

Chapter 1

Monetary Interaction: Case A

1. The Model

1) The static model. The world economy consists of two monetary regions, say Europe and America. The monetary regions are the same size and have the same behavioural functions. This chapter is based on target system A. The target of the European central bank is zero inflation in Europe. And the target of the American central bank is zero inflation in America.

An increase in European money supply lowers European unemployment. On the other hand, it raises European inflation. Correspondingly, an increase in American money supply lowers American unemployment. On the other hand, it raises American inflation. An essential point is that monetary policy in Europe has spillover effects on America and vice versa. An increase in European money supply raises American unemployment and lowers American inflation. Similarly, an increase in American money supply raises European unemployment and lowers European inflation.

The model of unemployment and inflation can be represented by a system of four equations:

$$u_1 = A_1 - M_1 + 0.5M_2 \quad (1)$$

$$u_2 = A_2 - M_2 + 0.5M_1 \quad (2)$$

$$\pi_1 = B_1 + M_1 - 0.5M_2 \quad (3)$$

$$\pi_2 = B_2 + M_2 - 0.5M_1 \quad (4)$$

Here u_1 denotes the rate of unemployment in Europe, u_2 is the rate of unemployment in America, π_1 is the rate of inflation in Europe, π_2 is the rate of inflation in America, M_1 is European money supply, M_2 is American money supply, A_1 is some other factors bearing on the rate of unemployment in Europe, A_2 is some other factors bearing on the rate of unemployment in America, B_1 is

some other factors bearing on the rate of inflation in Europe, and B_2 is some other factors bearing on the rate of inflation in America. The endogenous variables are the rate of unemployment in Europe, the rate of unemployment in America, the rate of inflation in Europe, and the rate of inflation in America.

According to equation (1), European unemployment is a positive function of A_1 , a negative function of European money supply, and a positive function of American money supply. According to equation (2), American unemployment is a positive function of A_2 , a negative function of American money supply, and a positive function of European money supply. According to equation (3), European inflation is a positive function of B_1 , a positive function of European money supply, and a negative function of American money supply. According to equation (4), American inflation is a positive function of B_2 , a positive function of American money supply, and a negative function of European money supply.

Now consider the direct effects. According to the model, an increase in European money supply lowers European unemployment. On the other hand, it raises European inflation. Correspondingly, an increase in American money supply lowers American unemployment. On the other hand, it raises American inflation. Then consider the spillover effects. According to the model, an increase in European money supply raises American unemployment and lowers American inflation. Similarly, an increase in American money supply raises European unemployment and lowers European inflation.

According to the model, a unit increase in European money supply lowers European unemployment by 1 percentage point. On the other hand, it raises European inflation by 1 percentage point. And what is more, a unit increase in European money supply raises American unemployment by 0.5 percentage points and lowers American inflation by 0.5 percentage points. For instance, let European unemployment be 2 percent, and let European inflation be 2 percent as well. Further, let American unemployment be 2 percent, and let American inflation be 2 percent as well. Now consider a unit increase in European money supply. Then European unemployment goes from 2 to 1 percent. On the other hand, European inflation goes from 2 to 3 percent. And what is more, American unemployment goes from 2 to 2.5 percent, and American inflation goes from 2 to 1.5 percent.

The target of the European central bank is zero inflation in Europe. The instrument of the European central bank is European money supply. By equation (3), the reaction function of the European central bank is:

$$2M_1 = -2B_1 + M_2 \quad (5)$$

An increase in B_1 requires a cut in European money supply. And a cut in American money supply requires a cut in European money supply.

The target of the American central bank is zero inflation in America. The instrument of the American central bank is American money supply. By equation (4), the reaction function of the American central bank is:

$$2M_2 = -2B_2 + M_1 \quad (6)$$

An increase in B_2 requires a cut in American money supply. And a cut in European money supply requires a cut in American money supply.

2) The dynamic model. We assume that the European central bank and the American central bank decide simultaneously and independently. Step 1 refers to a specific shock. Step 2 refers to the time lag. Step 3 refers to monetary policies in Europe and America. Step 4 refers to the time lag. Step 5 refers to monetary policies in Europe and America. Step 6 refers to the time lag. And so on.

