

WS:  $W = P^e \cdot F(u, z)$

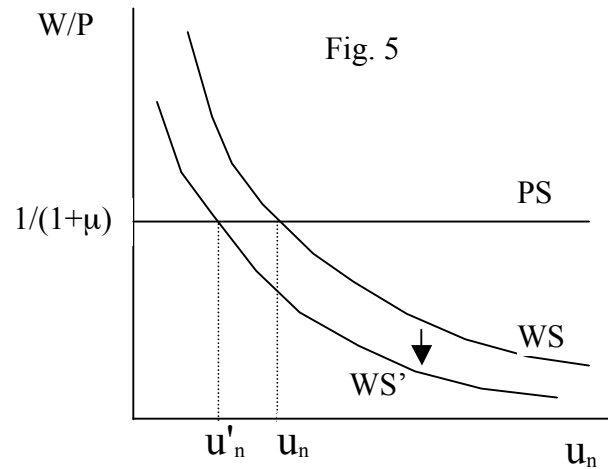
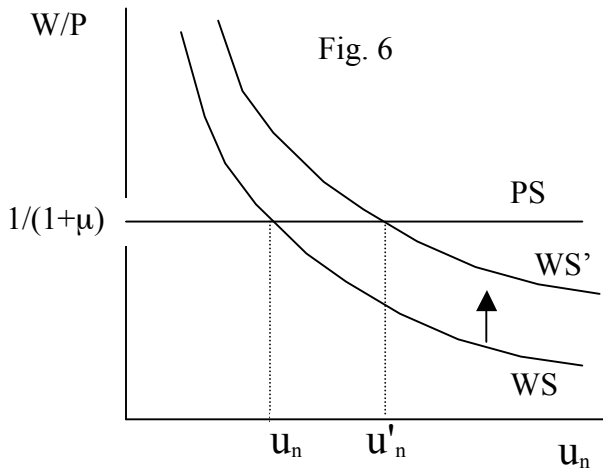
PS:  $P = W \cdot (1 + \mu)$

Figure 1. shows the equilibrium natural rate of unemployment and real wage.

a)- The new Department of Justice action reduces the market power, and the markup,  $\mu$ . This reduces the price level,  $P$ , at any level of wage rate (production cost), and then unemployment, i.e. an upward shift of PS curve, which leads to lower natural rate of unemployment, and higher real wage.(Figure 2).

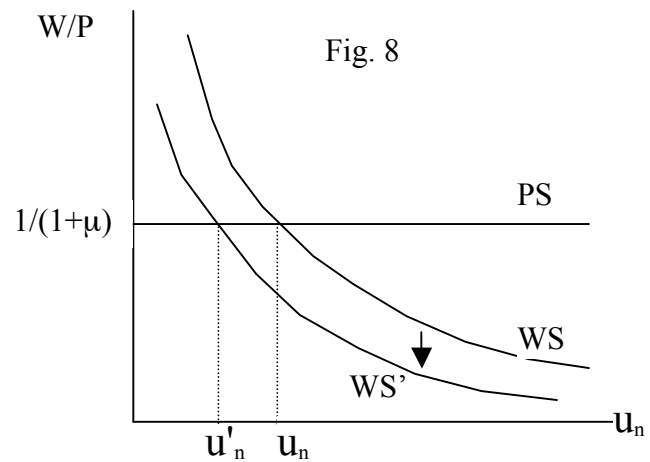
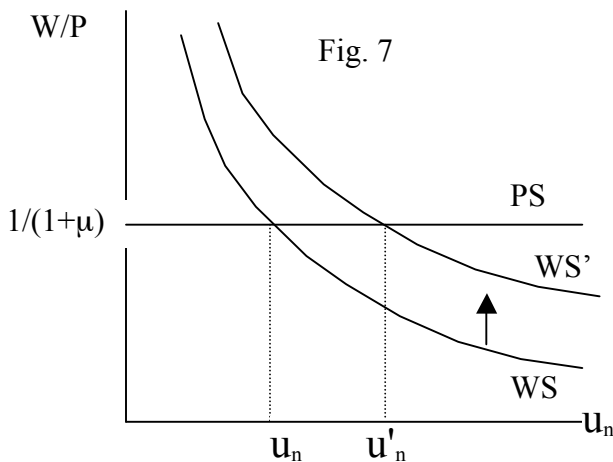
b)- Higher unionization puts upward pressure on wage rates, given any level of unemployment and expected price level. We can capture this by increasing variable  $z$ . This leads to an upward shift in wage setting relation, and causes higher natural rate of unemployment. Higher unionization increases the nominal wage rate, production cost and finally price level. The price and nominal wage rate go up at the same rate, so real wage remains the same. (Figure 3).

