Endterm Exam
Macro Economics

Institute for Financial Management & Research (Batch: 2018-20)

13 December, 2018

Maximum Points: 80 **Duration**: 150 minutes

Instructions and Advice:

- This exam accounts for 40% of your final grades.
- The question paper is divided in two sections- Part A and Part B.
- You need to answer 5 questions in all. [2 from Part A, and 3 from Part B]
- You can choose between Question 1 and Question 2, and between Question 3 and Question 4.
- In case you choose to answer Question 1 as well as Question 2 (by accident or by design) in the exam, the first question that you attempt will be evaluated. Same goes for Questions 3 and 4.
- All other questions are compulsory.
- Please be brief and precise in your answers. Unnecessarily lengthy answers will attract penalty.
- Label all graphs and figures clearly.
- At no point of this examination you are allowed to ask clarificatory questions. Make reasonable assumption if you have doubts and proceed to answer the question.
- You are **allowed** to use non-scientific calculator in the exam.
- There is plenty of time. Use it wisely, do not rush.
- All the best! **:)**

Part A

1. (10 points) *Consider an economy with flexible exchange rates. Let UIP stand for the uncovered parity condition.*

   (a) (5 points) In an $IS - LM - UIP$ diagram, show the effect of an increase in foreign output (Y^*) on domestic output (Y). Explain briefly.

   > **Solution:** The IS curve shifts to the right, because net exports will go up (because of rising foreign income). Domestic output is expected to move up. [This needs a correctly labelled set of graphs]

   (b) (5 points) In an $IS - LM - UIP$ diagram, show the effect an increase in the foreign interest rate (i^*) on domestic output. Explain briefly.

   > **Solution:** The IS curve moves rightwards, because $\uparrow i^*$ will put a downward pressure on the domestic currency (a depreciation). This depreciation will lead to higher exports. Domestic output goes up, and the interest parity line shifts up. [This needs a correctly labelled set of graphs]

Or

2. (10 points) Use the $IS - LM$ model to determine the impact on stock prices of each of the given policy changes. Illustrate your answer graphically.

   (a) (5 points) An unexpected expansionary monetary policy with no change in fiscal policy.

   > **Solution:** The LM curve moves downwards unexpectedly. There is an unexpected fall in the interest rate and an unexpected rise in output. Rise in output means greater dividends that can be distributed to shareholders. The two changes- falling interest, and rising output- will lead to an increase in the stock price.

   (b) (5 points) A fully expected contractionary monetary policy with an unexpected expansionary fiscal policy.

   > **Solution:** The interest rate will rise beyond what market expects. Although the IS curve moves right, the output rise may not be able to contain the pessimism caused by higher interest rates. Therefore, the stock price will fall. [A graph here will make things clearer.]

3. (10 points) *For each of the changes in expectations, determine whether there is a shift in the IS curve, the LM curve, both curves, or neither. In each case, assume that expected current and future inflation are equal to zero and that no other exogenous variable is changing.*

   (a) (5 points) an increase in expected future taxes.

   > **Solution:** There are multiple effects of rising future taxes.

1 $\uparrow T^e \Rightarrow \downarrow Y^e - T^e$. This will lead a reduction in current consumption. IS curve shifts to the left.

2 $\uparrow T^e \Rightarrow \downarrow r^e$. The fall in the expected future real interest rate will lead to a rise in investments in the future which, in turn, will shift the IS curve to the right.

The net effect on the IS curve is ambiguous.

(b) (5 points) a decrease in expected future income.

Solution: The LM curve will not shift, because it only depends upon the current income. The IS curve shifts to the left. [An answer to this part that doesn't explain what happens to the LM curve will be considered as incomplete.]

Or

4. (10 points) *Suppose a share is expected to pay a dividend of ₹1,000 next year, and the real value of dividend payments is expected to increase by 3% per year forever.*

Solution: First derive an expression for the price assuming that r is the real interest rate, g is the growth rate of dividends, θ is the risk premium.

$$Q = \frac{1000}{(1+r+\theta)} + \frac{1000(1+g)}{(1+r+\theta)^2} + \frac{1000(1+g)^2}{(1+r+\theta)^3} + \dots$$
$$Q = \frac{1000}{(r+\theta-g)}$$

(a) (3+3 points) What is the current price of the stock if the real interest rate is expected to remain constant at 5%? at 8%?

