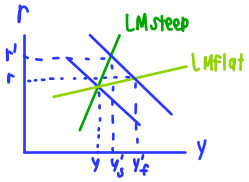
Group 5

Assignment 3 EE312 (Semester 2/2019)

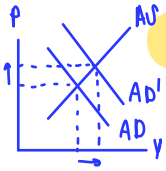
1. Due Feb 26th, 2020 (before 11.30 pm. Submit your work on the BE Moodle.)
2. For question 1 and question 2, even-numbered groups are assigned to do even-numbered sub questions.
3. Question 3 is required for every group.



Question 1: (True/False)

1.1 IS (random) shocks can generate a bigger volatility in real GDP under elastic money demand than under inelastic money demand. True

1.2 The effect of fiscal policy is the strongest when monetary authority chooses to accommodate the government policy by fixing the interest rate.



1.3 Based on the Keynesian theory, demand shocks (AD) produce a negative (positive) co-movement between price and output. That is, price is a countered-cyclical (pro-cyclical) variable under demand shocks. False

1.4 Based on the Keynesian theory, interest rate is a countered-cyclical variable under supply shocks.

Question 2 (Self-adjustment theorem and expectation)

2.1 Suppose the economy is operating at the long-term trend, i.e. natural level. Analyze the impact of a permanent increase in the money supply (MS) under the following scenarios.

a. What would be the short-run impact on macroeconomic variables if *the permanent increase is* ***unexpected***. Use the 4-diagram that we discussed in class.

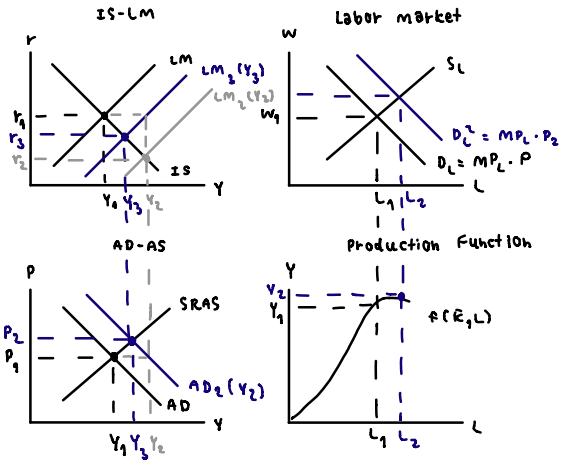
b. Describe what would happen over the medium-run. Link your analysis to the 4-diagram used in the previous sub-question.

c. Based on your analysis above, complete the following table.

Variables	Short-run (relative to initial level)	Medium-run	
		Relative to after-shock level (short-run)	Relative to initial level before shock
Output (real GDP)	↑	↓	–
Consumption	↑	↓	–
Investment	↑	↓	–
Labor employment	↑	↓	–
Nominal wage	↑	↑	↑
Price	↑	↑	↑
Real wage	↓	↓	↓

(2.1)

a. Permanent increase in M_S



Suppose that $M_S \uparrow \Rightarrow r \downarrow$ (LM shift right) : $LM_2(Y_2)$, $Y \downarrow (Y_1 \text{ to } Y_2)$

AD shift right : $AD_2(Y_2)$

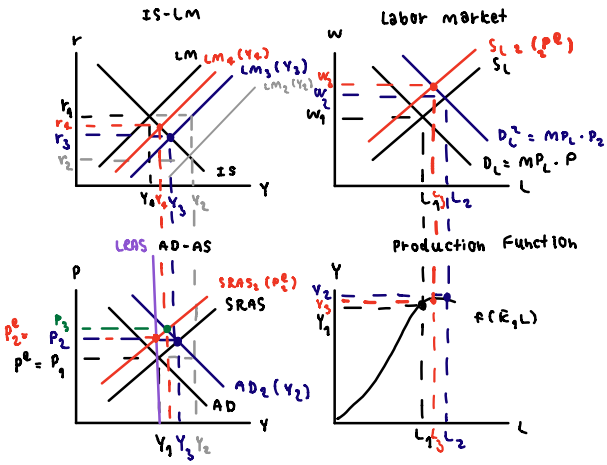
new equilibrium $\Rightarrow P \uparrow (P_2, Y_3)$, $Y \uparrow (Y_2 \text{ to } Y_3)$ (LM shift left)

