Macroeconomics 2016Q2
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Homework assignment

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Due on 29 June 2016

Collected in the classroom at the end of the class. For Problems 1 to 7, typing with a computer is desirable. If you handwrite, use pens. No pencils allowed. For problem (8), you can either email me or hand in a printed copy.

Solow model with a Cobb–Douglas production function

Let $F(K, AL) = K^\alpha (AL)^{1-\alpha}$.

(1) Compute the intensive form $f(k) = F(k, 1)$.

(2) Prove that f has the following properties.

- **a.** $f(0) = 0$,
- **b.** $f'(k) > 0$,
- **c.** $f''(k) < 0$,
- **d.** $\lim_{k\to 0} f'(k) = +\infty$,
- **e.** $\lim_{k\to +\infty} f'(k) = 0$.

(3) Solve the steady state equation, $sf(k^*) - (\delta + g + n)k^* = 0$, for $k^* > 0$.

(4) Similarly, find expressions for y^* and c^* in terms of s, δ, g, n and α, where y^* and c^* are the steady state levels of output and consumption per unit of effective labor, respectively.

(5) Compute the golden rule values of k^*, y^* and c^*. [Hint: find s that maximizes $c^* = c^*(s; \alpha, \delta, g, n)$ and plug that value into the solution of k^*, y^* and c^* obtained in (3) and (4).]

(6) Let s_G be the golden-rule saving rate and $s_1 < s_G$ the economy's saving rate given α, δ, g and n. Suppose that the economy is on the balanced growth path $k^*(s_1)$ from $t = 0$ to 1. At $t = 1$, the economy experiences a permanent increase of the saving rate to $s_1' < s_G$. Draw rough sketches of the dynamics of K, C, Y and K/L, C/L, Y/L.

(7) Do (6) again but, here, let the initial saving rate be $s_2 > s_G$ and suppose that there is a **decrease** $s_2 \to s_2' > s_G$ instead of an increase.

(8) You'll get a bonus of several points for simulating the dynamics for (6) and (7) by computer programs. Attach your figures and codes (in any programing language).