c)- The new requirement increases the cost of firing employees, and lowers the job separation rate, lower unemployment at any real wage rate. We can capture this effect by decreasing variable  $z$ , which shifts the WS curve down, leading to lower natural rate of unemployment, leaving the real wage rate the same. (Figure 4). Here we ignore the fact that the new policy can increase the production costs. If you want to include this effect you should increase the markup to capture the effect of the increasing production costs. This leads to downward shift of PS curve and partial off set of created employment. (Not drawn in the figure.).



d)- Internet helps with faster and more efficient information dissemination, including job market information, so job finding rate increases, i.e.  $z$  goes down, and WS curve shifts down, leading to lower natural rate of unemployment, leaving the real wage rate the same. (Figure 5). This policy lowers the wage and price level at the same rate.

e)- The new approval decreases the job finding rate, because given the new support workers take their time to find a higher paid job. Thus  $z$  goes up and WS shifts up, leading to higher natural rate of unemployment, while leaving the real wage rate the same. (Figure 6).

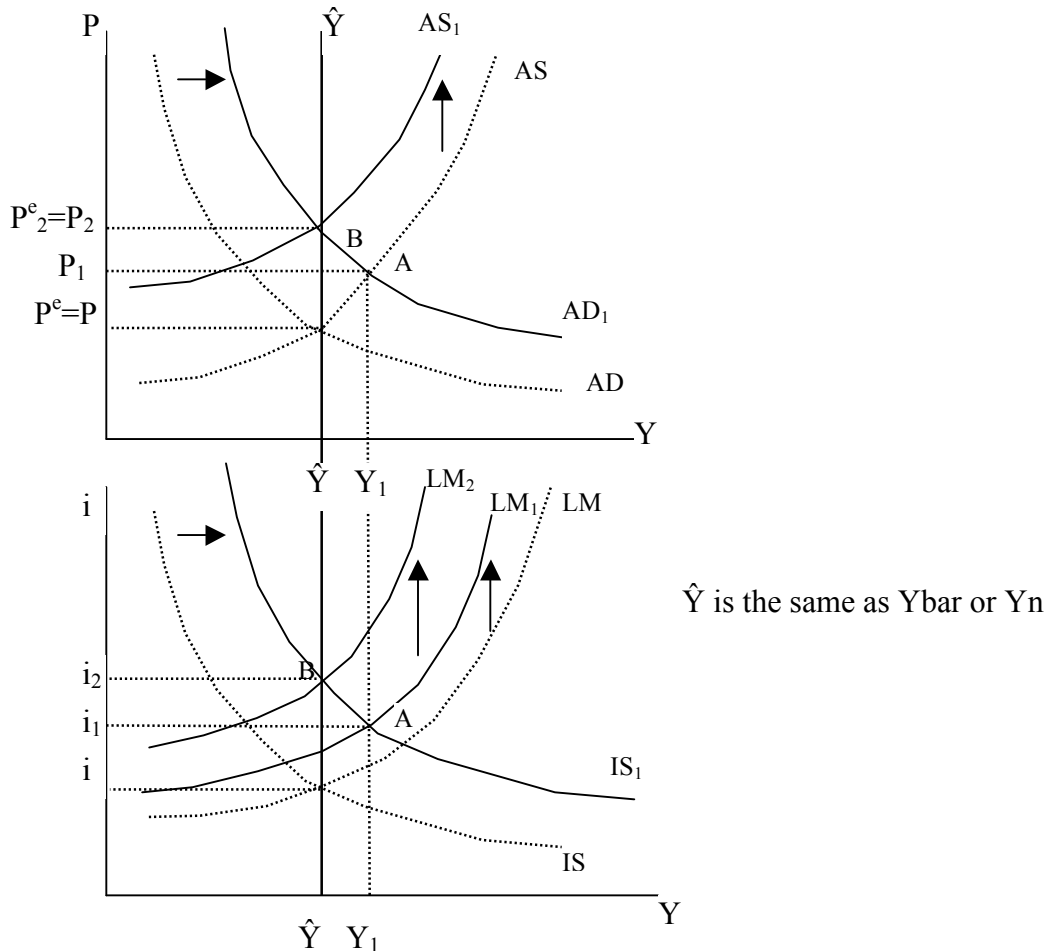


f)- The cut back slows down the efficient job market information dissemination, so job finding rate decreases, i.e.  $z$  goes up, and WS curve shifts up, leading to higher natural rate of unemployment, leaving the real wage rate the same. (Figure 7). This policy increases the wage and price level at the same rate.

g)- The new phenomenon increases labor force mobility, so job finding rate increases, i.e.  $z$  goes down, and WS curve shifts down, leading to lower natural rate of unemployment, leaving the real wage rate the same. (Figure 8). This policy lowers the wage and price level at the same rate.

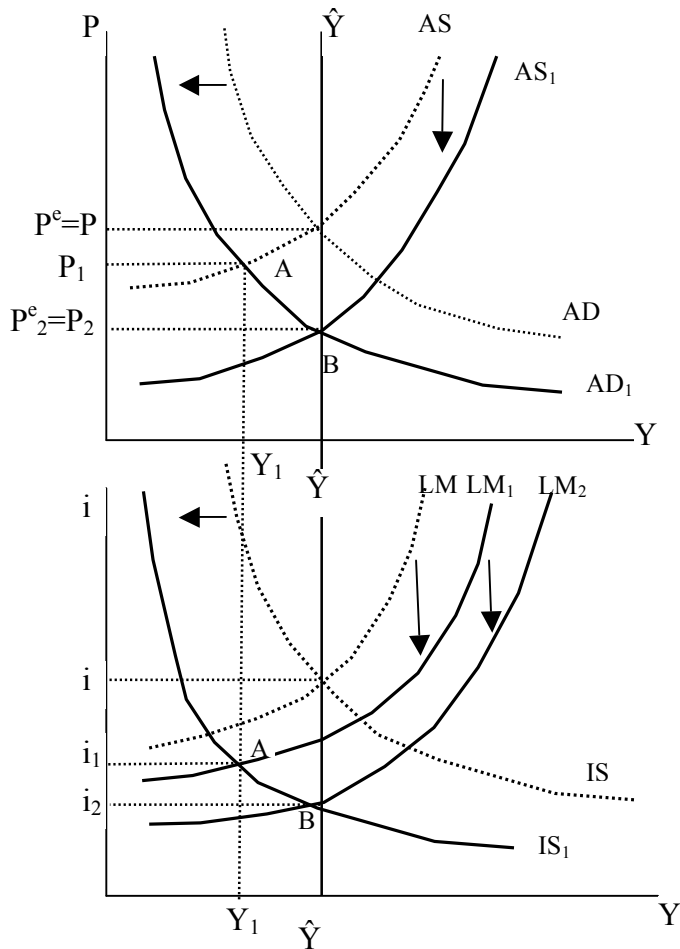
- Q1-  
 a)- True    b)- True    c)- False    d)- False. Shocks can also push economy out of its equilibrium level.  
 e)- True    f)- False. Fiscal policy can change interest rate, therefore investment in medium run.  
 g)- False. Price can go up or down in medium run.

