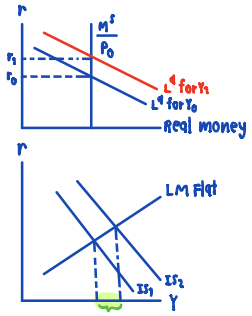
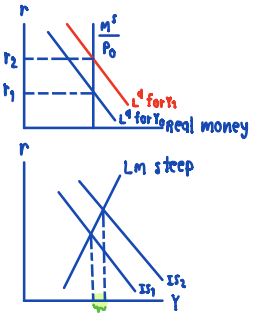
1.1 True. From the figure ,

From Highly elastic L^d to r (L_2 big)



From inelastic L^d for (L_2 small)

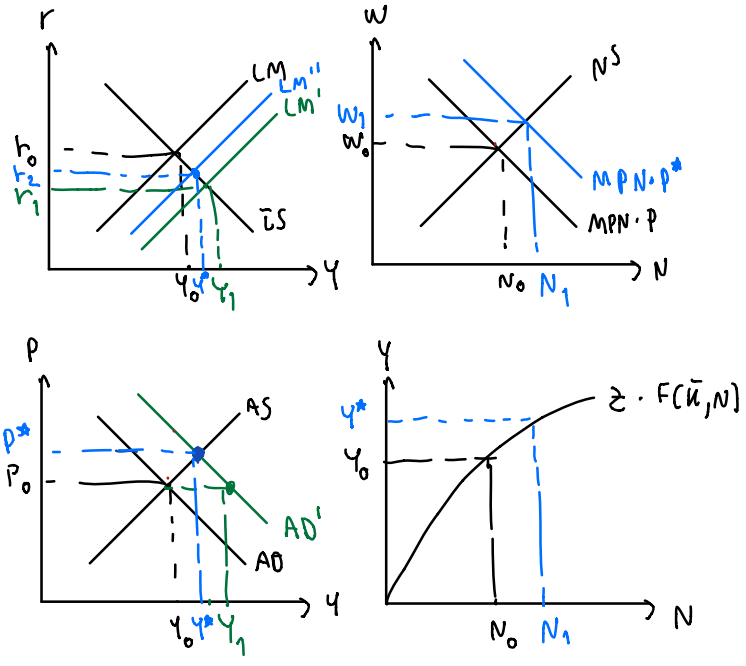


1.3 True. Due to the fact that price goes up , $\frac{MS}{P}$ will go down and then it affects that interest rate will go up. When interest rate go up , Investment and consumption level will go down

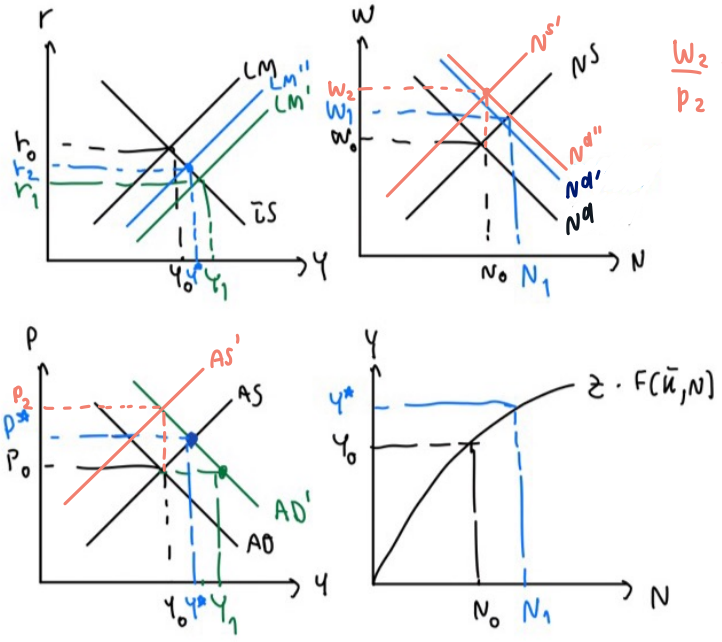
2) When money supply increases, it leads to decrease of interest rate (r_0 to r_1) that shifts LM curve to the right. In AD-AS moldel, AD is shifted to the right because of the effect of shifted LM curve.

However, at P_0 in AD-AS model, it is excess demand. Price should be set at higher position at P^*. High price affect LM curve to shift left because $\frac{M^S}{P^*}$ is lower that make interest rate higher (r_1 to r_2).