Now have a closer look at the dynamic model. Step 1 refers to a specific shock. This could be a demand shock, a supply shock or a mixed shock, in Europe or America. Step 2 refers to the time lag. This includes both the inside lag and the outside lag. In step 3, the central banks decide simultaneously and independently. The European central bank sets European money supply so as to achieve zero inflation in Europe. The reaction function of the European central bank is:

$$2M_1 = -2B_1 + M_2 \quad (7)$$

The American central bank sets American money supply so as to achieve zero inflation in America. The reaction function of the American central bank is:

$$2M_2 = -2B_2 + M_1 \quad (8)$$

Step 4 refers to the time lag. In step 5, the central banks decide simultaneously and independently. The European central bank sets European money supply so as to achieve zero inflation in Europe. The reaction function of the European central bank is:

$$2M_1 = -2B_1 + M_2 \quad (9)$$

The American central bank sets American money supply so as to achieve zero inflation in America. The reaction function of the American central bank is:

$$2M_2 = -2B_2 + M_1 \quad (10)$$

Step 6 refers to the time lag. And so on. Then what are the dynamic characteristics of this process?

2. Some Numerical Examples

It proves useful to study six distinct cases:

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

The target of the European central bank is zero inflation in Europe. And the target of the American central bank is zero inflation in America.

1) A common demand shock. In each of the regions, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to a decline in the demand for European and American goods. In terms of the model there is a 4

unit increase in A_1 , as there is in A_2 . On the other hand, there is a 4 unit decline in B_1 , as there is in B_2 . Step two refers to the time lag. Unemployment in Europe goes from zero to 4 percent, as does unemployment in America. On the other hand, inflation in Europe goes from zero to -4 percent, as does inflation in America.

In step three, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is -4 percent, and target inflation in Europe is zero percent. So what is needed is an increase in European money supply of 4 units. Second consider monetary policy in America. Current inflation in America is -4 percent, and target inflation in America is zero percent. So what is needed is an increase in American money supply of 4 units.

Step four refers to the time lag. The 4 unit increase in European money supply lowers European unemployment and raises European inflation by 4 percentage points each. And what is more, it raises American unemployment and lowers American inflation by 2 percentage points each. The 4 unit increase in American money supply lowers American unemployment and raises American inflation by 4 percentage points each. And what is more, it raises European unemployment and lowers European inflation by 2 percentage points each.

The total decline in European unemployment is 2 percentage points. The total increase in European inflation is 2 percentage points. The total decline in American unemployment is 2 percentage points. And the total increase in American inflation is 2 percentage points. As a consequence, unemployment in Europe goes from 4 to 2 percent, as does unemployment in America. And inflation in Europe goes from -4 to -2 percent, as does inflation in America.

In step five, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is -2 percent, and target inflation in Europe is zero percent. So what is needed is an increase in European money supply of 2 units. Second consider monetary policy in America. Current inflation in America is -2 percent, and target inflation in America is zero percent. So what is needed is an increase in American money supply of 2 units.

Step six refers to the time lag. The 2 unit increase in European money supply lowers European unemployment and raises European inflation by 2 percentage points each. And what is more, it raises American unemployment and lowers American inflation by 1 percentage point each. The 2 unit increase in American money supply lowers American unemployment and raises American inflation by 2 percentage points each. And what is more, it raises European unemployment and lowers European inflation by 1 percentage point each.

The total decline in European unemployment is 1 percentage point. The total increase in European inflation is 1 percentage point. The total decline in American unemployment is 1 percentage point. And the total increase in American inflation is 1 percentage point. As a consequence, unemployment in Europe goes from 2 to 1 percent, as does unemployment in America. And inflation in Europe goes from -2 to -1 percent, as does inflation in America.

In step seven, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is -1 percent, and target inflation in Europe is zero percent. So what is needed is an increase in European money supply of 1 unit. Second consider monetary policy in America. Current inflation in America is -1 percent, and target inflation in America is zero percent. So what is needed is an increase in American money supply of 1 unit. And so on. Table 1.1 presents a synopsis.

Now consider the long-run equilibrium. In each of the regions there is zero unemployment and zero inflation. There is no change in European or American money supply. However, taking the sum over all periods, the increase in European money supply is 8 units, as is the increase in American money supply.

