

1.

(a)

In the steady state,

$$k^* = \left(\frac{\bar{s}A}{d}\right)^{\frac{3}{2}} = \left(\frac{0.16 * 25}{0.04}\right)^{\frac{3}{2}} = 1,000 ,$$

$$y^* = \left(\frac{\bar{s}}{d}\right)^{\frac{1}{2}} \bar{A}^{\frac{3}{2}} = \left(\frac{0.16}{0.04}\right)^{\frac{1}{2}} 25^{\frac{3}{2}} = 250 \quad \text{or } y^* = \bar{A} (k^*)^{1/3} = 25 * 10 = 250$$

(b)

Immediately after the hurricane, the economy is below its steady state. Both total output and per capita income goes up immediately and continues to increase in a decreasing rate.

Since the initial capital stock is $K^* = k^* \bar{L} = 1,000 * 16,000 = 16m$, $K = 1/2 * 10m = 8m$ after the

hurricane. Total output after the hurricane is $Y = \bar{A} K^{1/3} L^{2/3} = 25 * 8m^{1/3} 16000^{2/3} =$

$3,174,802$ and per capita income is $Y/L = 3,174,802/16,000 = 198.42$.

Eventually, the economy goes back to its initial steady state level in the long run. The steady state level of per capita income is still 2,000 since there is no change in any determinants of the steady state.

(c)

If this economy receives a foreign aid, the total capital stock changes from $1/2K^*(=8m)$ to $3/4K^*(=12m)$. Total output and per capita income goes up immediately. Still, the economy reaches the same steady state in the long run.

(d)

New investment rate in this economy is now $0.16 * 2 = 0.32$. Because of increase in the investment rate, the steady state level of total output and per capita income permanently increase. The new steady state per capita income is,

$$y^* = \left(\frac{\bar{s}}{d}\right)^{\frac{1}{2}} \bar{A}^{\frac{3}{2}} = \left(\frac{0.32}{0.04}\right)^{\frac{1}{2}} 25^{\frac{3}{2}} = 353.5$$

After the hurricane, per capita income grows much faster and reaches the new steady state level eventually.

2.

(a)

In the steady state,

$$k^* = \left(\frac{\bar{s}A}{d}\right)^{\frac{3}{2}} = \left(\frac{0.36 * 25}{0.04}\right)^{\frac{3}{2}} = 3,375 , (K^* = 3,375 * 16,000 = 54m)$$

$$y^* = \left(\frac{\bar{s}}{d}\right)^{\frac{1}{2}} \bar{A}^{\frac{3}{2}} = \left(\frac{0.36}{0.04}\right)^{\frac{1}{2}} 25^{\frac{3}{2}} = 375 \quad \text{or } y^* = \bar{A} (k^*)^{1/3} = 25 * 15 = 375 (Y^* = 375 * 16000 = 6m)$$

(b)

For country B, capital stock per person immediately after the hurricane is $k = (1 - (1/10)) * 3,375 = 3,037.5$ and per capita income $y = \bar{A} k^{1/3} = 362.06$

Immediately after the hurricane, per capita income decreases below the steady state level. However, the steady state level remains the same and this economy continues to grow until it reaches its steady state.

(c)

Country A is further below its steady state than country B is. The percentage gap between the steady-state income and the income immediately after the hurricane for country A is $(250-198.42)/198.42=0.26$. For country B, the percentage gap is $(375-362.06)/362.06=0.04$. Therefore, country A should grow faster after the hurricane. However, as two economies approach their own steady state each, country B is richer in the long run. Country B has higher steady state per capita income(=375) because of the higher investment rate.

(d)

When the investment rate in country A is doubled, the steady state per capita income increases to 353.5. Country A grows at a much faster rate after the hurricane with the change in the investment rate since the gap is larger now. Also, its per capita income in the steady state is very close to that of country B(=375). Country A is almost as rich as country B in the long run. We find that, with a permanent change in the economy's fundamentals, we can generate convergence in income across countries in the long run.