Then, output decrease from Y_1 to Y^*. Meanwhile, the effect of higher price contributes to lower realwage, but nominal wage is higher (w_0 to w_1) that shift labor demand to the right. And, labor employment is higher at the same time.



b)



$$\frac{W_2}{P_2} = \frac{W_0}{P_0}$$

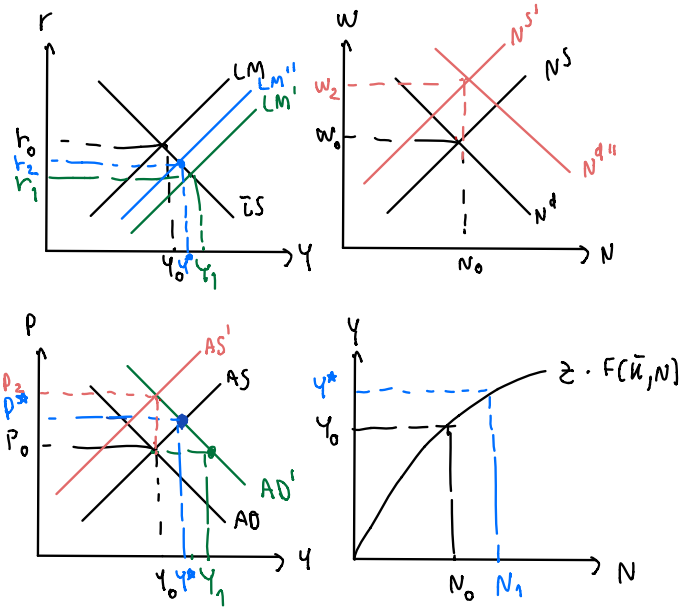
In medium run, there is a self-correcting mechanism that will bring the economy back to its potential level. As money supply increase, there is an excess demand that cause price to increase. As time pass by, people revise their price expectation. They underestimate the price at first because they didn't foresee the shock. Their new price expectation is revised upward to p^*.

As price increase, people also renegotiate for new wage, but they will ask for the wage at price = P_2 as price expectation. This is because in real term, real wage doesn't increase proportionately with price. People have to renegotiate for wage that will give them the same real wage as before getting hit by the shock. As wage renegotiated, labor supply shift from N^s to $N^{s'}$. Also, aggregated supply shift to the left because of price revised. As price increase, firm wants to produce more. Firm then hire more labor, resulted in an increase in labor demand. N^d shift to $N^{d''}$. After the self-correcting adjustment, the real wage is brought back to the same level as before shock. Economy is now return to the full potential level where the output and employment are at the natural level of Y_0 and N_0

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)	increase	decrease	no change
Consumption	increase	decrease	no change
Investment	increase	decrease	no change
Labor employment	increase	decrease	no change
Nominal wage	increase	increase	increase
Price	increase	increase	increase
Real wage	decrease	decrease	decrease
Interest rate	decrease	increase	no change

d)



If the permanent increase in money supply is anticipated, people will already know when the price increase. They know that real wage will rise if price increase. So, they require more nominal wage. Labor supply shift from N^s to $N^{s'}$, and aggregate supply shifts from AS to AS'. After, the price will increase, and shift N^d to $N^{d''}$.

As can we see the difference from unexpectation, the $N^{d'}$ curve is gone. As we observe actual output is not change. And, the trend is change faster than unexpectation

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 ($\bar{\pi}$)?

given $\theta = 0$ $u^n = 5\%$ $\vartheta_t = 0$ $\bar{\pi} = 2\%$ $u_t = 3\%$

3.1) $\pi_t^e = (1-0)\bar{\pi} + (0 \cdot \pi_{t-1})$ (pass info doesn't matter)

$\pi_t^e = \bar{\pi} = 2\%$

$\pi_t = 0.02 - 0.7(0.03 - 0.05) + 0$

$\pi_{t+1} = 0.02 - 0.7(0.03 - 0.05) + 0$

$\vdots$

$\pi_{t+5} = 0.02 - 0.7(0.03 - 0.05) + 0$

$0.034 = 3.4\%$

$\pi_t, \pi_{t-1}, \pi_{t-2}, \pi_{t-3}, \pi_{t-4}, \pi_{t-5} = 3.4\% > 2\% = \bar{\pi}$

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.)

3.2) No, because it is unlikely for theta to be zero and people will use pass information to form inflation expectation.

