

## Exam 2

Intermediate Macroeconomics

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**Instructions:** Answer all questions on these pages. Be sure to show your work. State any assumptions you make. Put labels on the axis, curves, and points in every diagram. If you need additional space, use the back sides of these pages.



**PROBLEM 1: The Multiplier Effect (25 points + 5 points)**

Suppose there are two types of investment in the economy:  $I_1$  is the investment of large mature firms determined by the real interest rate, and  $I_2$  is the investment of start-ups determined by consumer demand. In particular,  $I_1$  is a decreasing function of the real interest rate  $I_1 = \bar{I}_1 - d(r + \bar{f})$  and  $I_2$  is an increasing function of disposable income  $I_2 = \bar{I}_2 + mpc(Y - T)$ .

- a) (8 points) Assume the following: consumption  $C = \bar{C} + mpc(Y - T) - cr$ , net exports  $NX = \bar{NX} - xr$ , fiscal policies  $G = \bar{G}, T = \bar{T}$ , and the investment  $I = I_1 + I_2$  as described above. Write down the goods market equilibrium condition and derive the equation for the IS curve.
- b) (2 points) Write down the expenditure multiplier and the tax multiplier.
- c) (3 points) Suppose the government needs to balance its budget  $G = T$ : the expenditure must be equal to tax revenue. How can the government stimulate the economy in this case? What is the total effect on  $Y$  per unit?

$\bar{C} = 2$	$mpc = 0.25$
$\bar{I}_1 = \bar{I}_2 = 1.5$	$c = 0.55$
$\bar{G} = 1.4$	$d = 0.3$
$\bar{T} = 1.6$	$x = 0.15$
$\bar{NX} = 1$	$\bar{f} = 2$

d) (5 points) Assume the above values for the parameters and write down the equation for the IS curve.

e) (7 points) Draw the IS curve below. Indicate the current equilibrium point  $(r_1, Y_1)$  where  $Y_1 = 6$ . Now suppose the government increases its spending by 1 unit. How does that change the diagram? Indicate the new equilibrium point  $(r_2, Y_2)$ .

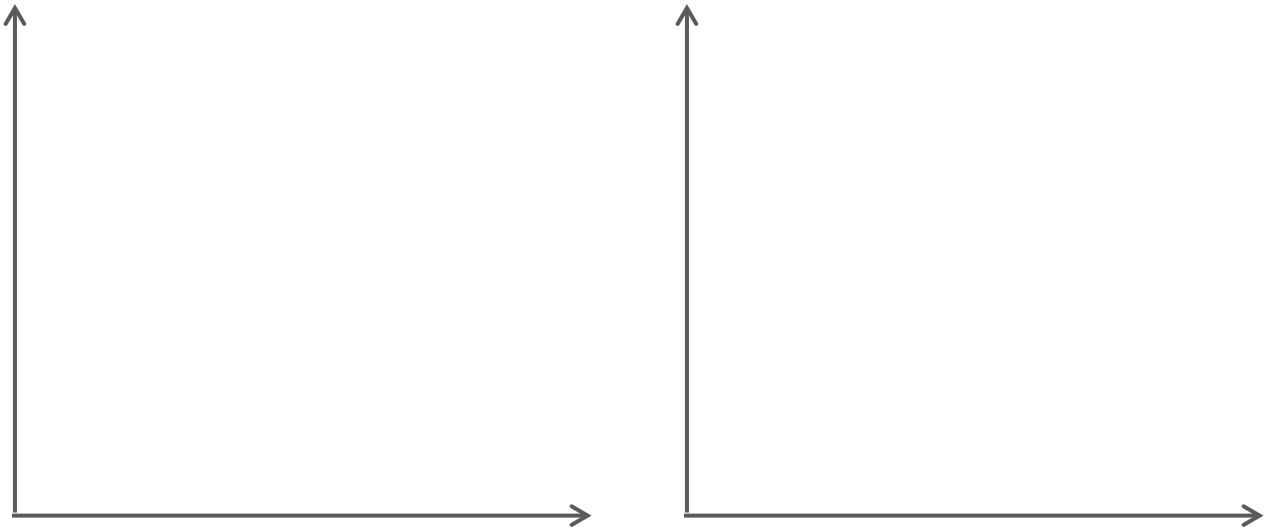


- f) (bonus! 5 points) How does the investment change when the real interest rate decreases from 6 to 5?

