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.

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 produce a negative co-movement between price and output. That is, price is a countered-cyclical variable under demand shocks.

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 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			

Question 1: (True/False)

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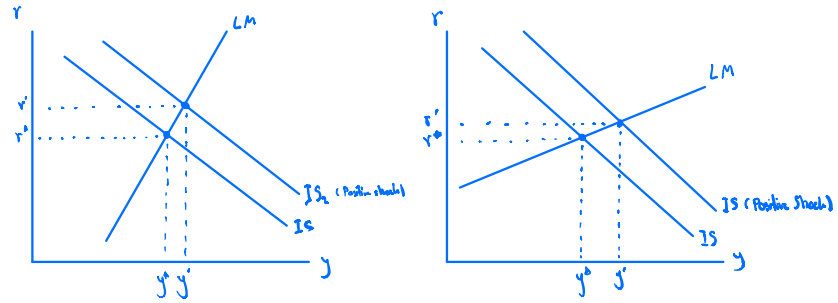
1.1)



False, In inelastic money demand can generate bigger volatility in real GDP more than elasticity money demand.

1.3) False, due to demand shocks produce positive co-movement between price and output. So, price is cyclical variable under demand shocks.

Question 2 (Self-adjustment theorem and expectation)

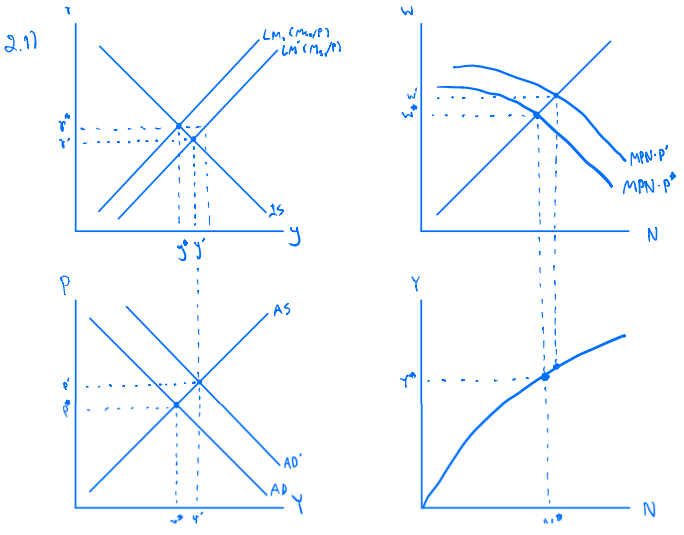
2.1 Suppose the economy is operating at the long-term trend, i.e. natural level. Analyze the impact of a permanent increase in the money supply under the following scenarios.

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.

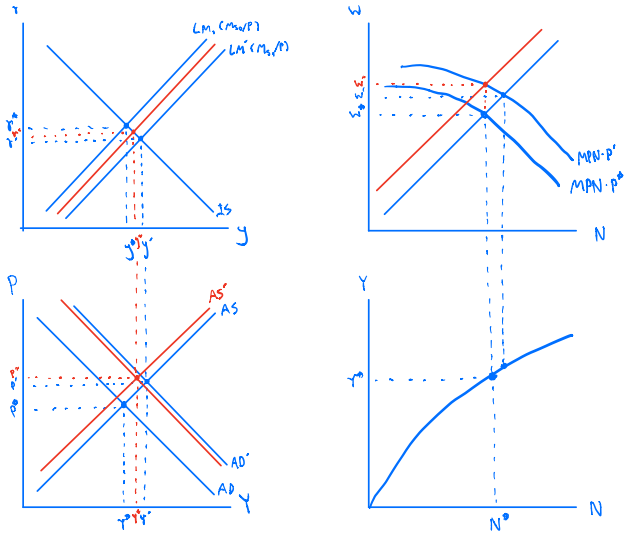
b. Describe what would happen over the medium-run. Link your analysis to the 4-diagram used in the previous sub-question.