Solution: ₹50,000; ₹20,000

Now suppose that people require a risk premium to hold stocks.

(b) (2 points) Redo the calculations in part (a) if the required risk premium is 8%.

Solution: ₹10,000; ₹7692.31

(c) (2 points) Redo the calculations in part (a) if the required risk premium is 4%.

Solution: ₹16,666.7; ₹11,111.1

Part B

5. (20 points) *Suppose that every consumer is born with zero financial wealth and lives for three periods: youth, middle age, and old age. Consumers work in the first two periods and retire in the last one. Their income is $5 in the first period, $25 in the second, and $0 in the last one. Inflation and expected inflation are equal to zero, and so is the real interest rate.*

   (a) (5 points) What is the present discounted value of labour income at the beginning of life? What is the highest sustainable level of consumption such that consumption is equal in all three periods?

   Solution: EPDV of future labour income, W = \$5 + \$25 + \$0 = \$30.
   $C = \frac{W}{3}$ = \$10 (in each of the three periods).

   (b) (5 points) For each age group, what is the amount of saving that allows consumers to maintain the constant level of consumption you found in part (a)?

   Solution:

$$Y_1 = 5,\ C_1 = 10 \Rightarrow\ S_1 = -5$$
$$Y_2 = 25,\ C_2 = 10 \Rightarrow\ S_2 = 15$$
$$Y_3 = 0,\ C_1 = 10 \Rightarrow\ S_3 = -10$$
$$S = S_1 + S_2 + S_3 = 0$$

   (c) (5 points) Suppose there are n people born each period. What is total saving in the economy? Explain.

   Solution: Total savings, $S = n \times (-5 + 15 - 10) = 0$.

   (d) (5 points) What is total financial wealth in the economy?

   Solution: To answer this part, you must understand what financial wealth means. Remember from our class discussions that wealth is different from income. At any point of time, financial wealth is the sum of wealth accumulated in past plus savings in the given period. We can write down, for any given individual in the economy, the wealth function:

$$W_t = \text{Wealth Accumulated}_{t-1} + \text{Savings}_t$$

$$W_1 = W_0 + S_1 = 0 + (-5) = -5$$
$$W_2 = W_1 + S_2 = -5 + 15 = 10$$
$$W_3 = W_2 + S_3 = 10 + (-10) = 0$$

   Therefore, the total financial wealth in the economy is

$$\text{Financial wealth}, W = n \times (W_1 + W_2 + W_3) = (-5 + 10 + 0)n = 5n$$

   .

6. (20 points) *Suppose that Mexico wishes to fix its exchange rate relative to the U.S. dollar.*

   (a) (5 points) If the Federal Reserve raises interest rates, what would happen to the peso-dollar exchange rate in the absence of any change in Mexican interest rates?

   Solution: When the Federal Reserve raises interest rates, U.S. assets become more attractive than Mexican assets. This increases the demand for dollars and reduces the demand for pesos, putting pressure on the peso to depreciate.

   (b) (10 points) Suppose Mexico wants to keep its interest rate fixed no matter what, maintain a fixed exchange rate, and allow open capital markets. What will happen when the United States raises interest rates?

   Solution: Let us see what Mexico is trying to achieve. At the old exchange rate, investors will want to trade their pesos for dollars to milk the situation (high American interest rate). The Mexcian central bank can finance these (mis)adventures using its forex reserves, but eventually Mexico is going to run of $. As it runs out of dollars, it will be compelled to reduce the value of the peso.

   (c) (5 points) Summarize the policy "buttons" that are working for Mexico in this scenario.

   Solution: You cannot have all the three "buttons" available at the same time- stable exchange rate, monetary policy autonomy, and free capital.

7. (20 points) *Consider an open economy in which the real exchange rate is fixed and equal to one. Consumption, investment, government spending, and taxes are given by*

$$C = 10 + 0.8(Y - T), I = 10, G = 10, \text{ and } T = 10$$

   Imports and exports are given by

$$IM = 0.3Y \text{ and } X = 0.3Y^*$$

   where Y^* denotes foreign output.

   (a) (5 points) Solve for equilibrium output in the domestic economy. What is the multiplier in this economy? If we were to close the economy what would the multiplier be? Why would the multiplier be different in a closed economy?

