EXERCISE 4: 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 unit tax ($T$) on 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 determined as capital is allocated between regions. Regional output is a common, freely traded good ($q_1$, $q_2$), which has a unity 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.

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

When $q_i = L_i k_i^{1-\ell_i}$ (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 ($r$):

\[
K = L_2\left(\frac{1-\ell_1}{r+T}\right)^{1/\ell_1} + L_1\left(\frac{1-\ell_2}{r}\right)^{1/\ell_2}
\]  \hspace{1cm} (6)

Solve numerically, this system of equations when $\ell = .7$, $K=100$, $L_1=90$, $L_2=10$, 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 [$r k_i$], as well as if capital income is a share of national capital income [$r (K L_2)/(L_1+L_2)$]. Is the region better off? By what measures?