1. Consider an economy described by the Solow model that is on its balanced growth path. Assume that the saving rate is $s_0$. Now suppose that from time $t_0$ to time $t_1$, the saving rate rises gradually from $s_0$ to $s_1$ (where $s_1 > s_0$), and then remains at $s_1$.

Sketch the resulting path over time of log output per worker. For comparison, also sketch on the same graph: (i) the path that log output per worker would have followed if the saving rate had remained at $s_0$; (ii) the path that log output per worker would have followed if the saving rate had jumped discontinuously from $s_0$ to $s_1$ at time $t_0$ (and remained at $s_1$).

Explain your answer.

2. Saving rates may be higher at higher levels of income. This problem asks you to investigate the consequences of this possibility for economic growth.

Consider the Solow model without technological progress. For simplicity, assume that $A$ is one, so that $y$ and $k$ are income per worker and capital per worker.

Now suppose that, in contrast to our usual assumptions:

-- The saving rate is zero if income per worker is less than some critical level, $f(\bar{k})$.

-- The saving rate is $s$ (where $s > 0$) if income per worker exceeds $f(\bar{k})$.

Finally, assume that $sf(\bar{k})$ is greater than $(n + \delta)\bar{k}$.

a. Describe how, if at all, this change affects our usual diagram for the Solow model -- that is, the diagram showing actual investment per worker and break-even investment per worker as functions of capital per worker.

b. Describe what the behavior of output per worker over time will be if:

   i. The initial level of capital per worker, $k(0)$, is between 0 and $\bar{k}$.

   ii. The initial level of capital per worker, $k(0)$, is slightly greater than $\bar{k}$.

3. Romer, Problem 2.3.

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4. In the usual Solow model, people consume a constant fraction of their income: $C(t) = (1-s)Y(t)$. Suppose instead, however, that consumption depends on income and on wealth. Specifically, suppose $C(t) = (1-s)Y(t) + aK(t)$, where $a$ is a positive parameter. Assume that, as in the usual Solow model, investment is the difference between output and consumption.

How, if at all, does this change in the model affect the basic diagram for the Solow model -- that is, the diagram showing actual and break-even investment per unit of effective labor as functions of capital per unit of effective labor?

5. Romer, Problem 1.9.

6. Romer, Problem 1.10.

7. Romer, Problem 2.4.

8. Romer, Problem 1.12.