial\_file contains parameters for initial condition. Please do not change the values to avoid execution errors. The listed value on the right-hand side is the number employed in the present study.

01:period\_max 　：Maximum number of simulation periods 360

02: nconsumer 　：Number of consumers 150

03: nretailer 　：Number of retailers 30

04: nwholesaler　：Number of material-makers 6

05: nequipment 　：Number of equipment-makers 1

06: bank 　：Number of banks 1

07: min\_with\_drawal\_ratio　：Minimum value of withdrawal ratio for bank account 0

08: max\_with\_drawal\_ratio　：Maximum value of withdrawal ratio for bank account 0.5

09: bank\_interest\_rate 　：Interest rate of bank account 0.03

10: bonus\_rate\_min 　：Minimum value of the rate of bonus 0.75

11: bonus\_rate\_max 　：Maximum value of the rate of bonus 0.75

12: housyu\_rate 　：The rate of executive compensation 0.95

13: n\_class 　　　　　：Number of classes of products 12

14: Keynes\_a 　　　　　：Constant value of Keynesian consumption function 3000

15:threshold\_deposit 　：Marginal propensity to consume 10000

16:min\_constant\_wage 　：Minimum value of constant wage 7000

17:max\_constant\_wage 　：Maximum value of constant wage 7500

18:price\_up\_rate 　：The rate of increasing price 1.15

This value stands for the ratio of increasing price of a product for producers.

19:price\_down\_rate 　：The rate of reducing price 0.1

This value stands for the ratio of decreasing the price of a product for producers.

20:repay\_time\_ave 　：Repayment period for loans on investment. 120

This value corresponds to 10 years in the actual world in the present study.

21:invest\_money 　：Price of equipment on investment for producers. 500000

22: max\_ban 　：Maximum number of flags at which production quitted. 20

A manufacturer increases the flag by 1 when all of the products are unsold at a period. When the cumulative number of flag reaches to this value, the producer quits production of the said class of products.

23:nmax\_p ：Maximum number of classes of products to be produced by producers 2

24:nmax\_c 　　　　　：Maximum number of classes of products to be bought by consumers 5

Remarks

・Number of consumers 02 must be larger than the sum of firms listed in 03～06.

Otherwise, the system will stop due to the execution error.

・Please set the same value for 11 and 10

・The value for 23 and 24 must be less than half of the value for 13.

③ 　03Variable\_file.csv

03Variable\_file contains the initial value of parameters for state variables which will change in its value during the simulation.

Please do not change these values, because they are responsible for stable funds circulation.

　04Other\_file.csv

04Other\_file contains parameters for the standard variables of simulation.

Please do not change these values, because they are not related to the present study but related to the stable simulation run.

○Calculated results of simulation

The files of simulated results are stored in “data” as csv files. The data files directory relating to the present study are 01OUTPUT\_GDP.csv and 02OUTPUT\_Deposit.csv. The multipliers are calculated based on the GDP data of the runs with and without public investment.

① 01OUTPUT\_GDP.csv

Calculated GDP values at the end of each period are listed in this file.

What are listed are the each number of the period in the first column and the GDP value at each period in the next column.

② 02OUOTPUT\_Deposit.csv

Total amounts of deposit of consumers and producers are listed in this file

. What are listed are the each number of the period in the first column and the total amount of deposits of consumers and producers at each period in the subsequent columns.