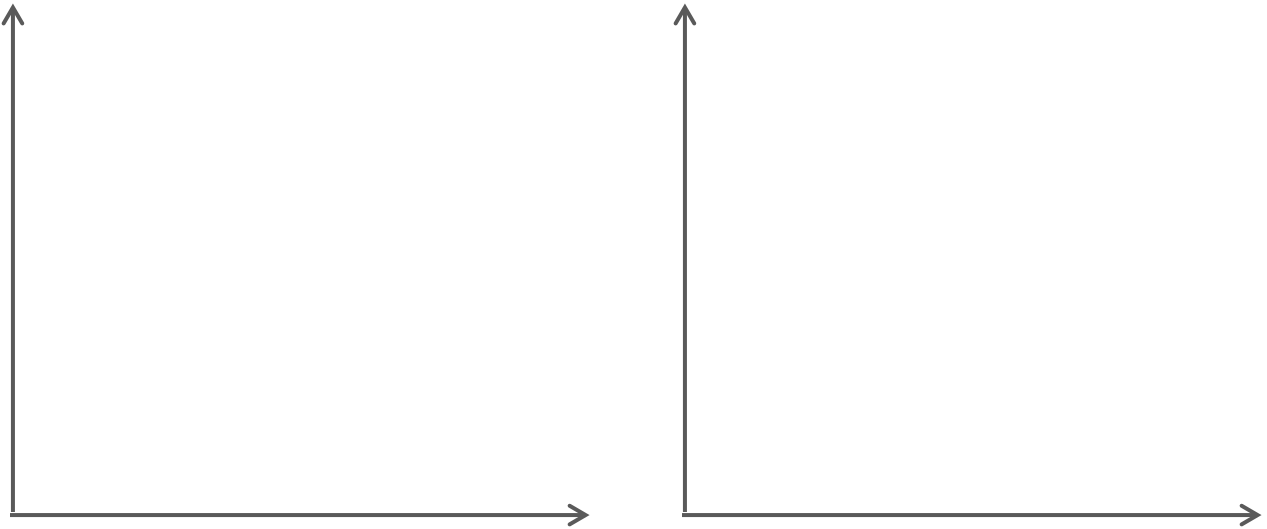
**PROBLEM 2: Savings and Investment Curves (30 points)**

Consider three countries: The United States (US, a large open economy), South Korea (SK, a small open economy), and North Korea (NK, a closed economy).

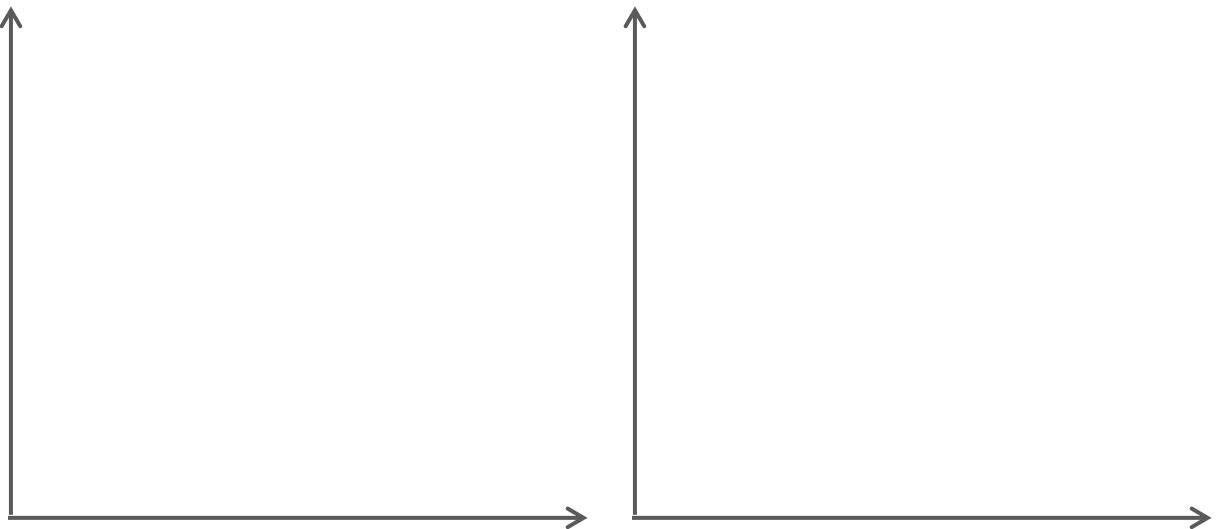
- a) (5 points) Suppose that US is a net importer against the rest of the World (ROW) in the equilibrium. Find the equilibrium for the world economy. Indicate the world real interest rate  $r^w$ , the level of saving ( $S^{US}, S^{ROW}$ ), investment ( $I^{US}, I^{ROW}$ ) and the quantity of net exports ( $NX^{US}, NX^{ROW}$ ) for US and the rest of the World.



