CHAPTER 24
THE OPEN ECONOMY WITH FIXED EXCHANGE RATES

Themes:

• The impotence of monetary policy under fixed exchange rates
• The macroeconomic trilemma
• The case for fixed exchange rates
• The AS-AD model of the open economy with fixed exchange rates
• Fiscal policy and exchange rate policy under fixed exchange rates
• The vulnerability of a fixed exchange rate regime

VARIANTS OF A FIXED EXCHANGE RATE REGIME

"Hard" pegs

• Monetary union
• Dollarization
• Currency board

"Soft" pegs

• Fixed exchange rate against an anchor currency within a band
• Fixed exchange rate (within a band) vis-à-vis a basket of currencies
THE IMPOTENCE OF MONETARY POLICY
UNDER FIXED EXCHANGE RATES

Uncovered interest parity:

\[ i = i^f + e_{+1}^e - e, \quad e \equiv \ln E, \quad e_{+1}^e \equiv \ln E_{+1}^e \]  (1)

Under a credible fixed exchange rate regime we have

\[ e_{+1}^e = e \]

The uncovered interest parity (1) then implies

\[ i = i^f \]  (2)

**Implication of (2):** Under fixed exchange rates and perfect capital mobility, domestic monetary policy becomes impotent.

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THE MACROECONOMIC TRILEMMA

A macroeconomic policy regime can include at most two of the following three goals:

- free cross-border capital flows
- a fixed exchange rate
- an independent monetary policy
THE CASE FOR FIXED EXCHANGE RATES

- The elimination of exchange rate uncertainty benefits international trade and investment
- Exchange rate stability prevents arbitrary redistribution of income stemming from the ‘overshooting’ of floating exchange rates
- A fixed exchange rate serves as a ’nominal anchor’ which helps to stabilise expectations of inflation

Disadvantages of fixed exchange rates

- Loss of monetary policy autonomy (under free capital flows)
- Loss of ability to use the exchange rate as a shock absorber
- Vulnerability to speculative attacks on the exchange rate (as long as the country does not enter a monetary union)

INFLATION AND REAL EXCHANGE RATE DYNAMICS

In general we have

\[ e^r = e^r_{-1} + \Delta e + \pi^f - \pi \]

Under a ”hard” peg (a fully fixed exchange rate) we have

\[ \Delta e = 0 \]

from which it follows that

\[ e^r - e^r_{-1} = \pi^f - \pi \] \hspace{1cm} (3)

A long-run equilibrium \((e^r = e^r_{-1})\) therefore requires

\[ \pi = \pi^f \]
GOODS MARKET EQUILIBRIUM AND EXPECTATIONS FORMATION UNDER FIXED EXCHANGE RATES

Condition for goods market equilibrium:

\[ y - \bar{y} = \beta_1 (e' + \pi^f - \pi) - \beta_2 (i^f - \pi^e - \bar{r}^f) + \bar{z} \]  \hspace{1cm} (4)

Expectations formation under a credibly fixed exchange rate:

\[ \pi^e_{t+1} = \pi^e = \pi^f \]

Interest rate formation under a credibly fixed exchange rate:

\[ i = i^f \Rightarrow \]

\[ r \equiv i - \pi^e_{t+1} = i^f - \pi^f = r^f \]

Substitution into (4) yields

THE AD CURVE FOR THE OPEN ECONOMY WITH FIXED EXCHANGE RATES

\[ y - \bar{y} = \beta_1 (e'_{-1} + \pi^f - \pi) + z \quad \Leftrightarrow \]

\[ \pi = e'_{-1} + \pi^f - \left( \frac{1}{\beta_1} \right) (y - \bar{y} - z), \quad \hspace{1cm} (7) \]

\[ z \equiv -\beta_2 (r^f - \bar{r}^f) + \beta_3 (g - \bar{g}) \]

\[ + \beta_4 (y^f - \bar{y}^f) + \beta_5 (\ln e - \ln \bar{e}) \]

The AD curve slopes downwards since higher domestic inflation ⇒ deterioration of domestic competitiveness ⇒ lower demand for domestic goods
DEMAND SHOCKS

From (7) we have the following

Sources of demand shocks

Changes in

• the foreign real interest rate
• foreign economic activity (foreign GDP)
• business and consumer confidence (ε)
• domestic fiscal policy

