Chapter 3
Monetary and Fiscal Cooperation

1. The Model

The model of unemployment, inflation, and the structural deficit can be represented by a system of three equations:

\[ u = A - M - G \] (1)
\[ \pi = B + M + G \] (2)
\[ s = G - T \] (3)

The policy makers are the central bank and the government. The targets of policy cooperation are zero inflation, zero unemployment, and a zero structural deficit. The instruments of policy cooperation are money supply and government purchases. There are three targets but only two instruments, so what is needed is a loss function. We assume that the policy makers agree on a common loss function:

\[ L = \pi^2 + u^2 + s^2 \] (4)

L is the loss caused by inflation, unemployment, and the structural deficit. We assume equal weights in the loss function. The specific target of policy cooperation is to minimize the loss, given the inflation function, the unemployment function, and the structural deficit function. Taking account of equations (1), (2) and (3), the loss function under policy cooperation can be written as follows:

\[ L = (B + M + G)^2 + (A - M - G)^2 + (G - T)^2 \] (5)

Then the first-order conditions for a minimum loss are:

\[ 2M = A - B - 2G \] (6)
\[ 3G = A + T - B - 2M \]  \hspace{1cm} (7)

Equation (6) shows the first-order condition with respect to money supply. And equation (7) shows the first-order condition with respect to government purchases.

The cooperative equilibrium is determined by the first-order conditions for a minimum loss. The solution to this problem is as follows:

\[ 2M = A - B - 2T \]  \hspace{1cm} (8)
\[ G = T \]  \hspace{1cm} (9)

Equations (8) and (9) show the cooperative equilibrium of money supply and government purchases. As a result there is a unique cooperative equilibrium. An increase in A causes an increase in money supply. And an increase in B causes a decline in money supply. A unit increase in A causes an increase in money supply of 0.5 units. And a unit increase in B causes a decline in money supply of equally 0.5 units.

From equations (1), (8) and (9) follows the optimum rate of unemployment:

\[ 2u = A + B \]  \hspace{1cm} (10)

From equations (2), (8) and (9) follows the optimum rate of inflation:

\[ 2\pi = A + B \]  \hspace{1cm} (11)

And from equations (3) and (9) follows the optimum structural deficit ratio:

\[ s = 0 \]  \hspace{1cm} (12)

The structural deficit is zero. By contrast, unemployment and inflation are not zero.