Q2-



a)- Increase in consumer confidence, increases the consumption at any level income shifts the IS curve to the right ( $IS_1$ ), which is equivalent to a right shift in AD curve ( $AD_1$ ). But as soon as AD starts shifting right, price level increases, which reduces the supply of real money balances, equivalent to an upward shift of LM curve to  $LM_1$ . Therefore, in the short run, equilibrium output, interest rate, and price level would be higher ( $Y_1, i_1, P_1$ , respectively.) Point A is the short run equilibrium. Notices that in the short run, the expected price level,  $P^e$ , is below the equilibrium price level,  $p_1$ . But over time workers adjust their expected price level upward, asking for higher wage rate, which leads to higher production costs and prices at any level of output, therefore aggregate supply curve start shifting upward. Increasing price level shrinks the real money supply constantly, which would be together with shifting LM curve upward. Finally at point B, economy reaches to its new medium run equilibrium, where, all medium run requirements are satisfied, i.e.  $P^e=P, Y=\hat{Y}$  (potential output level, or natural level of output or  $Y_n$  in Blanchard's terminology), and  $u=u_n$  (natural rate of unemployment).

b-



$\hat{Y}$  is the same as  $\bar{Y}$  or  $Y_n$

Increase in taxes, decreases the consumption at any level income shifts the IS curve to the left ( $IS_1$ ), which is equivalent to a left shift in AD curve ( $AD_1$ ). But as soon as AD starts shifting left, price level falls, which increases the supply of real money balances, equivalent to a downward shift of LM curve to  $LM_1$ . Therefore, in the short run, equilibrium output, interest rate, and price level would be lower ( $Y_1, i_1, P_1$ , respectively.) Point A is the short run equilibrium. Notices that, in the short run the expected price level,  $P^e$ , would be above the equilibrium price level,  $p_1$ . But over time workers adjust their expected price level downward, giving up for higher wage rate, which leads to lower production costs and prices at any level of output, therefore aggregate supply curve start shifting downward. Decreasing price level expands the real money supply constantly, which would be together with further shifting LM curve downward. Finally at point B, economy reaches to its new medium run equilibrium, where, all medium run requirements are satisfied, i.e.  $P^e=P, Y=\hat{Y}$  (potential output level, or natural level of output or  $Y_n$  in Blanchard's terminology), and  $u=u_n$  (natural rate of unemployment).

8-

i)-

$$Y = C + I + G = 100 + 0.7(Y - 100) + 0.1Y - 100i + 100 = 130 + 0.8Y - 100i$$

$$\rightarrow \text{IS: } Y = 650 - 500i$$

$$\text{LM: } 1000/P = 4Y - 100i \quad \rightarrow \quad i = 0.04Y - 10/P$$

ii)- Combining IS and LM curves by eliminating the interest rate :

$$Y = 650 - 500 * (0.04Y - 10/P) \quad \rightarrow \quad \text{AD: } Y = 30.95 + 238.095/P$$

iii)-

$$\text{WS: } W = P^e Y/330$$

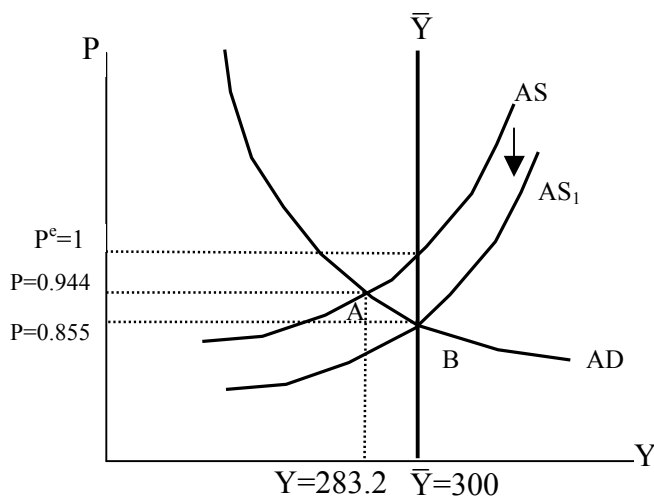
$$\text{PS: } P = W(1 + \mu) = 1.1W \quad \rightarrow \quad \text{AS: } P = P^e Y/300$$

iv)- If we substitute  $P = P^e$  in the AS curve:  $\bar{Y} = 300$ .