THE AGGREGATE SUPPLY CURVE

The expectations-augmented Phillips curve:

\[ \pi = \pi^e + \gamma (y - \bar{y}) + s \]

Expectations formation under a credibly fixed exchange rate:

\[ \pi^e = \pi^f \]

From this we get

The short-run aggregate supply curve under fixed exchange rates

\[ \pi = \pi^f + \gamma (y - \bar{y}) + s \]
SUMMARIZING THE AS-AD MODEL OF THE OPEN ECONOMY WITH FIXED EXCHANGE RATES

AD curve: \[ \pi = e_{-1}^r + \pi^f - \left(1/ \beta_1 \right)(y - \bar{y} - z) \]

SRAS curve: \[ \pi = \pi^f + \gamma (y - \bar{y}) + s \]

Real exchange rate: \[ e^r = e_{-1}^r + \pi^f - \pi \]

**Long run equilibrium** requires \( e^r = e^r_{-1} \), that is:

\[ \bar{\pi} = \pi^f \]

\[ y = \bar{y} \quad (\text{for } s = 0) \]

Adjustment to long run equilibrium under fixed exchange rates
MACROECONOMIC ADJUSTMENT MECHANISMS

The closed economy

Recession →
falling inflation →
the central bank cuts the real interest rate →
aggregate demand increases

The open economy with fixed exchange rates

Recession →
domestic inflation < foreign inflation →
improvement of domestic competitiveness →
increase in demand for domestic goods

THE SPEED OF ADJUSTMENT

For \( s_t = 0 \) the AS-AD model of the open economy with fixed exchange rates may be reduced to

\[
\hat{y}_{t+1} = \beta \hat{y}_t + \beta \left( z_{t+1} - z_t \right),
\]

(15)

\[
\hat{y}_t \equiv y_t - \bar{y}, \quad \beta \equiv \frac{1}{1+\gamma\beta_1}
\]

For \( z_{t+1} = z_t \) we find from (15) that

\[
\hat{y}_t = \hat{y}_0 \beta^t
\]

(16)

Since

\[
0 < \beta < 1
\]

the economy is stable
THE SPEED OF ADJUSTMENT

One can show that

$$\beta_1 = \left( \frac{M_o}{\bar{Y}} \right) (\eta_x + \eta_M - 1) - \left( \frac{D}{\bar{Y}} \right) \eta_D, \quad \eta_D = -\frac{\partial D}{\partial E'} \frac{E'}{D}$$

Suppose

$$\eta_x + \eta_M = 3, \quad \eta_D = 0.3, \quad M_o/\bar{Y} = 0.3, \quad D/\bar{Y} = 0.8, \quad \bar{D}_y = 0.5$$

We then get

$$\beta = \frac{1}{1 + \gamma \beta_1} \approx 0.87, \quad t_h = -\frac{\ln 2}{\ln \beta} = -\frac{0.693}{\ln \beta} \approx 4.98$$

In other words, it takes almost 5 years for the economy to complete half of the adjustment to long run equilibrium

DISCRETIONARY FISCAL POLICY: A TEMPORARY FISCAL EXPANSION UNDER FIXED EXCHANGE RATES
Suppose now that fiscal policy follows the rule

\[ g - \bar{g} = a(\bar{y} - y), \quad a > 0 \]  

(17)

Substitution of (17) into (7) yields

The AD curve with countercyclical fiscal policy

\[
\pi = \pi^f + e_{-1}^r - \left( \frac{1 + \beta_3 a}{\beta_1} \right) (\bar{y} - y) + \frac{\hat{z}}{\beta_1},
\]

(18)

\[
\hat{z} \equiv -\beta_2 \left( r^f - \bar{r}^f \right) + \beta_4 (y^f - \bar{y}^f) + \beta_5 (\ln \varepsilon - \ln \bar{v})
\]

We see that countercyclical fiscal policy makes the AD curve **steeper**. The implications of this are illustrated in the diagrams on the next two pages:
The economy’s speed of adjustment under countercyclical fiscal policy

