SOLUTIONS CHAPTER 10

1.a) TRUE. The AS relation is defined as $P = P^e(1 + \mu)F(u, z)$, where $u = 1 - \frac{Y}{L}$. Hence, $\Delta^+ Y \Rightarrow \Delta^- u \Rightarrow \Delta^- u \Rightarrow \Delta^+ F(u, z) \Rightarrow \Delta^+ P$. The AS relation summarizes the labor-market equilibrium. As he output increases, unemployment decreases. This gives a stronger bargaining position to workers, who will obtain higher nominal wages. Facing higher labor costs, firms respond by increasing output prices.

1.b) TRUE. By definition, the natural level of output is obtained when expected prices are equal to actual prices. It is thus the value of Y that solves $F(1 - \frac{Y}{L}, Z) = \frac{1}{1+\mu}$.

1.c) FALSE. The AD relation yields the output-price pairs that solve the following two equations:
$$Y = C(Y - T) + I(Y, i) + G$$
$$\frac{M}{P} = YL(i)$$
An increase in P results in a lower real money supply, which brings about a higher interest rate for any Y. As the interest goes up, investment decreases, resulting in a lower output level.

1.d) FALSE. There are other factors that can affect the natural rate of output. Recall that the latter is defined as Y_n such that $F(1 - \frac{Y_n}{L}, Z) = \frac{1}{1+\mu}$. For instance, a stricter enforcement of anti-trust policy will reduce the markup factor μ, thus increasing Y_n. Also, increased unemployment benefits will increase z, thereby reducing Y_n.

1.e) TRUE. In the medium run, an increased money supply will be matched by a proportional increase in prices, thus leaving the real money supply unchanged.

1.f) FALSE. In the medium run, an increase in government spending will be matched by an equivalent decrease in investment. This is why the output level is at its natural level. The interest rate remains permanently higher however.

1.g) FALSE. It depends what caused the shock. If there is a "structural" shock, such as one affecting the intensity of competition or the unemployment benefits, then the natural rate of output may change in the medium run. As for the price level, it will change even in the medium run following a change in the money supply.

2)SPENDING SHOCKS AND THE MEDIUM RUN
2.a)Increased consumer confidence Increased consumer confidence implies that consumers will increase their demand for consumption at any income level Y. Consumption function $C(Y - T)$ takes on higher values for any given $Y - T$. The goods market equilibrium is (see graphic 10.2.1)

(1) $$ZZ: \quad Z = C(Y - T) + I(Y, i) + G$$

(2) $$ZZ': \quad Z = C'(Y - T) + I(Y, i) + G$$

where $C'(Y - T) > C(Y - T)$. As for the goods and financial market equilibrium, it is given by the IS-LM equilibrium (see graphic 10.2.2):

(3) $$IS: \quad Y = C(Y - T) + I(Y, i) + G$$

(4) $$LM: \quad \frac{M}{P} = YL(i)$$

The initial equilibrium is at point A. With increased consumer confidence, the IS curve shifts to the right, representing the fact that for any interest rate level, there is a higher output level. Introducing now the labor market into the goods and financial market, we get the AS-AD equilibrium (see graphic 10.2.3):

$$(5) \qquad AS: \quad P = P^e(1-\mu)F(1 - \frac{Y}{L}, Z)$$

$$(6) \qquad AD: \quad Y = C(Y-T) + I(Y,i) + G \text{ and } \frac{M}{P} = YL(i)$$

Increased consumer confidence shifts the AD curve to the right since for any price level, there corresponds a higher output. Note that in the short run, we end up with a higher price level. This is because with a higher output, employment goes up, thus allowing workers to negotiate higher nominal wages. Increased labor costs will, in turn, lead firms to set higher prices. But higher prices cause the real money supply to decrease. This shifts the LM curve up somewhat, though not enough to bring the output back to Y_n, otherwise the price would not increase in the first place. In the short run we have both higher output and price levels at A'.

Note that output at A' is higher than Y_n because people expected lower prices. In time, people's expectations will adjust to those higher price levels. This will shift the AS curve upward until people's expected prices equal actual prices. At that point, we have a new medium-run equilibrium at point A" for which the output level is back to the natural one, while the price level is higher.