$$\text{v)- } P^e = 1 \rightarrow \text{AS: } P = Y/300 \text{ and AD: } Y = 30.95 + 238.095/P \rightarrow 300P = 30.95 + 238.095/P$$

$$P = 0.103 + 0.79365/P \rightarrow P = 0.944, Y = 283.185 \leftarrow \text{Short run equilibrium (point A)}$$

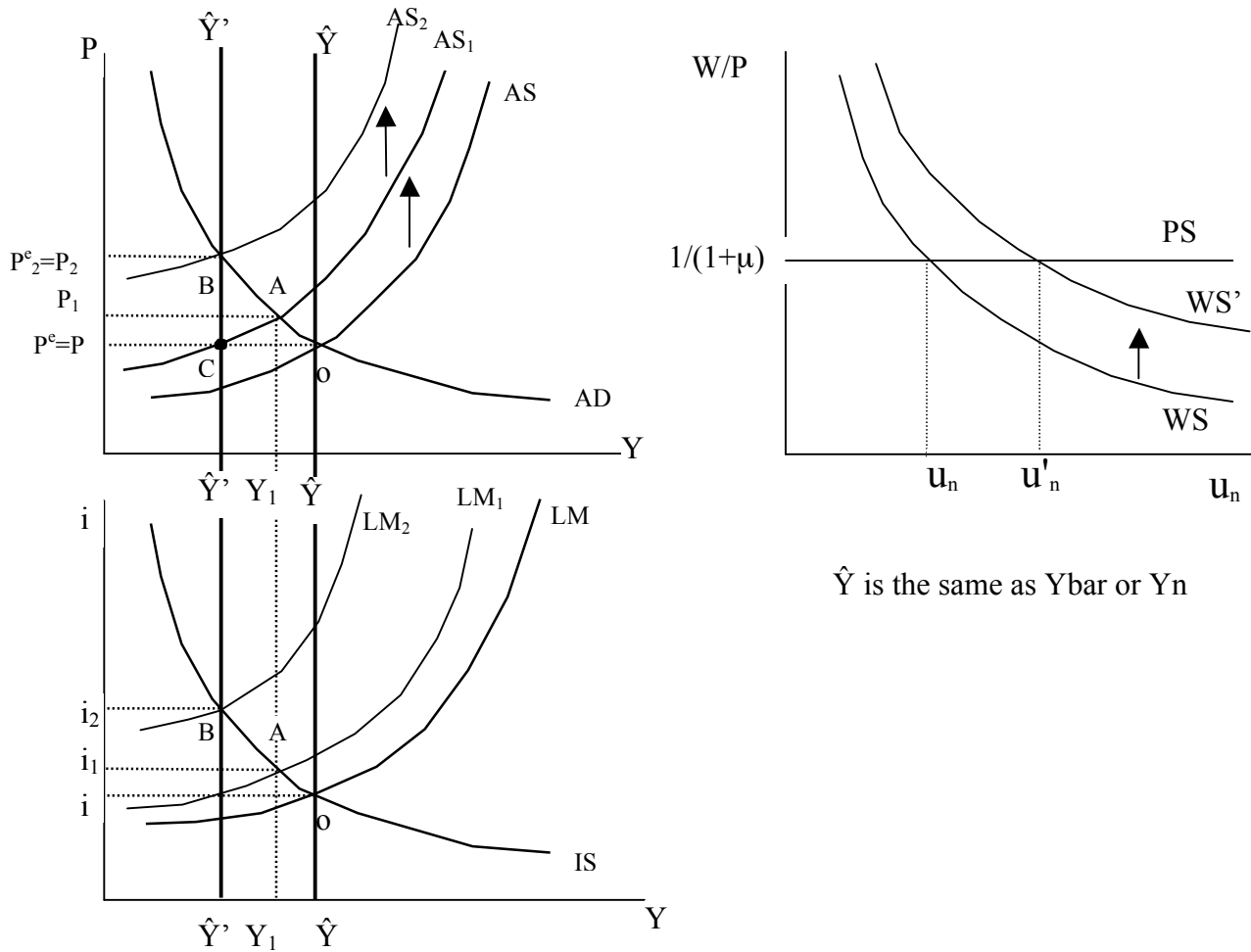
For the long run equilibrium (point B) substituting  $Y = 300$  in AD curve:  $P = 0.885$



