

Computational Economics and New Economic Geography Settings

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This is a technical tutorial, which aims at providing tools to numerically solve out standard New Economic Geography (NEG) settings, and to plot their fundamental correlations in MATLAB. To the best of our knowledge, there is an uncovered gap within the profession in such particular issues. In this regard, most of the NEG literature is either theoretical or empirical. However, there is a lack of works that systematically links computational economics to NEG models. This tutorial might help to improve the intuition behind the NEG paradigm as well as to motivate new theoretical developments.

The basic references are Miranda and Flacker (2001, MIT Press) and Fujita, Krugman and Venables (1999, MIT Press). The tutorial requires audience to have installed both MATLAB and M&F routines in their own laptops. The latter can be downloaded for free. In this regard, a computer laboratory is not strictly necessary. We will provide all the programs to the audience. We can take advantage of using a basic program to derive and plot the solutions of several well-known NEG models. An audience of 15 persons is reasonable to be expected as in the NARSC meeting in 2012.

The audience should have knowledge of NEG models and basic notions in programming (e.g. Gauss, RATS or R). This is an intermediate tutorial for graduate students, scholars, and professionals involved in regional science.

The instructors are, on the one hand, Mauricio Ramírez Grajeda, professor at the University of Guadalajara, Mexico, and he will be the organizer and instructor of this tutorial. His qualifications include a paper published in the journal *Spatial Economic Analysis*, which develops Krugman and Livas (1996) or FKV (1999, chap. 18) with taste heterogeneity and amenities. Besides his Ph.D. dissertation at the Ohio State University focuses entirely on NEG models. He has taught related courses for his own University, for Inter American Development Bank in Ecuador, the 2012 annual NARSC meeting, and for the Central Bank of Mexico.

On the other hand, Xiomara Vázquez Gullén obtained her doctorate from the University of Guadalajara with a dissertation on simulations of life-cycle models in MATLAB. She has been professor at ITESM since 2001. She will be providing technical assistance to the audience.

The format tutorial will be one day long in two sessions of three hours each one. The tutorial outline is:

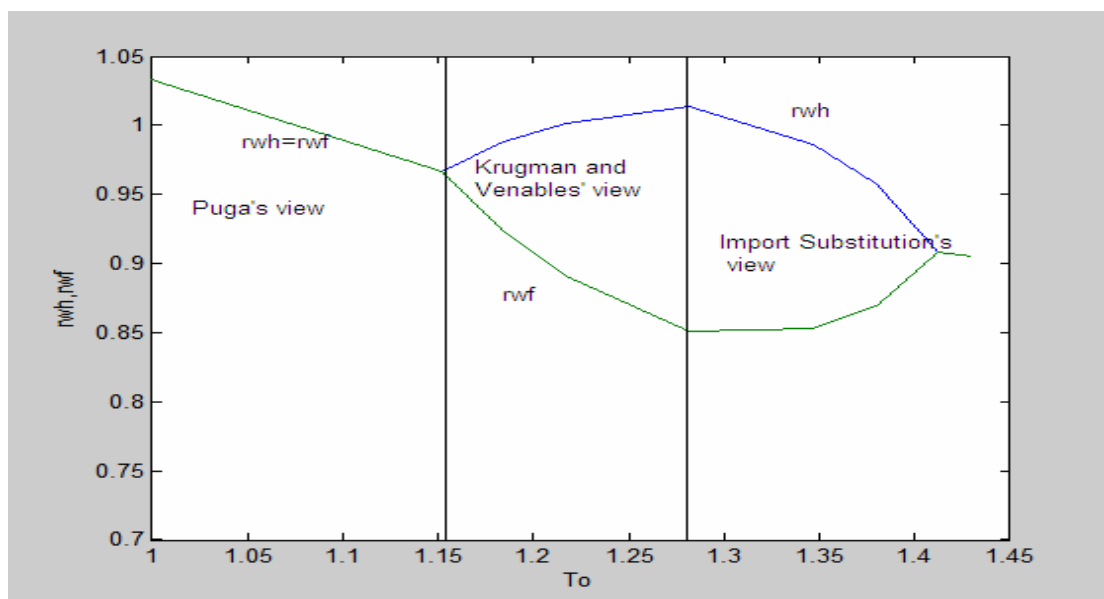
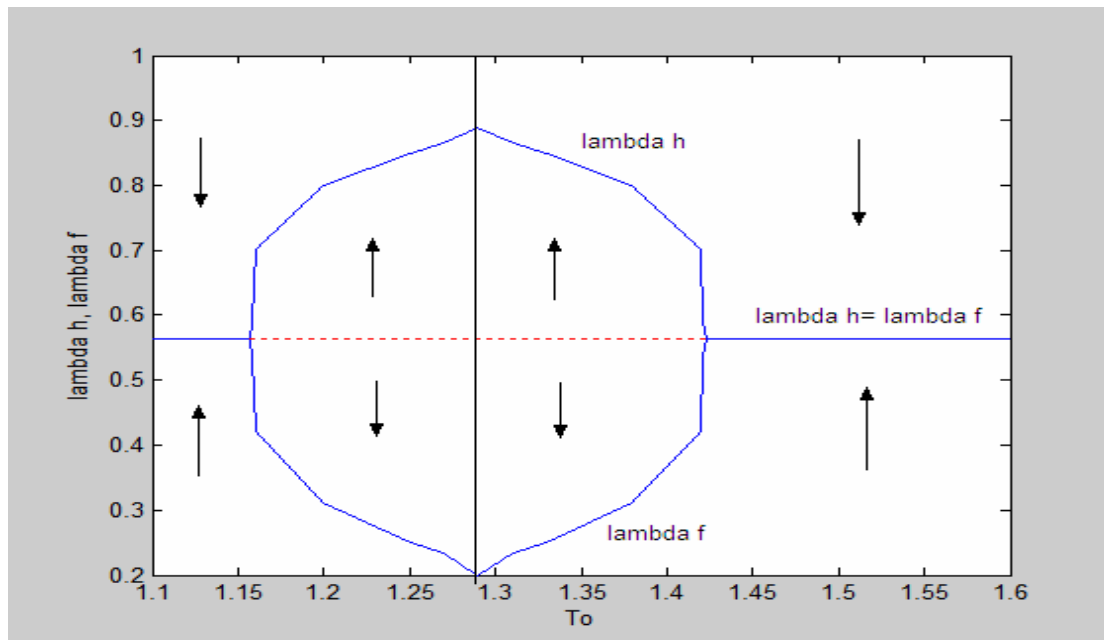
First session