$(LM_2 \text{ to } LM_3(Y_3))$, r_3

Labor market $\Rightarrow P \uparrow \Rightarrow D_L \uparrow$ (shift right) : $D_L^2 (MP_L \cdot P_2)$, L_2

Production Function $\Rightarrow L \uparrow (L_1 \text{ to } L_2)$, $Y \uparrow (Y_1 \text{ to } Y_2)$

b. Medium-run



when price increase $(P_1 \text{ to } P_2)$, P^e slightly adjust $(P^e \text{ to } P_2^e)$

$SRAS_2(P_2^e)$ cut $AD_2(Y_2) \Rightarrow Y \downarrow$

$Y \uparrow (Y_3 \text{ to } Y_4)$: LM shift left $(LM_3 \text{ to } LM_4(Y_4))$, $r \uparrow$

- AD-AS

Over time $P^e \uparrow (P^e \text{ to } P_2^e)$, SRAS shift left : $SRAS_2(P_2^e)$

$Y \downarrow (Y_3 \text{ to } Y_4) \Rightarrow$ LM shift left $(LM_3 \text{ to } LM_4(Y_4))$

$r \downarrow (r_3 \text{ to } r_4)$

$\therefore$ new equilibrium IS-LM (Y_4, r_4)

- Labor market

$P \uparrow (P^e \text{ to } P_2^e)$, effect the decrease in labor supply

$S_L \downarrow$ (shift left) ; $(S_L \text{ to } S_{L_2}(P_2^e)) \Rightarrow L \downarrow (L_2 \text{ to } L_3)$, $W \uparrow (W_2 \text{ to } W_3)$

- Production Function

$L \downarrow (L_2 \text{ to } L_3)$, $Y \downarrow (Y_2 \text{ to } Y_3)$

c.

Variables	Short-run (relative to initial level)	Medium-run	
		Relative to after-shock level (short-run)	Relative to initial level before shock
Output (real GDP)			=
Consumption			
Investment			
Labor employment			
Nominal wage			
Price			
Real wage			
Interest rate			

(d.) The impact of permanent increase in M_S effect the decrease nominal interest rate in short-run aggregate supply (SRAS). SRAS decrease effect the full-employment and impact permanently on higher price level.

Interest rate	↓	↑	–

d. If the permanent increase in the money supply is ***anticipated***, what would be the short-run impact on macroeconomic variables? Would one observe a deviation of actual output from the trend level?

2.2 Suppose the economy is operating at the long-term trend, i.e. natural level. Analyze the impact of a permanent decrease in government transfers under the following scenarios.

a. What would be the short-run impact on macroeconomic variables if *the permanent cut is* ***unexpected***. Use the 4-diagram that we discussed in class.

b. Describe what would happen over the medium-run. Link your analysis to the 4-diagram used in the previous sub-question.

c. Based on your analyses above, complete the following table.

Variables	**Short-run (relative to initial level)**	**Medium-run**	
		Relative to after-shock level (short-run)	**Relative to initial level before shock**
Output (real GDP)			
Consumption			
Investment			
Labor employment			
Nominal wage			
Price			
Real wage			
Interest rate			

d. If the permanent cut in government transfers is **anticipated**, what would be the short-run impact on macroeconomic variables? Would one observe a deviation of actual output from the trend level?

Question 3 (*Evolutionary inflation dynamic* and *Gaining trust*) Suppose that the Phillips curve takes the following form,

$$\pi_t = \pi_t^e - 0.7(u_t - u_t^n) + \vartheta_t$$

where π_t = inflation

π_t^e = expected inflation

u_t = actual unemployment rate

u_t^n = the natural rate of unemployment

$\pi_t = 2 + 1.4$
$= 3.4$

ϑ_t = other supply shocks that directly affect the inflation rate

Assume that the inflation expectation is given by,

$$\pi_t^e = (1-\theta)\bar{\pi} + \theta\pi_{t-1}$$

where $\bar{\pi}$ is the level of targeted inflation, set and publically announced by the central bank. In words, we assume that people form the expectation using the weighted average between past observed inflation and the targeted inflation rate. The value of theta (θ) could be between 0 and 1.

