Handout 9

(Final Exam Review - Part II)

1 Main equations

- GDP: $Y = C + I + \bar{G}$

- Consumption: $C = \bar{C} + mpc \cdot (Y - \bar{T})$

- Investment: $I = \bar{I} - d \cdot r$

- Fisher equation: $i = r + \pi^e$

- IS curve: $Y = \dfrac{1}{1 - mpc} \left[\bar{C} + \bar{I} + \bar{G} - mpc \cdot \bar{T} \right] - \dfrac{d}{1 - mpc} \cdot r$

- Monetary policy: $r = \bar{r} + \lambda \cdot \pi$

- AD curve: $Y = \dfrac{1}{1 - mpc} \left[\bar{C} + \bar{I} + \bar{G} - mpc \cdot \bar{T} - d \cdot \bar{r} \right] - \dfrac{\lambda \cdot d}{1 - mpc} \cdot \pi$

- AS curve: $\pi = \pi^e + \gamma \cdot (Y - \bar{Y}) + \bar{p}$ ($\bar{p}$: inflation shock)

2 Long run conditions (AS curve)

1. $\pi = \pi^e$

2. $\bar{p} = 0$

$\Longrightarrow Y = \bar{Y}$

- The long-run AS curve will be a vertical line.

1. For each of the scenarios, do the following:

   - Use the model of AS-AD to show graphically the long-run and short-run consequences for output and inflation.

   - Describe in words or graphically the short-run and long-run consequences for consumption, investment, and the real interest rate.

   Label all diagrams clearly. As usual, all shocks should be regarded as unanticipated unless stated otherwise.

   (a) A worldwide drought increases food prices and creates a temporary negative supply shock that increases $\bar{p}$.

   (b) Households in the US become more frugal and so $\bar{C}$ permanently decreases.

   (c) A natural disaster destroys a large part of the country's capital stock reducing potential output $\bar{Y}$.

   (d) The US Congress attempts to reduce the deficit by permanently raising taxes $\bar{T}$.

2. Use the quantity theory of money to answer the following questions.

   (a) Write down the quantity equation in terms of growth rates.

   (b) Assuming that the velocity of money is constant, if a country has an average annual growth rate of real GDP equal to 3%, then what is the average annual rate of money growth that would required to produce an average rate of inflation of 4%.

   (c) Assuming that the velocity of money is constant, if a country has an average annual growth rate of real GDP equal to 6%, an average real interest rate of 4%, and an average rate of money growth equal to 10%, then what is the average rate of nominal interest implied by the quantity theory of money?

3. Use the model of AS-AD to answer the following:

   (a) Suppose that $\bar{C}$ falls and that the central bank simultaneously adjusts $\bar{r}$ to stabilize π in the short-run. Does the central bank have to increase or decrease $\bar{r}$? What is the effect on π, Y , C, I, and r of the combined changes in $\bar{C}$ and $\bar{r}$?

(b) Suppose that $\bar{C}$ falls and that the Congress simultaneously adjusts $\bar{T}$ to stabilize Y in the short-run. Does the Congress have to increase or decrease $\bar{T}$? What is the effect on π, Y , C, I, and r of the combined changes in $\bar{C}$ and $\bar{T}$?

(c) Suppose that $\bar{I}$ falls and that the central bank adjusts r to stabilize π in the short-run. Does the central bank have to increase or decrease $\bar{r}$? Construct well-labeled diagrams and explain the effect on π, Y, I, and r.

(d) True or False: Central banks never face trade-offs between stabilizing inflation and output. Explain.

4. Consider the following Cobb-Douglas production function:

$$Y = AK^\alpha L^{1-\alpha} \tag{1}$$

Assume that labor and capital are both supplied inelastically and that the factor markets are perfectly competitive. Answer the following:

(a) Construct a pair of diagrams to demonstrate how an increase in the supply of capital affects the equilibrium real wage $\frac{W}{P}$ and the real rental rate $\frac{R}{P}$.

(b) Given the following values $K = 36$, $L = 16$, $\alpha = 0.5$ and $A = 1$, find the real wage $\frac{W}{P}$ and the real rental rate $\frac{R}{P}$.

5. Consider the Solow growth model that we've done in class:

(a) Explain what distinguishes the golden rule saving rate from every other potential saving rate.

(b) What is the numerical value of the saving rate maximizes steady state output per effective worker?

(c) In the steady state, what are the growth rates of $\frac{Y}{EL}$, $\frac{Y}{L}$ and Y?

(d) Policymakers are debating between two policies for raising output per worker:

   I. Permanently increase the saving rate s.

   II. Permanently increase the growth rate of labor efficiency g.

   Which of the two policies (I. or II.) will have a greater effect on output per worker in the long-run?