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?

because adaptive expectation, people are more likely to form expected inflation by assuming past information strongly relates to expected information

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%?

given $u = 3\%$, $\theta = 1$

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

$= \pi_{t-1} \Rightarrow$ past year

at π_{t+6}: $\pi_t^e = \pi_{t+5} = 0.034$

$\pi_{t+6} = 0.034 - 0.7(0.03 - 0.05) = 0.048 = 4.8\%$

$\pi_{t+7} = 0.048 - 0.7(0.03 - 0.05) = 0.062 = 6.2\%$

$\pi_{t+8} = 0.062 - 0.7(0.03 - 0.05) = 0.076 = 7.6\%$

$\pi_{t+9} = 0.076 - 0.7(0.03 - 0.05) = 0.09 = 9\%$

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?

3.6) $u_t = 5\%$ $u_t^n = 5\%$ $\bar{\pi} = 2\%$

$\pi_{t+10} = 0.09 - 0.7(0.05 - 0.05) = 0.09 = 9\%$

$\pi_{t+10} > \bar{\pi}$ no, central bank did not achieve targeted inflation

3.7) To achieve the targeted level of inflation $\bar{\pi} = 2\%$ in period π_{t+11} government has to increase unemployment rate to

$0.02 = 0.09 - 0.7(u_t - 0.05)$

$u_t = 0.15 = 15\%$

3.8) $\theta = 1$, $u_t = 5\%$

$\pi_{t+12} = 0.02 - 0.7(0.05 - 0.05) = 0.02$

$\vdots$

$\pi_{t+15} = 0.02 - 0.7(0.05 - 0.05) = 0.02$

} 2%

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?

because past information doesn't determine future inflation so theta value reduce to zero that's mean past inflation doesn't effect future inflation.

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.*

3.10) 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* ($\bar{\pi}$)?

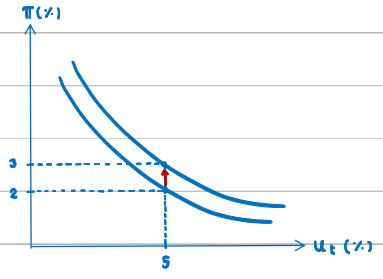
3.14) Based on the analysis given so far, do you think what could possibly determine the volatility of rate of inflation and the rate of unemployment under the presence of supply shocks? How does the credible commitment on inflation target play role in the determination of macroeconomic stability outcomes?

given at $t+16$; $\vartheta_t = 0$ $t+17$; $\vartheta_t = 1$ $t+18$; $\vartheta_t = 0$

$\theta = 0$ $\pi^e_t = \bar{\pi}$ $u^n_t = 5\%$ $u_t = 5\%$

3.10) $\pi_{t+16} = 0.02 - 0.7(0.05 - 0.05) + 0 = 0.02 = 2\%$

$\pi_{t+17} = 0.02 - 0 + 0.01 = 0.03 = 3\%$.



increase in inflation rate

shifts phillips curve upward

3.11) $\pi_{t+18} = 0.02 - 0.7(0.05 - 0.05) + 0 = 0.02$

$\pi_{t+19} = 0.02 - 0.7(0.05 - 0.05) + 0 = 0.02$ } 2%.

3.12) given $\theta = 1$ from 3.10 $\pi_{t+6} = \bar{\pi} = 2\%$.

$\pi_{t+17} = 0.02 - 0.07(0.05 - 0.05) + 0.01 = 3\%$

$\pi_{t+18} = 0.03 - 0.07(0.05 - 0.05) + 0 = 3\%$; $\pi_{t+18} \neq \bar{\pi}$

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?

3.13) $\pi_{t+19} = \pi_{t+18} - 0.7(0.05 - 0.05) + 0$

$= 0.03 - 0 + 0 = 3\%$

So, $\pi_{t+19} \neq \bar{\pi}$ to reduce inflation rate to targeted level ($\bar{\pi} = 2\%$) the government need to increase unemployment rate to

$0.02 = 0.03 - 0.7(u_t - 0.05) + 0$

$u_t = 0.064$

3.14) from the analysis 3.1 - 3.4 there is no volatility as $\pi_t = \pi_t^e$ and $u_t = u_t^n$ but if $v_t > 0$; π_t will be more than π_t^e to keep $\pi_t = \pi_t^e$ government has to adjust unemployment rate. If there are supply shock to adjust $\pi_t = \pi_t^e$ gov has to increase $u_t > u_t^n$ to keep $\pi_t = \pi_t^e$

Targeted inflation rate play important role in macroeconomic stability if π_t deviate much from $\bar{\pi}$ this mean the macroeconomy is less stable.