

The Core-Periphery Model in EXCEL¹

A Simulation Model – Version 1.1

by Henri L.F. de Groot

This handout provides some background to a simulation model developed in EXCEL aimed at solving the Core-Periphery model developed in the New Economic Geography Literature. This tool is best seen as a complement to existing routines developed in Gauss and GAMS that can alternatively be used to solve the model.² The advantage of this tool is that it requires no knowledge about programming languages as is required for programs such as Gauss and GAMS.

The version of the Core-Periphery Model that is implemented closely follows the version described in Chapters 3 and 4 of the book by Brakman et al. The EXCEL file enables the user to solve the model, which consists of six highly non-linear equations. It determines the static equilibria of the model for different allocations of labour.

Before getting started

In order to be able to use the EXCEL-tool for solving the Core-Periphery Model and the macros that are incorporated, take the following steps:

- Make sure that the Solver that EXCEL provides has been installed. You need to install it twice. First, go to add-ins (under Tools) and activate the Solver by ticking the appropriate box. Second, activate the Visual Basic Editor (under Tools > Macros). In the VBA-editor, go to Tools > References and click the Solver again.³
- Make sure that your computer uses points as decimal separator (instead of comma's). You can make the required changes by first going to Start, and then select Settings > Control Panel > Regional and Language Options. There, you can select English as the

¹ Comments on the model and this handout are much appreciated and can be sent to Henri de Groot at hgroot@feweb.vu.nl.

² See <http://www.few.eur.nl/few/people/vanmarrewijk/geography/simulations/simulation.htm> for several examples of such routines.

³ For further details on how to properly install the solver in order to be able to use it in macros, you may want to consult the following site: <http://www.egr.msu.edu/~lira/supp/macro.htm>

standard regional option. This automatically guarantees the use of points as decimal separator.

- Make sure that you are allowed to use macros on your computer (for reasons of protection, the use of macros can be prohibited on your computer). To allow the use of macros, go to Tools > Macros > Security and then select 'Medium' as the degree of protection. Upon starting the EXCEL file, you will then be asked whether you trust the source that has created the macro. Click 'Yes' and the tool should function properly.

Methods to characterize the equilibrium

This tool provides the user with two separate methods of characterizing the outcome of the model:

- Method (i): the construction of five different scenarios, where each scenario is characterized by a specific set of parameter values. This is useful for generating Figures such as Figure 4.2 in the book by Brakman et al. which shows the effect of varying transport costs. For reasons of computing time, this tool allows the user to specify five scenarios. For each scenario, five static equilibria are computed. This is oftentimes sufficient to get a good first impression.
- Method (ii): the construction of a single scenario characterized by one specific set of parameter values that is analyzed in great detail (meaning that many static equilibria are determined). This is useful for generating Figures such as Figure 4.1 in the book by Brakman et al.

Procedure for Method (i)

To use method (i), take the following steps:

- Step 1: Enter the parameter values for the different scenarios to be analysed in the sheet 'Scenarios'. Only change the coloured cells! After having done this, press the Solve button. This will start computing the equilibrium values. It may be the case that a pop-up appears informing you that an (intermediate) solution has been obtained. If so, just click OK. Once the solution has converged, the graphical solution will be depicted.
- Step 2: You can find the numerical information in the sheet 'Computations'. In this sheet, the parameter values that you have chosen are presented, as well as the equilibrium values for the six endogenous variables, the relative (real) wage rate and

welfare. These values may, for example, be copied to another worksheet if you want to store the solution (for example, if you want to analyse more than 5 scenario's).

- Step 3: This tool also provides information on welfare. Figures comparable to Figures 4.6 and 4.7 in the book can be found in the sheets with the extensions 3D. The sheet 3D-graphs contains the numerical information.

Procedure for Method (ii)

To use method (ii), take the following steps:

- Step 1: Enter the parameter values for the scenario that you want to analyse in the sheet 'Detail'. Only change the coloured cells! You can also enter the initial value for λ and the step-size of λ . The maximum value for λ is computed for your convenience (being equal to the initial value for λ plus 24 time the step size). Please make sure that the values are chosen such that the maximum value for λ is less than 1. After having specified the parameter values, press the Solve button. This will start computing the equilibrium values. It may be the case that a pop-up appears informing you that an (intermediate) solution has been obtained. If so, just click OK. Once the solution has converged, the graphical solution of the relative real wage rate will be depicted.
- Step 2: You can find the numerical information on equilibrium values of the endogenous variables in the sheet 'Detail'. Also the relative (real) wage rate and welfare is computed. These values may, for example, be copied to another worksheet if you want to store the solution (for example, if you want to analyse more than one detailed scenario).

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