As a result, given a common demand shock, monetary interaction produces both zero unemployment and zero inflation in each of the regions. There are repeated increases in money supply. There are repeated cuts in unemployment. And there are repeated cuts in deflation.

Table 1.1
Monetary Interaction
 A Common Demand Shock

Europe		America	
Unemployment	4	Unemployment	4
Inflation	− 4	Inflation	− 4
Δ Money Supply	4	Δ Money Supply	4
Unemployment	2	Unemployment	2
Inflation	− 2	Inflation	− 2
Δ Money Supply	2	Δ Money Supply	2
Unemployment	1	Unemployment	1
Inflation	− 1	Inflation	− 1
Δ Money Supply	1	Δ Money Supply	1
and so on			

2) A common supply shock. In each of the regions, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to the common supply shock. In terms of the model there is a 4 unit increase in B_1 , as there is in B_2 . And there is a 4 unit increase in A_1 , as there is in A_2 . Step two refers to the time lag. Inflation in Europe goes from zero to 4 percent, as does inflation in America. And unemployment in Europe goes from zero to 4 percent, as does unemployment in America.

In step three, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 4 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 4 units. Second consider monetary policy in America. Current inflation in America is 4 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 4 units.

Step four refers to the time lag. The 4 unit reduction in European money supply raises European unemployment and lowers European inflation by 4 percentage points each. And what is more, it lowers American unemployment and raises American inflation by 2 percentage points each. The 4 unit reduction in American money supply raises American unemployment and lowers American inflation by 4 percentage points each. And what is more, it lowers European unemployment and raises European inflation by 2 percentage points each.

The total increase in European unemployment is 2 percentage points. The total decline in European inflation is 2 percentage points. The total increase in American unemployment is 2 percentage points. And the total decline in American inflation is 2 percentage points. As a consequence, unemployment in Europe goes from 4 to 6 percent, as does unemployment in America. And inflation in Europe goes from 4 to 2 percent, as does inflation in America.

In step five, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 2 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 2 units. Second consider monetary policy in America. Current inflation in America is 2 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 2 units.

Step six refers to the time lag. The 2 unit reduction in European money supply raises European unemployment and lowers European inflation by 2 percentage points each. And what is more, it lowers American unemployment and raises American inflation by 1 percentage point each. The 2 unit reduction in American money supply raises American unemployment and lowers American inflation by 2 percentage points each. And what is more, it lowers European unemployment and raises European inflation by 1 percentage point each.

The total increase in European unemployment is 1 percentage point. The total decline in European inflation is 1 percentage point. The total increase in American unemployment is 1 percentage point. And the total decline in American inflation is 1 percentage point. As a consequence, unemployment in Europe goes from 6 to 7 percent, as does unemployment in America. And inflation in Europe goes from 2 to 1 percent, as does inflation in America.

In step seven, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 1 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 1 unit. Second consider monetary policy in America. Current inflation in America is 1 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 1 unit. And so on. Table 1.2 gives an overview.

Table 1.2
Monetary Interaction
 A Common Supply Shock

Europe		America	
Unemployment	4	Unemployment	4
Inflation	4	Inflation	4
Δ Money Supply	- 4	Δ Money Supply	- 4
Unemployment	6	Unemployment	6
Inflation	2	Inflation	2
Δ Money Supply	- 2	Δ Money Supply	- 2
Unemployment	7	Unemployment	7
Inflation	1	Inflation	1
Δ Money Supply	- 1	Δ Money Supply	- 1
and so on			

Now consider the long-run equilibrium. Unemployment in Europe is 8 percent, as is unemployment in America. And inflation in Europe is zero percent, as is inflation in America. There is no change in European or American money supply. However, taking the sum over all periods, the reduction in European money supply is 8 units, as is the reduction in American money supply.

As a result, given a common supply shock, monetary interaction produces zero inflation in each of the regions. As a side effect, it raises unemployment there. There are repeated cuts in money supply. There are repeated cuts in inflation. And there are repeated increases in unemployment.

3) A common mixed shock. In each of the regions, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to the common mixed shock. In terms of the model there is an 8 unit increase in B_1 , as there is in B_2 . Step two refers to the time lag. Inflation in Europe goes from zero to 8 percent, as does inflation in America. And unemployment in Europe stays at zero percent, as does unemployment in America.