Suppose that (i) θ is now equal to zero, (ii) the rate of unemployment initially stays at the natural rate of unemployment, assumed to be equal to 5%, (iii) ϑ_t is set equal to zero where there is no random shocks, and the inflation target ($\bar{\pi}$) is set to be 2%. *In year t, the government decides to bring the unemployment rate down to 3% and hold it there forever.* Answer the following question

3.1) Determine the rate of inflation in period t, t+1, t+2, t+3, t+4, t+5 How does the value of inflation in each period compare with the targeted inflation ($\bar{\pi}$)?

3.2) Do you believe the answer given in 3.1? Why or why not? (Hint: Think about how people are more likely to form the expectations of inflation.)

Now suppose in year t+6, θ increases from 0 to 1. Suppose that the government still determines to keep unemployment rate at 3%

3.3) Why might theta (θ) increase this way?

3.4) What might be the rate of inflation in period t+6, t+7, t+8, and t+9?

3.5) From (3.4), what can we conclude about inflation when $\theta = 1$ and unemployment rate is kept at 3%?

Now suppose in year t+10, a new government is elected. The government reforms the authority under control. It determines to keep unemployment rate at 5% and brings the inflation down to the targeted level ($\bar{\pi}$).

3.6) What happen to inflation in period t+10 if the government instead keeps the unemployment rate at 5%. Would this allow central bank to be successful in achieving the targeted inflation in period t+10?

3.7) To bring down the inflation to the targeted level, what does government need to do in period t+11? What will happen to the unemployment rate?

3.8) Given the result in (3.7) and its full commitment to keep unemployment rate at 5%, what happen to inflation in period t+12, t+13, t+14, t+15?

Now suppose in year t+16, the value of theta reduces from 1 t0 0.

3.9) Why might theta (θ) reduce this way? What can we imply about the value of theta (θ) and the past macroeconomic outcomes?

Now suppose that, in year t+17, Oil price suddenly increases, causing the random supply shocks to be equal to 1%. Assume the supply shock occurs temporarily, and takes the value of 1% only in period t+17. In the period afterwards, the shocks disappear, with the value of ϑ_t set to remain zero.

3.1) $\pi_t^e = (1-\theta)\bar{\pi} + \theta\pi_{t-1}$

At $t=0$, given that $\theta = 2$ and $\bar{\pi} = 2$; $\pi_t^e = (1-0)2 + 0(\pi_{t-1}) = 2$

$\pi_t = \pi_t^e - 0.7(u_t - u_t^n) + \vartheta_t$

$\pi_t = 2 - 0.7(5-5) + 0 = 2$

at $t=1$, u_t decreased from 5 to 3

$\pi_{t_1} = 2 - 0.7(-2) + 0 = 3.4$

Hence, from year t_1 to t_5, π_t will be constant at 3.4% because when $\theta = 0$, π_{t-1} will not affect π_t.

3.2) No, because mostly people think that inflation continue increasing every year.

3.3) $\pi_t^e = (1-1)2 + 1(\pi_{t-1})$

$\bar{\pi}$ has no affect on π_t, but π_{t-1} does have.

3.4) $\pi_{t_5} = 3.4$

$\pi_{t_6} = 3.4 - 0.7(-2) = 4.8\%$

$\pi_{t_7} = 4.8 - 0.7(-2) = 6.2\%$

$\pi_{t_8} = 6.2 - 0.7(-2) = 7.6\%$

$\pi_{t_9} = 7.6 - 0.7(-2) = 9\%$

3.5) We can conclude that only π_{t-1} has affect on π_t and by keeping $U_t = 3\%$, π_t will increase equally by 1.4% each year.

3.6) given $\bar{\pi} = 2\%$, $u_t = 5\%$

$\pi_{10} = 9 - 0.7(5-5) + v_t = 9\%$ $\quad \pi_{10} \neq \bar{\pi}$, therefore, no.

3.7) $\pi_{t_{11}} = 2$, find u_t

$2 = \pi_{10} - 0.7u_t + 3.5$ Hence, they have to increase u_t to 15%.

$\frac{2 - 9 - 3.5}{-0.7} = u_t = 15\%$

3.8) By giving U_t to be 5%, the inflation will equal to 2% for $\pi_{t_{12}}, \pi_{t_{13}}, \pi_{t_{14}}, \pi_{t_{15}}$.

