# Open Economy AS/AD Model

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# Objectives

In this section you will learn:

1. how to analyze an open economy in the medium run (AS/AD model)
2. how the effects of policies and shocks differ from the short run
3. why the medium run outcomes under floating and pegging are similar

# Short vs Medium Run

Short run:

- $P$ is fixed.
- Any adjustment of the real exchange rate must work through the nominal exchange rate:

$$\varepsilon = EP/P^* \qquad (1)$$

Medium run:

- $P$ adjusts
- Any change in $E$ can be mimicked by a change in $P$
  - same effect on $\varepsilon$
  - no other real effects of money in the medium run

# Fixed Exchange Rates

# Fixed Exchange Rate Model

We need to clear these markets:

1. Foreign exchange: UIP with fixed $E$ implies: $i = i^*$

2. Money:

$$M/P = YL(i^*) \tag{2}$$

   Endogenous: $M/P, Y$

3. Goods:

   3.1 demand:

   $$Y = C(Y - T) + I(Y, i^* - \pi^e) + G + NX(Y, Y^*, \bar{E}P/P^*) \tag{3}$$

   3.2 supply:

   $$P = P^e(1 + m)F(1 - Y/L, z) \tag{4}$$

   Endogenous: $Y, P$ (really also $\pi^e$, but let's set that aside)

# Market Clearing

- Short run:
    - $P^e$ fixed
    - AS is upward sloping

- Medium run:
    - $P^e = P$
    - vertical AS curve determines $Y_n$ by itself:

$$1 = (1+m)F(1 - Y_n/L, z) \tag{5}$$

# Irrelevance of Money

We show:

- The goods market determines $Y$ and $P$
- The money market determines $M$
  - so that $i = i^*$ holds at all times
- The Fed has no control over the money supply
- This is true in short run and medium run
- Key assumption: high capital mobility (UIP holds).

# Aggregate Demand

Start from IS with $i = i^*$:

$$Y = C(Y - T) + I(Y, i^* - \pi^e) + G + NX(Y, Y^*, \bar{E}P/P^*) \qquad (6)$$

Simplify:

$$Y = Y\left(\bar{E}P/P^*, G, T\right) \qquad (7)$$

Negative slope: $P \uparrow \implies Y \downarrow$

▶ this works through the real exchange rate and $NX$

New shifters: $Y^*, i^*, P^*, E$

# Aggregate Demand

$M/P$ no longer shifts AD

Why not?

# Analyzing the Model

We can forget about the money market and UIP and just analyze AS:

$$P = P^e(1+m)F(1-Y/L, z) \qquad (8)$$

AD:

$$Y = Y\left(\bar{E}P/P^*, G, T\right) \qquad (9)$$

Short run: $P^e$ is given.

Medium run: $P^e = P$.

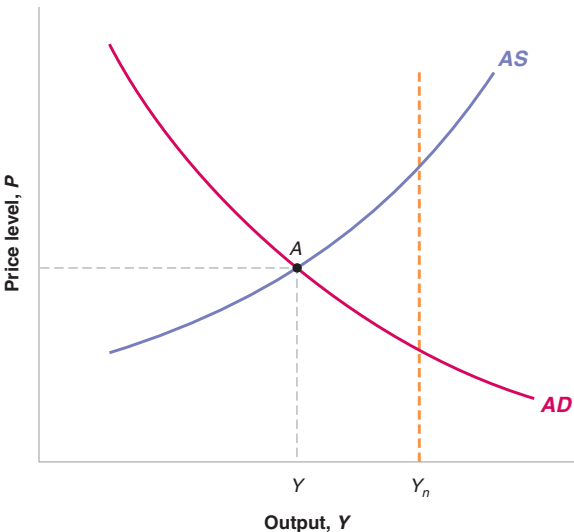Transition: $P^e \to P$ shifts AS.

## Analysis: Medium Run

- $P = P^e$: AS is vertical and determines $Y_n$:

$$1 = (1+m)F(1 - Y_n/L, z) \rightarrow Y_n$$

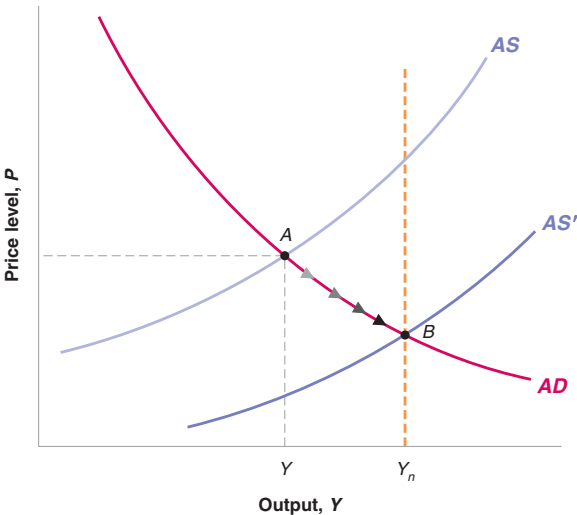- $P$ adjusts to get the "right" real exchange rate, such that $AD = Y_n$:

$$Y_n = Y\left(\bar{E}P/P^*, G, T\right) \rightarrow P$$

# AS/AD Graph



Short run: $P^e$ is fixed.
Output is not at the natural rate.

