ECO5002 Introduction to Economics

Quiz 3

(Total Points: 40, Due on August 18$^{\text{th}}$, 2024)

1 Question 1

Answer the following questions with necessary explanations:

1. **(2pts)** Describe how human capital may interact with physical capital?
2. **(2pts)** Show three main functions of money in real life.
3. **(2pts)** Why is the central bank not able to precisely control the money supply?
4. **(2pts)** Why is the long-run aggregate supply curve vertical?
5. **(2pts)** Evaluate the statement: *industrial policies can promote innovation.*

2 Question 2

Explain whether the events below increase or decrease the money supply.

1. **(2pts)** The Fed buys bonds in open-market operations.
2. **(2pts)** The Fed reduces the reserve requirement.
3. **(2pts)** Citibank repays a loan it had previously taken from the Fed.

3 Question 3

Suppose that the economy is initially in a long-run equilibrium, use the AD-AS diagram to analyze the short-run effect of the following policies:

1. **(2pts)** A contractionary monetary policy.
2. **(2pts)** An expansionary fiscal policy.

4 Question 4

Recall the Solow model with population growth and technology progress. The key equation of this model is as follows

$$\dot{\tilde{k}}_t = sf(\tilde{k}_t) - (\delta + g + n)\tilde{k}_t,$$

where $\tilde{k}_t$ is per effective worker capital at time t (i.e., $\tilde{k}_t \equiv \frac{K_t}{A_t L_t}$), s is saving rate, δ is depreciation rate, g and n are growth rate of population and technology, and $f(\cdot)$ is the normalized production function which solely depends on $\tilde{k}_t$.

1. **(4pts)** Derive the growth rate of per capita capital g_k (where $k_t \equiv \frac{K_t}{L_t}$).
2. **(4pts)** Assume that the production function is $Y_t = F(K_t, A_t L_t) = K_t^{\alpha}(A_t L_t)^{1-\alpha}$, solve for the steady state of per effective worker capital (i.e., $\tilde{k}^*$).
3. **(4pts)** Use the diagram to show how $\tilde{k}^*$ changes when g decreases?
4. **(4pts)** Derive the Golden Rule level of per effective worker capital (i.e., $\tilde{k}_{\text{gold}}$).
5. **(4pts)** Following 2, derive the local convergence rate of $\tilde{k}_t$. [*Hint: you can do a first-order Taylor expansion of* $\dot{\tilde{k}}_t$ *around steady state* $\tilde{k}^*$, *and you will get something like* $\dot{\tilde{k}}_t = \zeta \cdot (\tilde{k}_t - \tilde{k}^*)$ *where* ζ *is defined as the convergence rate.*]