In step three, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 8 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 8 units. Second consider monetary policy in America. Current inflation in America is 8 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 8 units.

Step four refers to the time lag. The 8 unit reduction in European money supply raises European unemployment and lowers European inflation by 8 percentage points each. And what is more, it lowers American unemployment and raises American inflation by 4 percentage points each. The 8 unit reduction in American money supply raises American unemployment and lowers American inflation by 8 percentage points each. And what is more, it lowers European unemployment and raises European inflation by 4 percentage points each.

The total increase in European unemployment is 4 percentage points. The total decline in European inflation is 4 percentage points. The total increase in American unemployment is 4 percentage points. And the total decline in American inflation is 4 percentage points. As a consequence, unemployment in Europe goes from zero to 4 percent, as does unemployment in America. And inflation in Europe goes from 8 to 4 percent, as does inflation in America.

In step five, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 4 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 4 units. Second consider monetary policy in America. Current inflation in America is 4 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 4 units.

Step six refers to the time lag. The 4 unit reduction in European money supply raises European unemployment and lowers European inflation by 4 percentage points each. And what is more, it lowers American unemployment and raises American inflation by 2 percentage points each. The 4 unit reduction in American money supply raises American unemployment and lowers American inflation by 4 percentage points each. And what is more, it lowers European unemployment and raises European inflation by 2 percentage points each.

The total increase in European unemployment is 2 percentage points. The total decline in European inflation is 2 percentage points. The total increase in American unemployment is 2 percentage points. And the total decline in American inflation is 2 percentage points. As a consequence, unemployment in Europe goes from 4 to 6 percent, as does unemployment in America. And inflation in Europe goes from 4 to 2 percent, as does inflation in America.

In step seven, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 2 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 2 units. Second consider monetary policy in America. Current inflation in America is 2 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 2 units. And so on. For a synopsis see Table 1.3.

Now consider the long-run equilibrium. Unemployment in Europe is 8 percent, as is unemployment in America. And inflation in Europe is zero percent, as is inflation in America. There is no change in European or American money supply. However, taking the sum over all periods, the reduction in European money supply is 16 units, as is the reduction in American money supply.

Table 1.3
Monetary Interaction
A Common Mixed Shock

Europe		America	
Unemployment	0	Unemployment	0
Inflation	8	Inflation	8
Δ Money Supply	- 8	Δ Money Supply	- 8
Unemployment	4	Unemployment	4
Inflation	4	Inflation	4
Δ Money Supply	- 4	Δ Money Supply	- 4
Unemployment	6	Unemployment	6
Inflation	2	Inflation	2
Δ Money Supply	- 2	Δ Money Supply	- 2
and so on			

As a result, given a common mixed shock, monetary interaction produces zero inflation in each of the regions. As a side effect, it causes some unemployment there. There are repeated cuts in money supply. There are repeated cuts in inflation. And there are repeated increases in unemployment.

4) A demand shock in Europe. In each of the regions, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to a decline in the demand for European goods. In terms of the model there is a 4 unit increase in A_1 and a 4 unit decline in B_1 . Step two refers to the time lag. European unemployment goes from zero to 4 percent. European inflation goes from zero to - 4 percent. American unemployment stays at zero percent. And American inflation stays at zero percent as well.

In step three, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is - 4

percent, and target inflation in Europe is zero percent. So what is needed is an increase in European money supply of 4 units. Second consider monetary policy in America. Current inflation in America is zero percent, and target inflation in America is zero percent as well. So what is needed is no change in American money supply.

Step four refers to the time lag. The 4 unit increase in European money supply lowers European unemployment and raises European inflation by 4 percentage points each. And what is more, it raises American unemployment and lowers American inflation by 2 percentage points each. As a consequence, European unemployment goes from 4 to zero percent. European inflation goes from -4 to zero percent. American unemployment goes from zero to 2 percent. And American inflation goes from zero to -2 percent.

In step five, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is zero percent, and target inflation in Europe is zero percent as well. So what is needed is no change in European money supply. Second consider monetary policy in America. Current inflation in America is -2 percent, and target inflation in America is zero percent. So what is needed is an increase in American money supply of 2 units.