Combining the AD curve (18) with the SRAS curve, we can reduce the model to

\[
\hat{y}_{t+1} = \hat{\beta} \hat{y}_t + \frac{\hat{z}_{t+1} - \hat{z}_t - \beta_1 s_{t+1}}{1 + \gamma \beta_1 + \beta_3 a},
\]

\[
\hat{\beta} \equiv \frac{1 + \beta_3 a}{1 + \gamma \beta_1 + \beta_3 a}.
\]

**Implication of (19):** A more countercyclical fiscal policy (a higher value of \(a\)) will reduce the economy’s speed of adjustment. Hence policy makers face a trade-off, since the previous graphical analysis showed that a higher value of \(a\) will also reduce the short-run effects of shocks on output.
AN UNANTICIPATED DEVALUATION

Assumptions:

• The devaluation is unanticipated

• The devaluation does not generate expectations of further future devaluations

• The devaluation does not increase the expected rate of domestic inflation

In period 1 where the devaluation takes place, we have

\[ e_1^r = e_o^r + \Delta e + \pi^f - \pi_1 \]

Hence the AD curve for period 1 reads (for \( z = e_o^r = 0 \)):

\[ \pi_1 = \Delta e + \pi^f - \left( \frac{1}{\beta_1} \right) \left( y_1 - \bar{y} \right) \]  \hspace{1cm} (17)

The effect of the unexpected devaluation is illustrated in Figure 24.6.

Note: In the long run the devaluation is fully neutral; it has no impact on any real variables.
AN UNANTICIPATED DEVALUATION (FIGUR 24.6)

SPEEDING UP THE ADJUSTMENT TO LONG RUN EQUILIBRIUM THROUGH AN UNANTICIPATED DEVALUATION
A (partly) anticipated devaluation

Period 0: The economy is in long run equilibrium

Period 1: Market participants start to expect that a devaluation will occur in period 2

Period 2: A devaluation of magnitude $\Delta e_2$ is implemented

From period 3 and onwards: The exchange rate is fixed at the new level

THE ANTICIPATION STAGE: THE EFFECTS OF AN ANTICIPATED DEVALUATION ON EXPECTATIONS (formed in period 1)

\[ e_2^e - e_1 = \phi\Delta e_2, \quad 0 \leq \phi \leq 1 \]  
(19)

$\phi = 0$: Unanticipated devaluation  
$\phi = 1$: Fully anticipated devaluation

Expectations effect on the nominal interest rate

\[ i_1 = i^f + e_2^e - e_1 = i^f + \phi\Delta e_2 \]  
(20)

Effect on expected inflation rate for period 2

\[ \pi_2^{eb} \equiv p_2^{eb} - p_1 = \pi^f + \theta_2\phi\Delta e_2, \quad 0 \leq \theta_2 \leq 1 \]  
(21)

Expectations effect on the real interest rate

\[ r_1 \equiv i_1 - \pi_2^{eb} = r^f + \phi(1 - \theta_2)\Delta e_2, \quad r^f \equiv i^f - \pi^f \]  
(22)
THE ANTICIPATION STAGE: EFFECT ON THE AD CURVE

Goods market equilibrium in period 1 requires (for \( z=0 \)):

\[
y_1 - \bar{y} = \beta_1 e_1^r - \beta_2 \left( r_1 - r^f \right)
\]

\[
= \beta_1 \left( \pi^f - \pi_1 \right) - \beta_2 \left( r_1 - r^f \right)
\]  

(23)

since \( e_1^r = e_o^r + \pi^f - \pi_1 = \pi^f - \pi_1 \) for \( e_o^r = 0 \)

Substitution of (22) into (23) gives the AD curve for period 1

\[
\pi_1 = \pi^f - \left( 1/ \beta_1 \right) \left( y_1 - \bar{y} \right) - \left( \beta_2 \phi / \beta_1 \right) \left( 1 - \theta_2 \right) \Delta e
\]  

(24)

Implication: The AD curve shifts down in period 1 due to an expectations effect on the real interest rate

THE ANTICIPATION EFFECT OF A DEVALUATION
THE IMPLEMENTATION STAGE (PERIOD 2):
EFFECT ON THE SHORT-RUN AGGREGATE SUPPLY CURVE

Assumption: the devaluation is implemented at the start of period 2, right before decisions on wage and price setting are made.

