

Answers to additional problem. on HW3.

1. a). The equation determining the long-run equilibrium value of capital per effective worker is given by

$$sk^{1/2} = (g_E + d)k.$$

This requires saving per effective worker to equal replacement investment per effective worker. Replacement investment is the quantity of investment necessary to keep the per effective worker capital stock constant.

Substituting values yields:

$$.36k^{1/2} = (.03 + .01)k = .04k$$

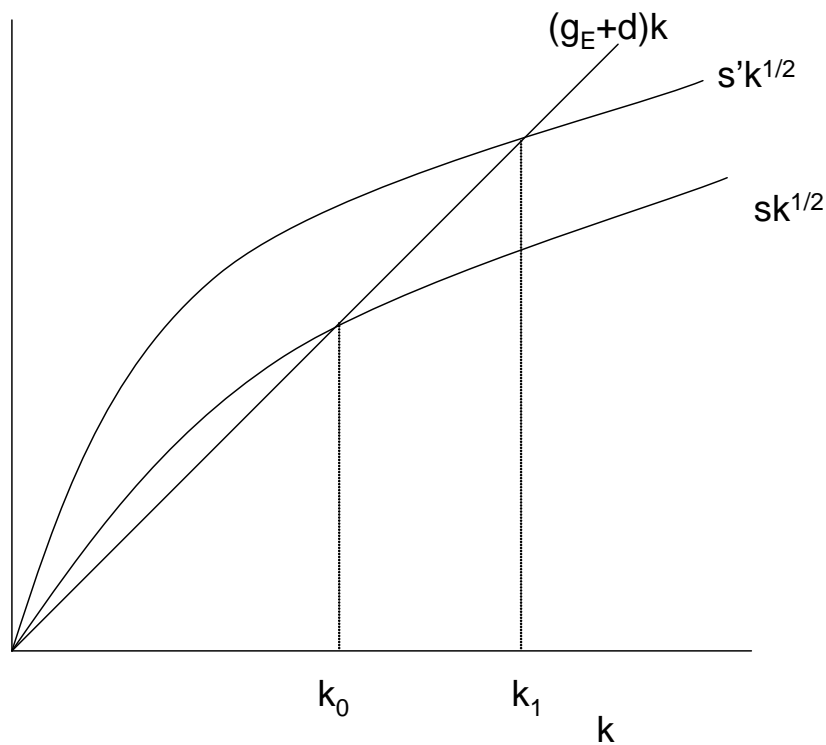
$$k^{1/2} = 9$$

$$k = 81$$

Output is given by

$$y = k^{1/2} = 9$$

c and d. The initial equilibrium is at k_0 . The increase in the savings rate increases capital per effective worker to k_1 . This also increases output per effective worker since $y = k^{1/2}$.



e) In steady state

$$k = \frac{K}{NQ} \quad y = \frac{Y}{NQ}$$

where both y and k are constant. Therefore the numerators must be growing at the same rates as the denominators.

$$\frac{\Delta K}{K} - \frac{\Delta N}{N} = \frac{\Delta Y}{Y} - \frac{\Delta N}{N} = \frac{\Delta Q}{Q} = g_Q.$$

Since

$$g_E = g_Q + n$$

$$g_Q = g_E - n = .03 - .02 = .01$$

Therefore, both capital per worker and output per worker grow at 1% per year in steady state.