- b) (5 points) Suppose that SK has net capital inflows in the equilibrium. Find the equilibrium for SK and NK. Indicate the equilibrium real interest rate, level of saving ( $S^{SK}, S^{NK}$ ), investment ( $I^{SK}, I^{NK}$ ) and the quantity of net exports ( $NX^{SK}, NX^{NK}$ ) for SK and NK.



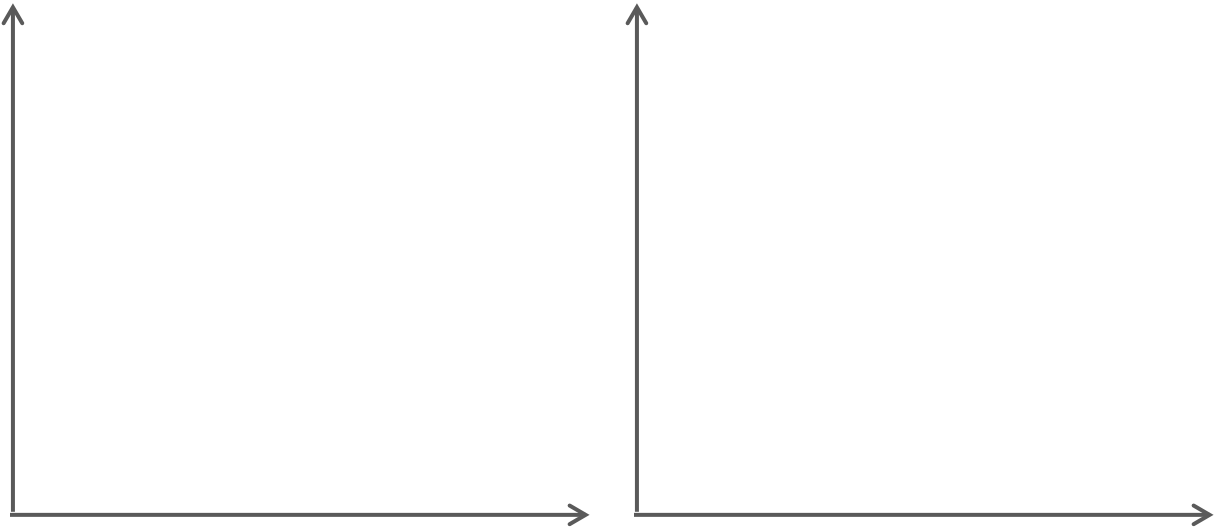
- c) (5 points) In the equilibrium found in part (a), now there is a drop in autonomous consumption in US. Find the new equilibrium for US and ROW.



- d) (5 points) Determine the impact on the real interest rate, level of saving, investment, and the quantity of net exports for US and ROW. (Indicate “↑”, “↓”, or “No change”).

	US	ROW
Saving		
Investment		
Net exports		
Real interest rate		

- e) (5 points) In the equilibrium found in part (b), there is a drop in autonomous consumption in US. Find the new equilibrium for SK and NK based on the result in part (c) and (d).



- f) (5 points) Determine the impact on the real interest rate, level of saving, investment, and the quantity of net exports for SK, and NK. (Indicate “↑”, “↓”, or “No change”).

	SK	NK
Saving		
Investment		
Net exports		
Real interest rate		

**PROBLEM 3: Aggregate Demand (25 points)**

Assume firms are willing and able to produce the output demanded.

- a) (5 points) Draw the IS, MP and AD curves below. Label your curves with the subscript “1”. Choose a point in each diagram and label it as “1”. Indicate the level of inflation, real interest rate, and output as  $\pi_1$ ,  $r_1$ , and  $Y_1$ .

