

## Chapter 4

# Cooperation between European Central Bank, American Central Bank, German Labour Union, and French Labour Union

### 1. The Model

1) Introduction. As a starting point, take the output model. It can be represented by a system of three equations:

$$Y_1 = A_1 + 0.5\alpha M_{12} - 0.5\beta M_3 - \lambda W_1 - \mu W_2 \quad (1)$$

$$Y_2 = A_2 + 0.5\alpha M_{12} - 0.5\beta M_3 - \lambda W_2 - \mu W_1 \quad (2)$$

$$Y_3 = A_3 + \alpha M_3 - \beta M_{12} + \nu W_1 + \nu W_2 \quad (3)$$

Here  $Y_1$  denotes German output,  $Y_2$  is French output,  $Y_3$  is American output,  $M_{12}$  is European money supply,  $M_3$  is American money supply,  $W_1$  is German nominal wages, and  $W_2$  is French nominal wages. The endogenous variables are German output, French output, and American output.

At the beginning there is unemployment in Germany, France and America. More precisely, unemployment in Germany is high, and unemployment in France is low. The policy makers are the European central bank, the American central bank, the German labour union, and the French labour union. The targets of policy cooperation are full employment in Germany, full employment in France, and full employment in America. The instruments of policy cooperation are European money supply, American money supply, German nominal wages, and French nominal wages. There are three targets and four instruments, so there is one degree of freedom. As a result, there is an infinite number of solutions. In other words, cooperation between the European central bank, the American central bank, the German labour union, and the French labour union can achieve full employment in Germany, France and America.

Of course there are many more potential targets of policy cooperation:

- balancing the budget in Germany, France and America
- balancing the current account in Germany, France and America
- high investment in Germany, France and America
- preventing foreign exchange bubbles
- preventing stock market bubbles
- and so on.

To sum up, in a sense, policy instruments are abundant. And in another sense, policy instruments are scarce.

2) The policy model. On this basis, the policy model can be characterized by a system of three equations:

$$\Delta Y_1 = 0.5\alpha\Delta M_{12} - 0.5\beta\Delta M_3 - \lambda\Delta W_1 - \mu\Delta W_2 \quad (4)$$

$$\Delta Y_2 = 0.5\alpha\Delta M_{12} - 0.5\beta\Delta M_3 - \lambda\Delta W_2 - \mu\Delta W_1 \quad (5)$$

$$\Delta Y_3 = \alpha\Delta M_3 - \beta\Delta M_{12} + \nu\Delta W_1 + \nu\Delta W_2 \quad (6)$$

Here  $\Delta Y_1$  denotes the initial output gap in Germany,  $\Delta Y_2$  is the initial output gap in France,  $\Delta Y_3$  is the initial output gap in America,  $\Delta M_{12}$  is the required change in European money supply,  $\Delta M_3$  is the required change in American money supply,  $\Delta W_1$  is the required change in German nominal wages, and  $\Delta W_2$  is the required change in French nominal wages. The endogenous variables are  $\Delta M_{12}$ ,  $\Delta M_3$ ,  $\Delta W_1$  and  $\Delta W_2$ .

We now introduce a fourth target. We assume that the reduction in German nominal wages should be equal in size to the increase in French nominal wages:

$$\Delta W_1 + \Delta W_2 = 0 \quad (7)$$

Put another way, we assume that the price level of European goods should be constant. Add up equations (4) and (5), taking account of equation (7), to find out:

$$\Delta Y_1 + \Delta Y_2 = \alpha\Delta M_{12} - \beta\Delta M_3 \quad (8)$$