# Adjustment Over Time



Initially: $P^e > P$.
$W/P$ too high.
$P^e$ falls over time.
$AS$ shifts down

# What Differs From Closed Economy?

- Closed economy:
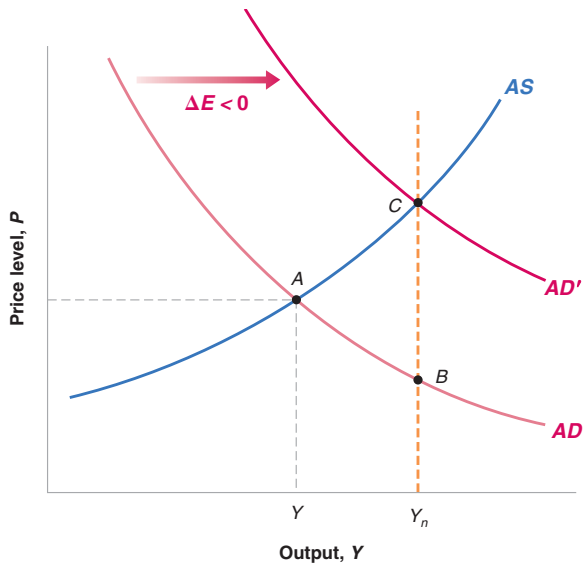  - $P \downarrow \implies M/P \uparrow \implies i \downarrow \implies I \uparrow$
- Open economy:
  - $P \downarrow \implies NX \uparrow$

# Devaluation

- Instead of waiting for $P$ to fall, why not simply lower $E$?
- The effect on the real exchange rate and on demand is the same.
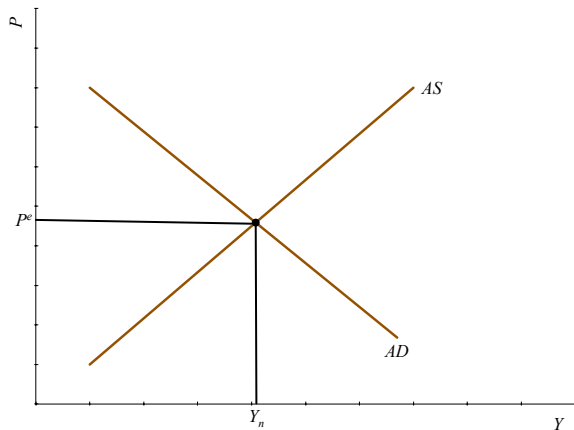- Avoid the painful period of unemployment.

# Devaluation

# A Free Lunch?

- ▶ Now fixed exchange rates look like a free lunch.
- ▶ Avoid exchange rate volatility
- ▶ Gain instant adjustment to full employment through devaluation.
- ▶ What's the catch?
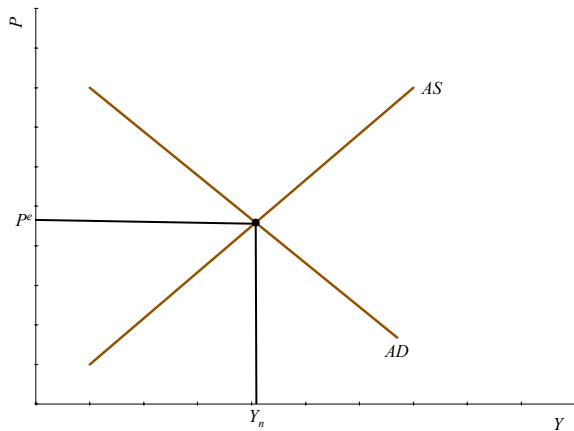- ▶

# Example: Fiscal expansion



Shock: $G \uparrow$
Medium run:
Short run:
Process:

# Example: Increase in $i^*$



Shock: $i^* \uparrow$
Medium run:
Short run:
Process:

# Currency Crises

# Currency Crises

- Under the peg: UIP implies $i = i^*$
- But what happens if investors doubt the peg?
- UIP:

$$i_t = i_t^* - x_t \tag{10}$$

$$x_t = \frac{E_{t+1}^e - E_t}{E_t} \tag{11}$$

- $x$: expected FX depreciation / dollar appreciation.
- In general, the depreciation term $x_t$ can be positive or negative.
- But the peg offers insurance to those who bet against the peg: $x_t$ can never be positive.