Step six refers to the time lag. The 2 unit increase in American money supply lowers American unemployment and raises American inflation by 2 percentage points each. And what is more, it raises European unemployment and lowers European inflation by 1 percentage point each. As a consequence, American unemployment goes from 2 to zero percent. American inflation goes from -2 to zero percent. European unemployment goes from zero to 1 percent. And European inflation goes from zero to -1 percent.

In step seven, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is -1 percent, and target inflation in Europe is zero percent. So what is needed is an increase in European money supply of 1 unit. Second consider monetary policy in America. Current inflation in America is zero percent, and target inflation in America is zero percent as well. So what is needed is no change in American money supply. And so on. For an overview see Table 1.4.

Table 1.4
Monetary Interaction
A Demand Shock in Europe

Europe		America	
Unemployment	4	Unemployment	0
Inflation	− 4	Inflation	0
Δ Money Supply	4	Δ Money Supply	0
Unemployment	0	Unemployment	2
Inflation	0	Inflation	− 2
Δ Money Supply	0	Δ Money Supply	2
Unemployment	1	Unemployment	0
Inflation	− 1	Inflation	0
Δ Money Supply	1	Δ Money Supply	0
and so on			

Now consider the long-run equilibrium. In each of the regions there is zero unemployment and zero inflation. There is no change in European or American money supply. However, taking the sum over all periods, the increase in European money supply is 5.33 units, and the increase in American money supply is 2.67 units.

As a result, given a demand shock in Europe, monetary interaction produces both zero unemployment and zero inflation in each of the regions. There are repeated increases in money supply. There are damped oscillations in unemployment. And there are damped oscillations in deflation.

5) A supply shock in Europe. In each of the regions, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to the supply shock in Europe. In terms of the model there is a 4 unit increase in B_1 , as there is in A_1 . Step two refers to the time lag. European inflation goes from zero to 4

percent. European unemployment goes from zero to 4 percent as well. American inflation stays at zero percent. And American unemployment stays at zero percent as well.

In step three, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 4 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 4 units. Second consider monetary policy in America. Current inflation in America is zero percent, and target inflation in America is zero percent as well. So what is needed is no change in American money supply.

Step four refers to the time lag. The 4 unit reduction in European money supply raises European unemployment and lowers European inflation by 4 percentage points each. And what is more, it lowers American unemployment and raises American inflation by 2 percentage points each. As a consequence, European unemployment goes from 4 to 8 percent. European inflation goes from 4 to zero percent. American unemployment goes from zero to -2 percent. And American inflation goes from zero to 2 percent.

In step five, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is zero percent, and target inflation in Europe is zero percent as well. So what is needed is no change in European money supply. Second consider monetary policy in America. Current inflation in America is 2 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 2 units.

Step six refers to the time lag. The 2 unit reduction in American money supply raises American unemployment and lowers American inflation by 2 percentage points each. And what is more, it lowers European unemployment and raises European inflation by 1 percentage point each. As a consequence, American unemployment goes from -2 to zero percent. American inflation goes from 2 to zero percent. European unemployment goes from 8 to 7 percent. And European inflation goes from zero to 1 percent.

In step seven, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 1

percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 1 unit. Second consider monetary policy in America. Current inflation in America is zero percent, and target inflation in America is zero percent as well. So what is needed is no change in American money supply. And so on. Table 1.5 presents a synopsis.

Table 1.5
Monetary Interaction
A Supply Shock in Europe

Europe		America	
Unemployment	4	Unemployment	0
Inflation	4	Inflation	0
Δ Money Supply	- 4	Δ Money Supply	0
Unemployment	8	Unemployment	- 2
Inflation	0	Inflation	2
Δ Money Supply	0	Δ Money Supply	- 2
Unemployment	7	Unemployment	0
Inflation	1	Inflation	0
Δ Money Supply	- 1	Δ Money Supply	0
and so on			

Now consider the long-run equilibrium. European unemployment is 8 percent, and European inflation is zero percent. American unemployment is zero percent, as is American inflation. There is no change in European or American money supply. However, taking the sum over all periods, the cut in European money supply is 5.33 units, and the cut in American money supply is 2.67 units.

As a result, given a supply shock in Europe, monetary interaction produces zero inflation in Europe. As a side effect, it raises unemployment there. And

what is more, monetary interaction produces both zero unemployment and zero inflation in America. There are repeated cuts in money supply. There are damped oscillations in unemployment. And there are damped oscillations in inflation.