- A brief induction to MATLAB. This section will provide a general overview to manage this software.
- Solving out a system of non linear equations by numerical methods. This section provides mathematical tools to solve out such type of systems like Newton's method and Quasi Newton's method.
- Solving out a system of non linear equations by numerical methods in MATLAB. This section will provide the main M&F's MATLAB routines to solve such systems.
- Solving out and plotting Krugman's (1991, *JPE*) main outcomes for two and three cities. First, we will set the system of first order conditions and compute a solution. In particular, we will plot urban concentration against wage differentials, where trade costs are given. And second, we will plot trade costs against urban population distribution. This exercise can be carried out using different migration rules or replicator dynamics.

Second session

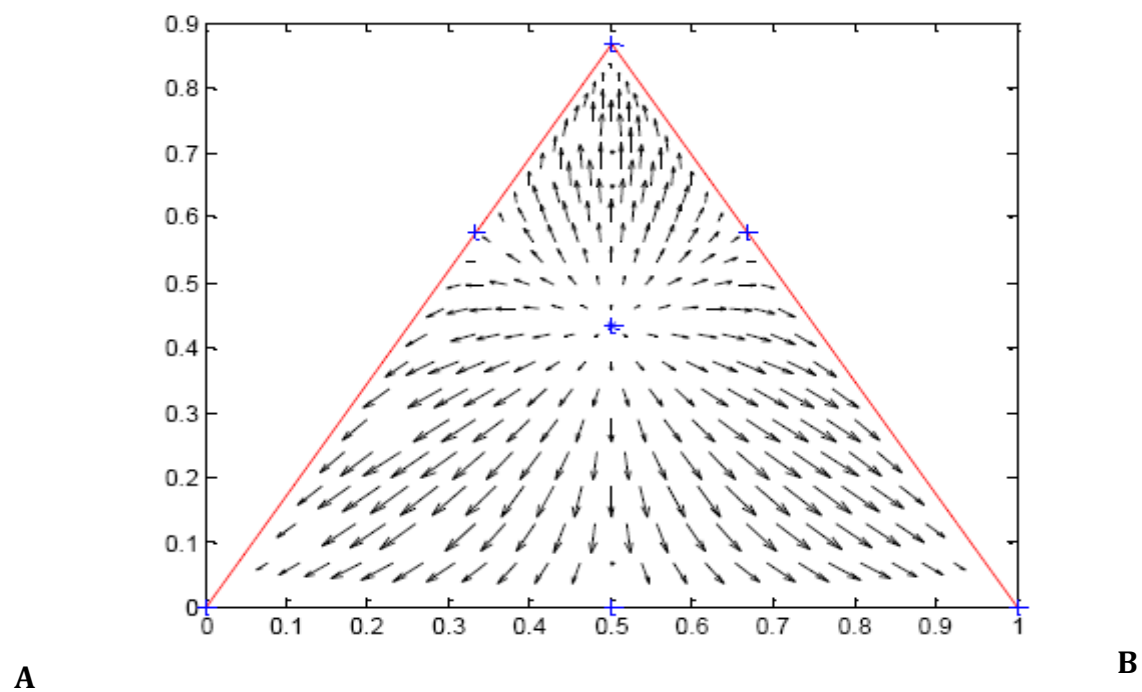
- Solving out and plotting Krugman and Livas' (1996, *JDE*) main outcomes for two and three cities. We will teach how to plot trade costs against urban concentration.
- Solving out and plotting Puga (1999, *EER*) for two countries. We will teach how to plot trade costs against wages in the manufacturing sector.
- Solving out and plotting Ramírez Grajeda and Cortez Yactayo's (2010, *SEA*) main outcomes for two countries with taste heterogeneity and amenities. We will teach how to plot trade costs against urban concentration.

These are some examples of Puga (1999) depicted in FKV (1999, chap 18):



- $\lambda f(h)$ denotes the fraction of the population in the foreign (home) country in the industrial sector.
- $rw f(h)$ denotes the real wage of the population in the foreign (home) country in the industrial sector.
- T_o = International trade costs.
- If T_o is either high or low industry is evenly distributed across countries.
- For intermediate levels of T_o , industry is concentrated in a single city. Therefore, welfare disparities arise.

This, for example, is Krugman and Livas (1996) for three cities:



- High international trade costs imply that population could agglomerate in city A.