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

2.1)



2.21



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	↓	↑	↓

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

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) $\pi_t = \pi^e_t - 0.7(u_t - u^n_t) + v_t$

u^n_t = 5%. $\pi^e_t = (1-\theta)\bar{\pi} + \theta \pi_{t-1}$

$\bar{\pi}$ = 2%.

u_t = 3%. $\theta = 0$, $v_t = 0$

t; $\pi_t = \pi^e_t - 0.7(3-5) + v_t$

$= [(1)(2) + 0] - (0.7)(-2) + 0$

$= 2 + 1.4 = 3.4$ #

$t+1$; $\pi_{t+1} = \pi^e_{t+1} - 0.7(3-3) + 0$

$= [(1)(2) + 0) - (0.7)(-2)$

$= 3.4$

$t+2$; $\pi_{t+2} = 3.4$

$t+3$; $\pi_{t+3} = 3.4$

$t+4$; $\pi_{t+4} = 3.4$

$t+5$; $\pi_{t+5} = 3.4$

targeted inflation is 2%.

but the value of inflation is 3.4%.
in all period.

3.2) likely to be wrong because

π_t^e won't be 2% at all
period because θ can vary from
0 to 1 so that could change
the real value of inflation.

3.3) θ increases to 1 because people
change the way they form π_t^e.

3.4) $t+6$;

$$\pi_{t+6} = \pi^e_{t+6} - 0.7(3-2) + 0$$

$$\pi^e_{t+6} = (1-\theta)\bar{\pi} + \theta \pi_{t+5}$$

$$= 1(3.4) = 3.4$$

$$\pi_{t+6} = 3.4 + (1.4) = 4.8$$

$t+7$; $\pi_{t+7} = 4.8 + 1.4 = 6.2$

$t+8$; $\pi_{t+8} = 6.2 + 1.4 = 7.6$

$t+9$; $\pi_{t+9} = 7.6 + 1.4 = 9$

3.5) we can conclude that the value of inflation keeps rising over year.

3.6) $t+10$; $\pi_{t+10} = \pi^e_{t+10} - 0.7(5-5)$

$u_t = 5, \theta = 1$ $= \pi^e_{t+10} - 0$

$= \theta \pi_{t+9}$

$= 1(9) = 9$

$\overline{\pi} = 2\%$. which doesn't match the expectation so the bank won't be successful.

3.7) to make the π_{t+11} equals to $\overline{\pi}$, government needs to up the unemployment rate (U_t) and

lower the natural rate of unemployment. $U_t \downarrow\downarrow$.

3.8) $U_t = \bar{u} \rightarrow \pi_{t+11} = 2$

$t+12$; $\pi_{t+12} = \pi^e_{t+12} - 0.7(5-5)$

$= \theta \pi_{t+11}$

$= 1(2) = 2$

$\pi_{t+13} = \pi^e_{t+13} - 0$

$= \theta \pi_{t+12}$

$= (1)(2) = 2$

$\pi_{t+14}, \pi_{t+15} = 2$ #

3.9) $t+16$ $\theta: 1 \to 0$ $\pi_{t+16} = 2\%$

adjust expectation in NKPC(π)

$v = 1\%$ $\pi_{t+17}\ (v=1\%) = 2\% - 0.7(5-5)\% + 1\% = 3\%$

$\pi_{t+18} = (v = 0\%) = 2\%$

3.11 $\pi_{t+17} = 3\%$

$\pi = (1-\theta)\bar{\pi} + \theta \pi_{t-1} - 0.7(u_t - u_t^n) + v_t$

$\pi_{t+18} = 2\%$

$\pi_{t+19} = 2\%$ too π_{t+18}, π_{t+19} would expect to target inflation

3.12 $\theta = 1$ $\pi_{t+16} = 2\%$

$\pi = (1-\theta)\bar{\pi} + \theta \pi_{t-1} - 0.7(u_t - u_t^n) + v_t$

π_{t+17} has $v_t = 1\%$

$\pi_{t+17} = 2+1 = 3\%$

$\pi_{t+18} = 3.1 = 3\%$
$\theta \to 0$

3.13 $\bar{\pi} = 2\%$

$\pi = (1-\theta)\bar{\pi} + \theta \pi_t - 0.7(u_t - u_t^n) + v_t$

$2\% = \pi_{t-1} - 0.7(u_t - u_t^n)$

$2\% = 3 - 0.7u_t + 3.5$

$-4.5\% = -0.7u_t$

$u_t = 6.429\%$

$\therefore$ Increase u_t to 6.429%

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?