# Currency Crises

Example:

- 25% chance of 20% devaluation over the next month
- $x_t = 0.75 \times 0 + 0.25 \times -0.2 = -0.05$
- investors demand an interest premium of 5% **per month** to compensate for this risk

# Policy Options

1. Raise $i$ by 60%
   major recession as borrowing shuts down
2. Raise $i$ by less than 60%
   - capital outflows
   - CB must sell FX and eventually runs out of reserves
3. Devalue the currency

# Lessons

1. Fixed exchange rates are fragile
   1.1 they can only be sustained as long as investors remain utterly convinced that a peg will hold
   1.2 betting against a peg is insured by the government

2. Fixed exchange rates can collapse without reason
   If many investors believe the peg will fail, it will fail.
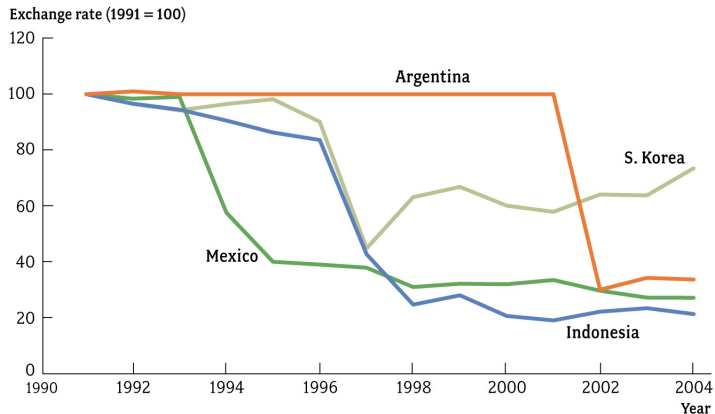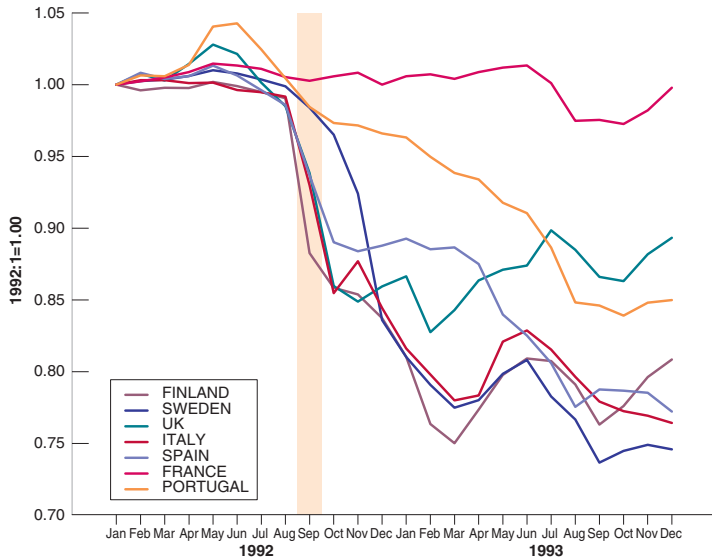
# Crisis Examples



Exchange rate (1991 = 100)

**FIGURE 15.7** **Depreciations During Several Currency Crises, 1991−2004**

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# Crisis Examples

# Which Exchange Rate Regime Is Best?

# The costs of fixing the exchange rate

1. Loss of monetary autonomy.
   - Import the U.S. inflation rate
2. Risk of speculative attacks.
3. Volatile interest rates.
4. Loss of automatic adjustment to certain shocks.

# Benefits of fixing the exchange rate

1. Loss of monetary autonomy.
   - Import the U.S. inflation rate
2. Incentives for fiscal discipline.
   - Cannot print money to finance budget deficits.
3. Stable exchange rate

# The Impossible Trinity

- Exchange rate regimes pursue 3 goals:
    1. Stable exchange rates
    2. Monetary autonomy
    3. Free capital flows.
- Only 2 of the 3 goals are attainable.
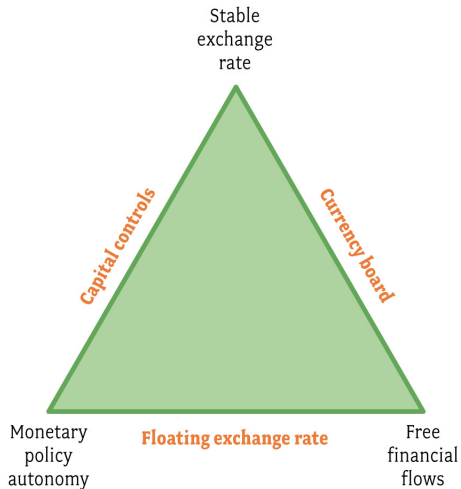
# The Impossible Trinity



FIGURE 15.6 **The Policy Trilemma in Open Economies**

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# Which regime is best?

- ▶ The answer depends on the characteristics of the country.
- ▶ Large, relatively closed countries can handle volatile currencies - they usually float.
- ▶ Small countries with a major trading partner may want to peg
  - ▶ But beware of pegging against the wrong country (Argentina).
- ▶ Countries with questionable central banks may want to peg

# Example: Regime Choice

1. USA vs rest of the world
2. Canada vs USA
3. Argentina vs USA vs Brazil

# Currency Unions

- If the exchange rate is fixed, why not get rid of it?
- Main example: Euro
- Benefits:
    - lower transactions costs
    - credibility
    - speculative attacks no longer possible.
- Costs:
    - irreversible: cannot devalue in response to shocks
    - loss of monetary policy

# Reading

- Blanchard / Johson, Macroeconomics, 6th ed., ch. 21

Additional reading:

- Jones, Macroeconomics, ch. 15.