vi)- Point A is the short run equilibrium, and point B is the medium run equilibrium. Economy is in recession, because  $Y < \bar{Y}$ , and  $P < P^e$ .

vii)- In medium run workers adjust their expected price level downward, because it turned out that actual price level is less than expected price level. Therefore, the AS curve shifts down, as lower expected price level leads lower wage, lower production cost, and lower price level.

Q3

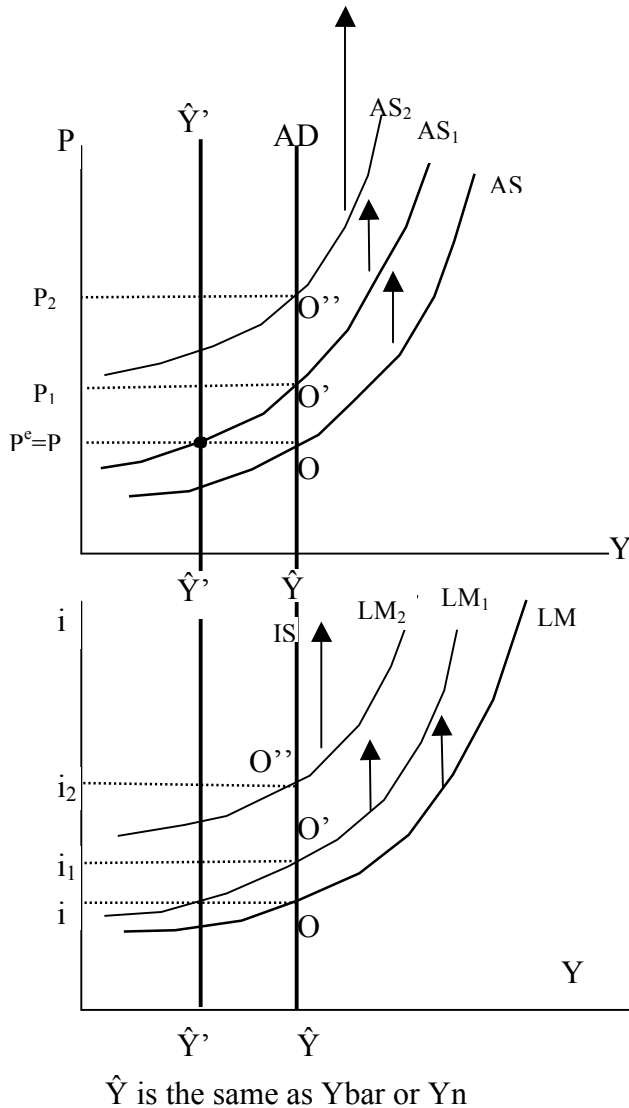


a)- The new approval decreases the job finding rate, because given the new support, the workers take their time to find a higher paid job. Thus  $z$  goes up and  $WS$  shifts up, leading to higher natural rate of unemployment,  $u'_n > u_n$ , while leaving the real wage rate the same. When the natural rate of unemployment is higher, it means potential output level decreases,  $Y'bar < Ybar$  (or  $\hat{Y}' > \hat{Y}$  in the graph). Going back to the IS/LM and AS/AD curve, the  $Ybar$  vertical line shifts to left. Now the question is what would be the short and long run equilibrium points. Increase in  $z$  shifts  $AS$  curve up, because it leads to higher nominal wage rate, production cost, and price level, at any level of output. But what would be the size of the shift? For this we have to notice the point  $(Ybar, P^e)$  must be on the  $AS$  curve, i.e. it must go through point  $C$  (See the  $AS_1$  curve). Therefore, the short run equilibrium would be point  $A$ , with lower output,  $Y_1$ , and high price level,  $P_1$ . Notice two points: first, the  $LM$  curve shifts up to  $LM_1$  curve, due to the increase in price level even in short run, which reduces the supply of real money balances. This shift increases the interest rate to  $i_1$ . Second, notice that the expected price level is still at  $P$  level, below the new level  $P_1$ .

In the medium run, people adjust the expected price level upward to catch up with the reality of the higher price level. This means upward adjustment of the nominal wage rate, production cost, and price level continuously, or upward and gradual shifts of the  $AS$  curve up to the point  $B$ , the medium run equilibrium. Point  $B$  in a medium equilibrium, because it has all three requirements of medium run equilibrium, i.e.  $Y=Ybar$ ,  $P^e=P$ ,  $u=u_n$ . Correspondingly, the continuous, and gradual increases in the price level shrink the supply of real money, and shift  $LM$  curve from  $LM_1$  to  $LM_2$ .

