Chapter 2
Target System B

1. The Model

This chapter is based on target system B. The targets of the European central bank are zero inflation and zero unemployment in each of the member countries. The model of unemployment and inflation can be characterized by a system of four equations:

\[ u_1 = A_1 - M \]  \hspace{1cm} (1)  
\[ u_2 = A_2 - M \]  \hspace{1cm} (2)  
\[ \pi_1 = B_1 + M \]  \hspace{1cm} (3)  
\[ \pi_2 = B_2 + M \]  \hspace{1cm} (4)

An increase in European money supply lowers unemployment in Germany and France. On the other hand, it raises inflation there.

The targets of the European central bank are zero inflation and zero unemployment in each of the member countries. The instrument of the European central bank is European money supply. There are four targets but only one instrument, so what is needed is a loss function. We assume that the European central bank has a quadratic loss function:

\[ L = \pi_1^2 + \pi_2^2 + u_1^2 + u_2^2 \]  \hspace{1cm} (5)

\( L \) is the loss to the European central bank caused by inflation and unemployment in each of the member countries. We assume equal weights in the loss function. The specific target of the European central bank is to minimize the loss, given the inflation functions and the unemployment functions. Taking account of equations (1), (2), (3) and (4), the loss function of the European central bank can be written as follows:
Then the first-order condition for a minimum loss is:

\[ 4M = A_1 + A_2 - B_1 - B_2 \]  

Here \( M \) is the optimum level of European money supply. An increase in \( A_1 \) or \( A_2 \) requires an increase in European money supply. And an increase in \( B_1 \) or \( B_2 \) requires a cut in European money supply.

\[ L = (B_1 + M)^2 + (B_2 + M)^2 + (A_1 - M)^2 + (A_2 - M)^2 \]  

(6)

2. Some Numerical Examples

Here are eight distinct cases:

- a demand shock in Germany
- a supply shock in Germany
- a mixed shock in Germany
- another mixed shock in Germany
- a common demand shock in Europe
- a common supply shock in Europe
- a common mixed shock in Europe
- another common mixed shock in Europe.

1) A demand shock in Germany. In each of the member countries, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to a decline in the demand for German goods. In terms of the model there is an increase in \( A_1 \) of 2 units and a decline in \( B_1 \) of equally 2 units. Step two refers to the time lag. Unemployment in Germany goes from zero to 2 percent. Unemployment in France stays at zero percent. Thus unemployment in Europe goes from zero to 1 percent. Inflation in Germany goes from zero to \(-2\) percent. Inflation in France stays at zero percent. Thus inflation in Europe goes from zero to \(-1\) percent.