3-Country, 1-Sector Version of Eaton & Kortum Model of International Trade

Solve this simple version of the Eaton & Kortum model numerically using the Julia programming language.

Problem 1. Simple Version of Ricardian Trade Model (Eaton and Kortum, 2002).

Consider a three-country world, where the endowment of labor in each country is 1. There is a continuum of goods k and the technology for producing a good k in country i is $y_i(k) = z_i(k)\ell_i(k)$. Preferences are of constant elasticity of substitution form, with the elasticity set to 2. Assume that the distributions over z are Fréchet with $\theta = 4$.

a. Simple and symmetric. Let there be no trade costs, i.e., $\tau_{ni} = 0$, and let $T_i = 1.5$ for all i. Report the equilibrium bilateral trade share matrix. (An element of the matrix is π_{ni}, the share of total spending in n on goods from i.) The solution to this model is trivial, so this is a good place to first check that our programs are working.

b. Symmetric geography. Now introduce iceberg trade costs. Let $\tau_{ni} = 0.1$ for each $n \neq i$, and keep the remaining parameters as in part **a.** Report the bilateral trade share matrix.

c. Asymmetric geography. Countries have identical technologies, $T_i = 1.5$ for all i, and $\theta = 4$. Country 3 , however, is "far away" from countries 1 and 2 : $\tau_{12} = \tau_{21} = 1.05$ and $\tau_{13} = \tau_{31} = \tau_{32} = \tau_{23} = 1.3$. Report the equilibrium bilateral trade share matrix. (An element of the matrix is π_{ni}, the share of total spending in n on goods from i.) Report an index of welfare in each country, w_i/P_i, where P_i is the CES aggregate price index. [My equilibrium wage vector is: $(1, 1, 0.966)$.]

d. Technological progress. Let $T_2 = 3$, and keep the remaining parameters as in part (c). This is a technological improvement in country 2. [You will need to redraw your productivities.] Report the bilateral trade share matrix. Compare welfare in this economy with welfare in the economy in part (c). Discuss your findings in the context of how an increase in technology in one country benefits other countries. [My equilibrium wage vector is: $(1, 1.14, 0.962)$.]

e. Fréchet dispersion. Now change $\theta = 8$, and keep the remaining parameters as in part (c) (i.e., change $T_2 = 1.5$). [You will need to redraw your productivities.] Report the bilateral trade share matrix. Compare welfare in this economy with welfare in the economy in part (c). What is the intuition for this result? How does the change in θ affect countries 1 and 2 compared to country 3? Why? [My equilibrium wage vector is: (1, 1, 0.978).]