

Please solve the following homework

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The nation is composed of two regions and whose consumers who are homogeneous and whose utility function is

$u = x^a l^{1-a} z^b$ ($1 > a, b > 0$) where x is a composite good, l is area and local public

good is z . $N = N_1 + N_2$. We assume $0 < z_1 < z_2$. The consumers can move one region to the other freely without cost however they can only commute in the same region. Their wage is w constant across the regions.

First state

Their non wage income is s .

$s = (r_1 H_1 + r_2 H_2) / N$. Where H_1 and H_2 are the area of each regions. Income constraint is $w + s = x + rl$, price of x is unity and unit rent of land is r . This state is called “without a project”, using o as a symbol, i.e., u^o .

Second state

We make a project which increases a level of environment from z_1 up to z_2 with C (cost taking composite good). The cost is shared by all consumers equally. This state is called “with a project” using w as a symbol, such as u^w .

- 1) Find the values to maximize consumer's utility u^w , x^w and l^w .
- 2) Please state equilibrium conditions and find prices and other variables r^w and u^w .
- 3) Find the values of expenditure function as follows.

$E(1, r_2, z_2, u^o), E(1, r_2, z_2, u^w)$

Where $E(1, r_2, z_2, u) = \min_{x, l} 1x + r_2 l$; $u(x, l, z_2) = u$