- d)- This case was discussed in class extensively, where  $\mu$  decreases (opposite case of increase in oil price).
- b)- A decrease in price of oil affects the economy exactly like the case of technological progress that was discussed in class, where  $\mu$  decreases.
- c)-  $\mu$  decreases, like case of technological progress.
- e)- When labor mobility increases, frictional unemployment tends to decrease, i.e. the WS curve shifts down, which would be opposite case of part (a).

Q5-



b)- If investment is not a function of interest rate, the IS curve is vertical, because the output would not be a function of interest rate.

c)- LM curve is as usual, because demand for money is still a function of interest rate.

d)- AD curve would be vertical, because normally increase in price level should lead to lower supply of real money, higher interest rate, lower investment, therefore lower output. However, here the investment-interest rate relation doesn't exist. Therefore, change in price level cannot change the output.

e)- Due to the adverse shock the output capacity,  $Y_{bar}$ , decreases (shift to the left) and natural rate of unemployment rises, as a result, the AS curve shifts up and equilibrium point goes from O to O'.

f)- Over time people adjust their price expectation upward, therefore the AS curve shifts upward even further, but this leads to further increase in price level and NO decrease in output. So price and interest rate constantly go up (AS and LM curves shift up constantly.)

a)- This case may happen when output is very very low, and interest rate is too high, and the economy is located pretty much to the left. In that region IS curve tend to become steeper and more vertical. In that area output and interest rate can go further down.

Q7-

a)-

For calculating the natural rate of unemployment  $P=P^c \rightarrow Y=Y_n$ .