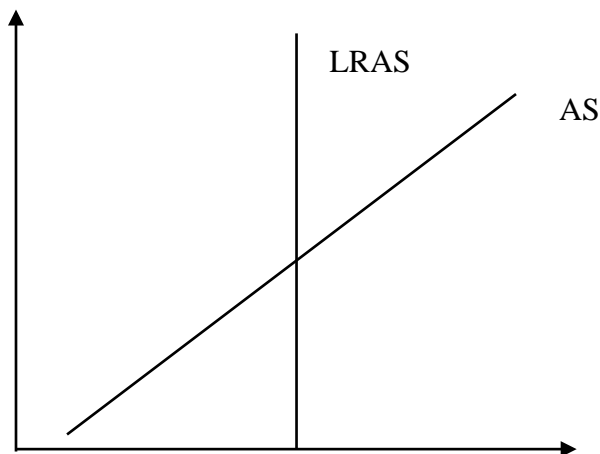




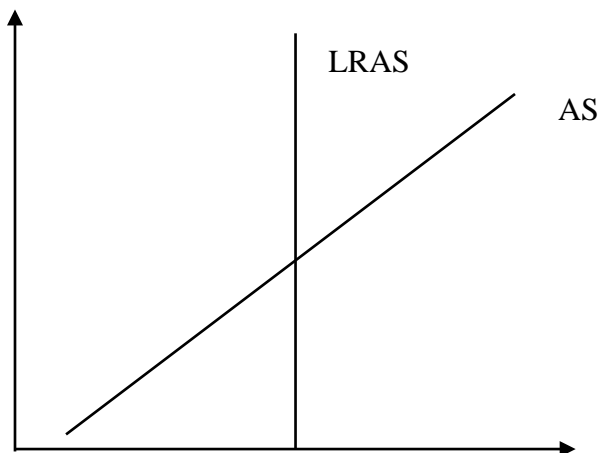
- b) (5 points) Analyze the effects of a decrease in government taxes  $\bar{T}$ , using the diagrams in part (a). Use arrows to indicate the direction of the shift and label your new curves with the subscript "2". Determine the impact on the inflation rate, real interest rate, and the quantity of output demanded. Label the new point as "2".
- c) (5 points) Assume that the Chairman of the Central Bank wants to restore the original output level ( $Y_1$ ). What do you recommend? Increasing or decreasing the autonomous part of real interest rate  $\bar{r}$ ? Why?
- d) (5 points) Show what changes in the graphs in part (a) after the change in  $\bar{r}$  you recommended in part (c). Shift the appropriate curve(s). Use arrows to indicate the direction of the shift and label your new curves with the subscript "3". Determine the impact on the inflation rate, real interest rate, and the quantity of output demanded. Label the new point as "3".
- e) (5 points) Taking into account that  $C = \bar{C} + C(Y - T, r)$ , what is the impact on consumption levels of the monetary policy you recommended in part (c) for a given level of inflation? Increases, decreases or it does not change? Why?

#### PROBLEM 4: Aggregate Supply (20 points)

Assume an economy with aggregate supply represented by the following figure. Suppose there is no price shock ( $\rho = 0$ ).

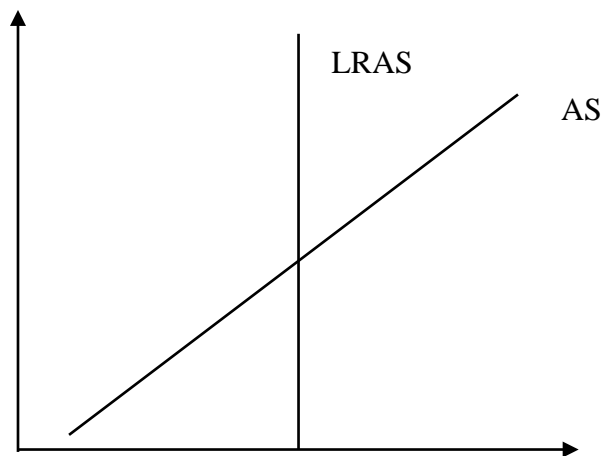


- (2 points) In the graph above put labels on the axis and identify potential output ( $Y_p$ ) and expected inflation ( $\pi^e$ ).
- (2 points) Assume output level ( $Y_1$ ) is above potential output, identify in the graph above the level of inflation ( $\pi_1$ ) associated with that level of output according to the aggregate supply function.
- (2 points) Is  $\pi_1$  below or above expected inflation  $\pi^e$ ? In this situation, what will happen with expected inflation  $\pi^e$ , assuming that the output gap is persistent?
- (7 points) Show in the graph below the impact of the change in expected inflation you identified in part (c). Indicate the new expected inflation as  $\pi_2^e$  and the inflation level at the output level ( $Y_1$ ) as  $\pi_2$ .



e) (7 points) Assume that the government introduces a regulation that makes more difficult for firms to hire workers. What is the effect on the natural rate of unemployment? How does that change the aggregate supply? Why?

Based on your answer describe what happens with the long run and short run aggregate supply using the graph below. Use arrows to indicate the direction of the change.



END OF EXAM