Problem Set No 2

Econ 14.05:
Intermediate Applied Macroeconomics

1. **Understanding the Eichengreen and Sachs model.**

   Note: To avoid confusion between the parameters and the difference operator I have replaced the parameter d in equation (2) by the Greek letter δ. The equations are:

$$m - p = y - hi \tag{1}$$
$$y = -\delta(p - e - p^*) - bi \tag{2}$$
$$p = \bar{p} \tag{3}$$
$$i = i^* \tag{4}$$
$$sdr + (1-s)dr^* = 0 \tag{5}$$
$$e = g^* - g \tag{6}$$
$$m = r - g - v \tag{7}$$

   (a) The economic meaning is straightforward. Equation (1) represents the equilibrium in the money market. That is, the equation of an LM curve. Equation (2) describes the equilibrium in the goods market (IS). Equation (3) is telling that we are considering prices as fixed (this is equivalent to an horizontal AS curve). Equation (4) represents interest rate parity with static expectations. Equation (5) tells that the total amount of gold in the economy is fixed. Equation (6) tells us that the exchange rate can be represented as the ratio of the gold prices in both countries. Equation (7) finally tells us that either an increase in the amount of gold reserves, a devaluation, or a change in the gold backing ratio affect the money supply.

   (b) As we noted above, equations (1) and (2) represent an IS-LM system. We can solve for the equilibrium level of income and interest rate (as function of the other parameters) by plugging one into the other. Reordering equation (1) we get:

$$i = \frac{1}{h}\{y - m + p\}$$

   replacing in (2), and re-ordering we obtain:

$$y = \frac{h}{h+b}\left\{\delta(g^* - g + p^* - p) + \frac{b}{h}(m - p)\right\} \tag{8}$$

   We can do the same thing for the interest rate by plugging equation (2) into equation (1). In this case, we obtain:

$$i = \frac{1}{h+b}\left\{\delta\left(g^* - g + p^* - p\right) - (m - p)\right\} \tag{9}$$

   which is what we wanted to prove.

   The analogous equations for the foreign country are:

$$y^* = \frac{h}{h+b}\{\delta(g - g^* + p - p^*) + \frac{b}{h}(m^* - p^*)\} \tag{10}$$

$$i^* = \frac{1}{h+b}\{\delta(g - g^* + p - p^*) - (m^* - p^*)\} \tag{11}$$

(c) i. $dg < 0$, $dv = 0$, $dg^* = 0$, $dv^* = 0$. In this case equation (7) tells us that

$$dm = dr - dg$$

and analogously, for the foreign county

$$dm^* = dr^*$$

The changes in output of the local and foreign country will then be given by

$$dy = -\frac{\delta}{\alpha}dg + \frac{b}{h\,\alpha}dm \tag{12}$$

$$dy^* = \frac{\delta}{\alpha}dg + \frac{b}{h\,\alpha}dm^* \tag{13}$$

Given that $dr^* = -(s/(1-s))dr$, we get that:

$$dm^* = -\frac{s}{1-s}(dm + dg) \tag{14}$$

Equation (9) implies that

$$di = \frac{1}{h+b}\{-\delta\,dg - dm\}.$$

Equalizing the change in interest rate in the local and foreign countries, we get that:

$$-\delta\,dg - dm = \delta\,dg - dm^*$$

Replacing dm^* from equation (14) we obtain:

$$dm = -(2\,\delta\,(1-s) + s)dg$$

which plugged into equation (12) finally tells us that:

$$dy = -\frac{h\,\delta + b(2\delta\,(1-s) + s))}{h+b}dg \tag{15}$$

Replacing the equation for dm into equation (14), and plugging this into equation (13), we finally get

$$dy^* = \frac{h\,\delta - b\,s(1-2\delta)}{h+b}dg \tag{16}$$

Similarly, we obtain:

$$di = di^* = \frac{2\delta(1-s) + s - \delta}{h+b}dg$$

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ii. $dg = dg^* < 0$, $dm = dm^* = 0$. This is very straightforward. By taking the differential of equations (8), and (10) we get that the effect of the simultaneous devaluations cancel out, and the effect of the monetary expansion is also zero. Therefore:

$$dy = dy^* = 0$$

The same happens when we take the differential of equations (9), and (11). That is:

$$di = di^* = 0$$

Therefore, nothing happens in this economy.

2. *Application of large-country model. Write your answers in a few sentences.*

   (a) When France adopted a low value of its currency, it attracted gold to France. This caused other countries to lose gold and have a monetary contraction. If France had allowed its money supply to expand, that would have offset the contraction in other countries. But France sterilized the gold inflow. In the large-country Mundell-Fleming model, France raised v to offset the fall in g. Recall that $m = r - g - v$. The effect of raising v was that the gold inflow did not increase m in France. It had no effect on France, and it depressed economic activity in other countries.

   (b) France maintained the value of the franc after most countries had devalued in 1933. In terms of our model, G^* had fallen. The real exchange rate, $(G^*P^*)/(PG)$, or in logs $(g^* + p^* - g - p)$, had fallen. In other words, the devaluation of other currencies led to an appreciation of the French currency. The French IS curve shifted inward causing a contraction. As French net exports declined, the French lost gold. Keeping g and v constant, the French had a monetary as well as a fiscal contraction.

   (c) The French maintained a constant policy, keeping its currency on gold at the same rate, but the world had changed around France. The French franc went from being undervalued before 1933 to being overvalued afterwards. The undervaluation of the French franc before the Great Depression had a depressing effect on other countries, but the overvaluation of the franc after 1933 hurt only France. France finally abandoned gold in 1936.

   (d) England was condemned in 1931 for a "beggar thy neighbor" policy. The British devalued. As we showed in our model, this exerted a contractionary effect on other countries if the British also avoided a loss of gold. The British kept their interest rate high for six months after devaluation in an effort not only to keep gold, but to recover the gold they had lost. Only in the spring of 1932 when the Bank of England lowered its discount rate did the British devaluation stop becoming harmful to other countries.

3. *Analysis of Labor Market Fluctuation with Friction.*

   (a) . Because nominal wages are fixed, the real wage is determined by fluctuations in the price level. If the price level is below the level that would equilibrate labor supply and labor demand, we can get involuntary unemployment (i.e. there are not enough jobs available for the number of people who would like to work at the going wage). The situation is depicted in Figure 1.

   (b) In this model of imperfect competition, producers set price above marginal cost. As the nominal wage changes, their cost may increase, but as long as their costs remain below the price that they are charging (which is fixed in this model), they will continue to meet demand at the prevailing price. If wages increase such that price is below marginal cost, however, they will refuse to produce their goods. So they will produce until the point that $P = MC$, or $Y^{\max}$. See Figure 2. In this model, we are always in equilibrium in the labor market. Wages can adjust to account for market