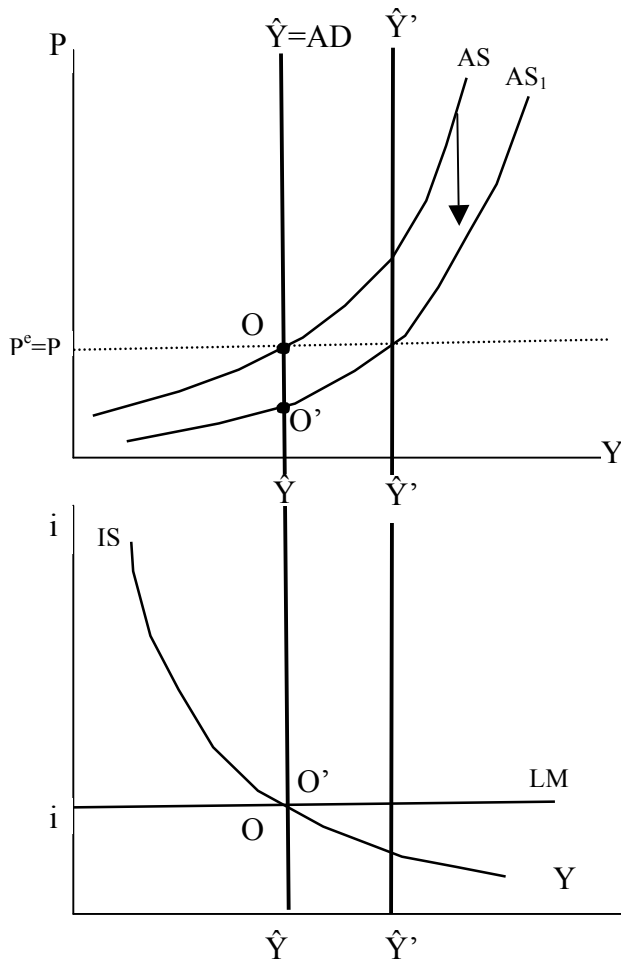
If we start from medium equilibrium,  $Y_n=c(M_0 - P_0)$  or  $P_0 = M_0 - Y_n/c$ .

b)-  $P^c = P_0 \rightarrow Y=2cM_0 - cP_0 - cdY + cdY_n \rightarrow Y=Y_n + (c/(1+cd)) * M_0$

c)- Investment goes up because interest rate is lower.

d)- In the medium run investment goes back to its original value, because interest rate goes back to its original level.

Q6-



$\hat{Y}$  is the same as  $Y_{bar}$  or  $Y_n$

a)- The LM curve would be flat (horizontal).

b)- The IS curve is as usual, because investment is still a function of interest rate.

c)- AD curve would be vertical. See the graph.  
(Note that I assumed that originally equilibrium was at point O, then due to a supply side shock output capacity shifts to the right, and output would be below capacity.

d)- If money supply increases, the LM curve doesn't shift, So the recession remain in short and medium run both.



Q4

a)- Money is neutral, because eventually (i.e. in medium and long run) it does not affect the so called real side of the economy. This means in medium run increase in money supply cannot change real variables, like real output/income, real consumption, real investment, real export and import, unemployment, and as you will see in future, real interest rate and real exchange rate. On the other, increase in money supply can affect only price level, and in turn all nominal variables, like nominal real output/income, nominal consumption, nominal investment, nominal export and import, and as you will see in future, nominal interest rate and nominal exchange rate.

Because, generally, we have defines in very early classes:

$$\text{Nominal variable} = \text{Price level} * \text{Real variable}$$

Given a fixed real variable, if the price goes up, the variable in nominal term increases.

Meanwhile, keep in mind that money can still affect real variables in short run, as we have seen in class.

But monetary policies are useful, because, they can affect real variables in short run, so we can use the policies to stimulate the economy, when it is in recession. For example, if economy is hit by a supply side shock (like increase in price of oil) and slipping to a recession, by an expansionary monetary policy the negative impact of the shock can be counteract.

b)- Fiscal policies can affect real variables in medium, and long run (or say permanently). Tax cuts can change real consumption, and real investment in medium run, even though the real output/income, and unemployment remain the same. Also, government spending can change real investment in medium run. So, fiscal policies are not neutral.

c)- Not all government policies, but only fiscal and monetary policies cannot change the natural level of output (output capacity). On the other hand supply side policy can affect the natural level of output (output capacity) very well. For example policies related to unemployment insurance system; unionization, pricing policies, and anti-trust laws; minimum wage and other wage related laws; and policies which affect the flow of information in labor market like opening unemployment offices. You should be able to discuss the impact of factors like these on the economy, in short and medium run.