Note also that as prices increase, the real money supply decreases, thus shifting the LM curve further up. We end up with a permanently higher interest rate at A". In fact, since the output is constant in the medium run, the higher consumption level is compensated for by a lower investment level in the composition of demand.

2.b) Increased taxes Increased taxes imply that consumers reduce their demand for consumption goods for any given output level. In the goods market, demand curve ZZ shifts down (see graphic 10.2.4).

$$(7) \qquad ZZ: \quad Z = C(Y-T) + I(Y,i) + G$$

$$(8) \qquad ZZ': \quad Z = C(Y-T') + I(Y,i) + G$$

where $T' > T$. Higher taxes lead to lower output, all else equal. The IS curve shifts to the left on the goods and financial market (see graphic 10.2.5):

$$(9) \qquad IS: \quad Y = C(Y-T) + I(Y,i) + G$$

$$(10) \qquad LM: \quad \frac{M}{P} = YL(i)$$

where $T \Rightarrow IS$, $T' \Rightarrow IS'$ with $T' > T$. The initial equilibrium is at point A. The goods, financial and labor markets equilibrium is characterized by (see graphic 10.2.6):

$$(11) \qquad AS: \quad P = P^e(1-\mu)F(1 - \frac{Y}{L}, Z)$$

$$(12) \qquad AD: \quad Y = C(Y-T) + I(Y,i) + G \text{ and } \frac{M}{P} = YL(i)$$

Increased T shifts the AD curve to the left, corresponding to a lower output for any price level. At the new equilibrium A', the output level is lower than the natural one. This causes prices to go down because in order to reduce output, employment must go down. With the associated increase in the unemployment rate, firms' bargaining position improves, thus leading to lower nominal wages. With lower labor costs, firms are able to set lower output prices.

Note that with lower prices, the real money supply goes up, thus shifting the LM curve down slightly. This partially cancels out the effects of the higher taxes on output.

At A', the price level is lower than the expected one. People's expectations adjust to this by lowering expected prices. This shifts the AS curve to the right. The economy moves along curve AD' with increasing output and decreasing prices. In the medium run, expected and actual prices coincide. As people correctly anticipate prices, the output level becomes equal to the natural one.

Note that as the price goes down towards its medium-run level, the LM curve keeps shifting down. This is because a lower price level implies a higher real money supply, or lower interest rate. It is with this lower interest rate that the investment level can increase and compensate the drop in consumption, which re-establishes the output level to the natural one.

10.3) SUPPLY SHOCKS AND THE MEDIUM RUN

a) Increased unemployment benefits An increase in unemployment benefits will give more bargaining power to workers, thereby increasing the nominal wage level obtained for any unemployment rate. The wage setting relation is:

(13)
$$WS: \quad W = P^e F(u, z).$$

while the price setting relation is

(14)
$$P = (1 + \mu)W.$$

Increasing unemployment benefits shifts $F(u, z)$ up. Assuming that $P^e = P$, in graphic 10.3.1, this results in a higher natural rate of unemployment, or a lower natural output level, since $u_n = 1 - \frac{Y_n}{L}$. Looking at the equilibrium in the goods, financial and labor markets, we have (see graphic 10.3.3):

(15)
$$AS: \quad P = P^e(1 - \mu)F(1 - \frac{Y}{L}, Z)$$

(16)
$$AD: \quad Y = C(Y - T) + I(Y, i) + G \text{ and } \frac{M}{P} = YL(i)$$

Increased unemployment benefits shifts the AS curve to the left. In the short run, we get a lower output and higher price level at A'. A higher price level lowers the real money supply. Therefore, the LM curve shifts up, resulting in higher interest rates (see graphic 10.3.2):

(17)
$$IS: \quad Y = C(Y - T) + I(Y, i) + G$$

(18)
$$LM: \quad \frac{M}{P} = YL(i)$$

In the medium run, people's expectations about prices are revised upwards, up to equilibrium point A". At that point, the output level is at its new, lower natural level. Prices are permanently higher, reflecting the higher wage level negotiated by workers, which led firms to raise prices.

Note that as prices increase, the real money supply contracts: the LM curve shifts up to eventually reach an equilibrium at AS". In the medium run, the interest rate stays higher. The investment level is unambiguously lower: in part because of the lower output, in part because of higher interest rates.