

EXERCISE 5: TAX COMPETITION BETWEEN REGIONAL ECONOMIES

Consider a two-region economy with a fixed national stock of capital  $K$ , which is competitively allocated between regions ( $k_1, k_2$ ). The labor force of each region is fixed ( $L_1, L_2$ ). Region 2 residents are contemplating a tax ( $T$ ) on each unit of capital, hoping to raise money even as they risk the flight of capital to the other region. Regional wages ( $w_1, w_2$ ) and outputs ( $q_1, q_2$ ) as well as the national return to capital ( $r$ ) are all determined as capital is re-allocated between regions in reaction to the tax. Regional output is a common, freely traded good ( $q_1, q_2$ ), which has a unit price.

The solution to this 2-region economy (the seven variables:  $k_1, k_2, w_1, w_2, r, q_1, q_2$ ) is based on the solution to the following seven equations.

$$\begin{aligned} q_1 &= f(L_1, k_1) & ; & & q_2 &= f(L_2, k_2) \\ \frac{\partial f}{\partial L_1} &= w_1 & ; & & \frac{\partial f}{\partial L_2} &= w_2 \\ \frac{\partial f}{\partial k_1} &= r & ; & & \frac{\partial f}{\partial k_2} &= r + T \\ k_1 + k_2 &= K \end{aligned}$$

When  $q_i = L_i^\alpha k_i^{1-\alpha}$  ( $i=1,2$ ), then the system of 7 equations can be reduced to a single equation below, which must be solved implicitly for the national return to capital ( $r$ ):

$$K = L_2 \left( \frac{1-\alpha}{r+T} \right)^{1/\alpha} + L_1 \left( \frac{1-\alpha}{r} \right)^{1/\alpha} \quad (6)$$

Solve numerically, this system of equations when  $\alpha=.7$ ,  $K=100$ ,  $L_1=90$ ,  $L_2=10$ , and when there is no tax in region 2. Then consider two alternative solutions to the system:

- a). Region 2 imposes a tax of .15 per unit of capital.
- b). Region 2 imposes a subsidy per unit of capital (-.15).

In each case get the solution and compare the following: region 2's wages, output, and capital income if locally owned [ $rk_i$ ], as well as capital income if it is a share of national capital income [ $rKL_2/(L_1+L_2)$ ]. Is the region better off? By what measures is this true or not true?