3.9)

Before	After
$\theta = 1$	$\theta = 0$

When $\theta = 0$, it implies that the expected inflation (π_t^e) doesn't depend on the inflation of the year before (π_{t-1}) anymore and will always be equal to the targeted level ($\bar{\pi}$) for the year after.

$\pi_{t+16}^e = (1-0)\bar{\pi} + 0 \cdot \pi_{t+15}$

$\pi_{t+16}^e = (1)2 + 0 = 2$

$\pi_{t+16} = 2 - 0.7(0) + 0$

$= 2\%$

3.10) With the supply shock and the policy to keep unemployment rate at its natural level, what is the inflation in period t+17? Supplement your analysis using the diagram that we discussed in class.

3.11) What happen to the inflation in period t+18 and t+19?

3.12) Redo (3.10) and (3.11) with the alternative assumption that the value of theta (θ) sets equal to 1. What would happen to the inflation in period t+17 and t+18? Would the inflation in period t+18 be equal to the targeted level?

3.13) Following from the analysis in (3.12), what would be the required policy plan in year t+19 if the government wants to keep the inflation equal to *the targeted level* ($\bar{\pi}$)?

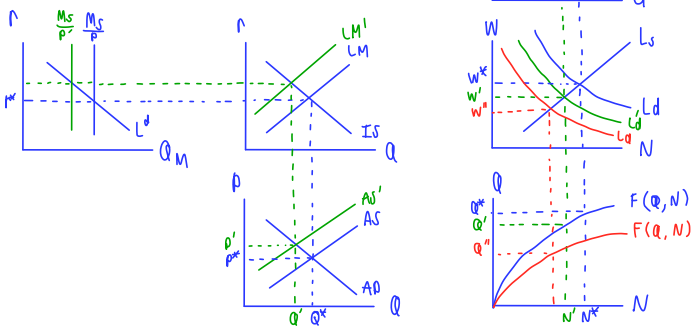
3.14) Based on the analysis given so far, do you think what could possibly determine the volatility of rate of inflation and the rate of unemployment under the presence of supply shocks? How does the credible commitment on inflation target play role in the determination of macroeconomic stability outcomes?

3.10) $v_t = 1\%$ for year $t+17$

$\pi^e_{t+17} = \bar{\pi} = 2\%$.

$\pi_{t+17} = 2 - 0.7(0) + 1$

$\pi_{t+17} = 3\%$



3.11) π_{t+18} will decrease by 1% as the forgone supply shock.

$\pi^e_{t+18} = 2$; $\pi_{t+18} = 2 + 0.7(0) + 0 = 2\%$.

Then, $\pi^e_{t+19} = 2\%$.

$\pi_{t+19} = 2\% - 0.7(0) + 0 = 2\%$.

3.12) when $\theta = 1$

(3.10) $\pi^e_{t+17} = 0\cdot(2) + 1(\pi_{t+16})$

$= 0 + 2$

$= 2$

$\pi_{t+17} = 2 - 0.7(0) + 1$

$= 3\%$.

(3.11) $\pi^e_{t+18} = 0 + 1(\pi_{t+17})$

$= 3\%$.

$\pi_{t+18} = 3\% - 0.7(0) + 0$

$= 3\%$.

$\pi^e_{t+19} = 0 + 3\% = 3\%$.

$\pi_{t+19} = 3 - 0.7(0) + 0$

$= 3\%$.

3.13) Target : $\pi_{t+1|9} = \bar{\pi} = 2$

$\pi^e_{t+1|9} = 3$

$2 = 3 - 0.7(u_{t+1|9} - 5) + 0$

find $u_{t+1|9}$: $0.7\, u_{t+1|9} = 4.5$

$u_{t+1|9} = \frac{4.5}{0.7} = 6.428571429$

$\therefore$ The required policy plan is to increase the unemployment rate to be $\approx 6.4286\%$.

3.14) When AS negatively shock, firm will cut down their labors which makes labor demand shifts to the left. Moreover, unemployment rate will rise and inflation rate will drop However, when AS has positive shock, firm will high more labor which makes labor demand shift to the right, therefore, unemployment rate will decrease and inflation rate will increase.