6) A mixed shock in Europe. In each of the regions, let initial unemployment be zero, and let initial inflation be zero as well. Step one refers to the mixed shock in Europe. In terms of the model there is an 8 unit increase in B_1 . Step two refers to the time lag. European inflation goes from zero to 8 percent. European unemployment stays at zero percent. American inflation stays at zero percent, as does American unemployment.

In step three, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 8 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 8 units. Second consider monetary policy in America. Current inflation in America is zero percent, and target inflation in America is zero percent as well. So what is needed is no change in American money supply.

Step four refers to the time lag. The 8 unit reduction in European money supply raises European unemployment and lowers European inflation by 8 percentage points each. And what is more, it lowers American unemployment and raises American inflation by 4 percentage points each. As a consequence, European unemployment goes from zero to 8 percent. European inflation goes from 8 to zero percent. American unemployment goes from zero to - 4 percent. And American inflation goes from zero to 4 percent.

In step five, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is zero percent, and target inflation in Europe is zero percent as well. So what is needed is no change in European money supply. Second consider monetary policy in America. Current inflation in America is 4 percent, and target inflation in America is zero percent. So what is needed is a reduction in American money supply of 4 units.

Step six refers to the time lag. The 4 unit reduction in American money supply raises American unemployment and lowers American inflation by 4 percentage points each. And what is more, it lowers European unemployment

and raises European inflation by 2 percentage points each. As a consequence, American unemployment goes from – 4 to zero percent. American inflation goes from 4 to zero percent. European unemployment goes from 8 to 6 percent. And European inflation goes from zero to 2 percent.

In step seven, the central banks decide simultaneously and independently. First consider monetary policy in Europe. Current inflation in Europe is 2 percent, and target inflation in Europe is zero percent. So what is needed is a reduction in European money supply of 2 units. Second consider monetary policy in America. Current inflation in America is zero percent, and target inflation in America is zero percent as well. So what is needed is no change in American money supply. And so on. Table 1.6 gives an overview.

Table 1.6
Monetary Interaction
A Mixed Shock in Europe

Europe		America	
Unemployment	0	Unemployment	0
Inflation	8	Inflation	0
Δ Money Supply	– 8	Δ Money Supply	0
Unemployment	8	Unemployment	– 4
Inflation	0	Inflation	4
Δ Money Supply	0	Δ Money Supply	– 4
Unemployment	6	Unemployment	0
Inflation	2	Inflation	0
Δ Money Supply	– 2	Δ Money Supply	0
and so on			

Now consider the long-run equilibrium. European unemployment is 8 percent, and European inflation is zero percent. American unemployment is zero percent, as is American inflation. There is no change in European or American money supply. However, taking the sum over all periods, the cut in European money supply is 10.67 units, and the cut in American money supply is 5.33 units.

As a result, given a mixed shock in Europe, monetary interaction produces zero inflation in Europe. As a side effect, it produces some unemployment there. And what is more, monetary interaction produces both zero unemployment and zero inflation in America. There are repeated cuts in money supply. And there are damped oscillations in unemployment and inflation.

7) Summary. One, consider a common demand shock. In that case, monetary interaction produces both zero unemployment and zero inflation in each of the regions. There are repeated increases in money supply. There are repeated cuts in unemployment. And there are repeated cuts in deflation. Two, consider a common supply shock. In that case, monetary interaction produces zero inflation in each of the regions. However, as a side effect, it raises unemployment there. There are repeated cuts in money supply. There are repeated cuts in inflation. And there are repeated increases in unemployment. Much the same applies to a common mixed shock.

Three, consider a demand shock in Europe. In that case, monetary interaction produces both zero unemployment and zero inflation in each of the regions. There are repeated increases in money supply. There are damped oscillations in unemployment. And there are damped oscillations in deflation. Four, consider a supply shock in Europe. In that case, monetary interaction produces zero inflation in Europe. However, as a side effect, it raises unemployment there. And what is more, monetary interaction produces both zero unemployment and zero inflation in America. There are repeated cuts in money supply. There are damped oscillations in unemployment. And there are damped oscillations in inflation. Much the same applies to a mixed shock in Europe.



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