   Solution:

$$\begin{aligned} Y &= C + I + G + NX \\ Y &= 10 + 0.8(Y - T) + 10 + 10 + X - IM \\ Y &= 30 + 0.8(Y - T) + 0.3(Y^* - Y) \\ Y &= 30 + (0.8 - 0.3)Y - 0.8T + 0.3Y^* \\ Y &= (30 - 8) + 0.5Y + 0.3Y^* \\ 0.5Y &= 22 + 0.3Y^* \\ Y_{eqlb} &= 44 + 0.6Y^* \end{aligned}$$

When the economy is closed ($NX = 0$), the multiplier would be $\frac{1}{(1-0.8)} = 5$.
When the economy is open, the multiplier is $\frac{1}{(1-0.8-0.3)} = 2$.
The multiplier in an open economy is smaller because a part of the demand is now met by importing goods.

(b) (5 points) Assume that the foreign economy is characterized by the same equations as the domestic economy (with asterisks reversed). Use the two sets of equations to solve for the equilibrium output of each country. What is the multiplier for each country now? Why is it different from the open economy multiplier in part (a)?

Solution: You have two equations with two unknowns (Y, Y^*).

$$Y_{eqlb} = 44 + 0.6Y^*$$
$$Y^*_{eqlb} = 44 + 0.6Y_{eqlb}$$
$$Y_{eqlb} = Y^*_{eqlb} = 110$$

Now, you also need to account for foreign income (because it's endogenous). So, the multiplier equals $\frac{1}{(1-0.8-0.3\times0.6+0.3)} = 3.125$. This multiplier is higher than the open economy multiplier because now you also account for the fact that the goods produced in the local economy are demanded outside of country.

Detailed Explanation (**Optional Read**):

$$Y = C + I + G + NX$$
$$Y = c_0 + c_1(Y - T) + \bar{I} + \bar{G} + (xY^* - mY)$$

Now, look at the equation that establishes a relation between foreign income and domestic income ($Y^*_{eqlb} = 44 + 0.6Y_{eqlb}$). We can express this in general form as $Y^* = \alpha + \beta Y$.

$$\begin{aligned} Y &= C + I + G + NX \\ Y &= c_0 + c_1(Y - T) + \bar{I} + \bar{G} + (x(\alpha + \beta Y) - mY) \\ Y &= (c_0 + \bar{I} + \bar{G} - c_1T + x \times \alpha) + (c_1 + x \times \beta - m)Y \\ Y[1 - (c_1 + x \times \beta - m)] &= (c_0 + \bar{I} + \bar{G} - c_1T + x \times \alpha) \\ Y &= \frac{(c_0 + \bar{I} + \bar{G} - c_1T + x \times \alpha)}{[1 - (c_1 + x \times \beta - m)]} \end{aligned}$$

This multiplier has a new additive component $x \times \beta$. The parameter values are all given to you $(x = 0.3, \beta = 0.6)$.

(c) (5 points) Assume that the domestic government, G, has a target level of output of 125. Assuming that the foreign government does not change G^*, what is the increase in G necessary to achieve the target output in the domestic economy? Solve for net exports and the budget deficit in each country.

Solution: Domestic Economy:

$$Y = 125$$
$$Y^* = 44 + 0.6(125) = 119$$

$$Y = 2(10 + 10 - 8 + G + 0.3Y^*)$$
$$125 = 2(12 + G + 0.3(119))$$
$$G = 14.8$$

Budget Deficit: $T - G = 10 - 14.8 = -4.8$

Net exports: $X - IM = 0.3(Y^* - Y) = -1.8$

Foreign Economy:

Net exports: $X^* - IM^* = 0.3(Y - Y^*) = 1.8$

Budget deficit: $T^* - G^* = 0$

(d) (5 points) Suppose each government has a target level of output of 125 and that each government increases government by the same amount. What is the common increase in G and G^* necessary to achieve the target output in both countries? Solve for net exports and the budget deficit in each country.

Solution: When $Y = Y^* = 125$,

$$125 = 2(12 + G + 0.3(125))$$
$$125 = 24 + 2G + 0.6(125)$$
$$G = 13$$

By symmetry, $G^* = 13$, and $NX = NX^* = 0$.
Therefore, budget deficits for the two countries required to keep the output at the given level is 3.