Hence wage and price setting for period 2 will be based on the expected inflation rate

\[ \pi_2^e = \pi^f + \theta_2 \Delta e_2 \]  \hspace{1cm} (25)

From (25) we get (for \( s = 0 \))

SRAS curve for period 2

\[ \pi_2 = \pi^f + \theta_2 \Delta e_2 + \gamma (y_2 - \bar{y}) \]  \hspace{1cm} (26)

Implication: The SRAS curve shifts up in period 2 due to a rise in the expected domestic inflation rate

THE IMPLEMENTATION STAGE (PERIOD 2):
EFFECTS ON THE AD CURVE

Goods market equilibrium in period 2:

\[ y_2 - \bar{y} = \beta_1 \epsilon_2^r - \beta_2 \left( r_2 - r^f \right) \]  \hspace{1cm} (27)

The implementation of the devaluation in period 2 means that

\[ \epsilon_2^r = \epsilon_1^r + \Delta e_2 + \pi^f - \pi_2 \]  \hspace{1cm} (28)

where \( \epsilon_1^r = \pi^f - \pi_1 > 0 \)

We assume that the implementation of the devaluation eliminates the fear of a further devaluation in the near future. This implies \( i_2 = i^f \), so the real interest rate for period 2 becomes

\[ r_2 \equiv i_2 - \pi^e_2 = i^f - \left( \pi^f + \theta_3 \Delta e_2 \right) = r^f - \theta_3 \Delta e_2 \]  \hspace{1cm} (29)

where \( \theta_3 \Delta e_2 \) is the expected effect of the devaluation on the rate of domestic inflation in period 3
THE IMPLEMENTATION STAGE (PERIOD 2):
EFFECTS ON THE AD CURVE

Inserting (28) and (29) into (27), we get the

AD curve for period 2

\[ \pi_2 = \pi^f + \epsilon_1^r + \Delta e_2 - \left( \frac{1}{\beta_1} \right) (y_2 - \bar{y}) + \left( \frac{\beta_2 \theta_3}{\beta_1} \right) \Delta e_2 \]  (30)

Implication: The AD curve shifts up in period 2 because of improved competitiveness (cf. the term \( \epsilon_1^r + \Delta e_2 \)) and because of a fall in the real interest rate (cf. the term \( \left( \frac{\beta_2 \theta_3}{\beta_1} \right) \Delta e_2 \)).

THE IMPLEMENTATION STAGE:
EFFECTS ON TOTAL OUTPUT

Substitution of the SRAS curve (26) into the AD curve (30) yields

\[ y_2 - \bar{y} = \left( \frac{\beta_1}{1 + \gamma \beta_1} \right) \epsilon_1^r + \left( \frac{\beta_1 (1 - \theta_2) + \beta_2 \theta_3}{1 + \gamma \beta_1} \right) \Delta e_2 > 0 \]  (31)

Hence output as well as inflation will rise in period 2 where the devaluation is implemented, as shown in Figure 24.9. Thus a partly anticipated devaluation will generate a "bust-boom" cycle in the domestic economy.
THE IMPLEMENTATION STAGE: EFFECTS ON OUTPUT AND INFLATION (FIGURE 24.9)

π > π_f \Rightarrow
Gradual erosion of the initial gain in competitiveness \Rightarrow
the AD curve gradually shifts down

The expected impact of the devaluation on domestic inflation gradually disappears (\( \theta \) is adjusted downwards) \( \Rightarrow \)
the SRAS curve shifts down

Implications:
The economy is pulled back towards the initial long run equilibrium
EFFECTS OF A PARTLY ANTICIPATED DEVALUATION:
SUMMARY

• Expectations of a future devaluation arise ⇒ fall in demand and output due to a higher real interest rate

• The devaluation is implemented ⇒ rise in demand and output due to improved competitiveness and a lower real interest rate

• Subsequent adjustment:
The expansionary effect of the devaluation is gradually eroded by higher domestic inflation

• In the long run the devaluation is neutral

THE LESSONS FROM THE EMS CRISIS

• A fixed exchange rate regime is vulnerable to currency speculation (speculation is almost costless)

• Speculative attacks can be self-fulfilling

• The vulnerability to currency speculation increases with growing capital mobility

These lessons explain why many countries in the 1990’s chose either to join a monetary union or to move towards flexible exchange rates