

# International Capital Flows and Macroeconomic Equilibrium (Chapter 12)

# European Exchange Rate Mechanism



Front cover of EP by Knebel, 2018

## Question?

What happens to GDP and interest rates in the short run, if capital can move freely accross borders?

# Outline

## International capital flows

- ▶ assumptions
- ▶ capital controls

## International financial markets line

- ▶ IS-TR-IFM model
- ▶ impossible trinity

Fixed Exchange rate regime (FIX)

Flexible exchange rate regime (FLEX)

# Introduction: Assumptions

Short-run: prices are fixed

International capital flows are allowed

Small economy

- ▶ does not affect the interest rates of the rest of the world
- ▶ takes the international interest rate requirement as given
- ▶ large economies: USA, China, EU, Japan

Open economy

- ▶ affected by the rest of the world (interest rate parity)
- ▶ no trade barriers or capital controls

# Capital Controls

## Different forms

- ▶ transaction taxes, prohibitions
- ▶ exchange controls: preventions and limitations for buying and selling national currency

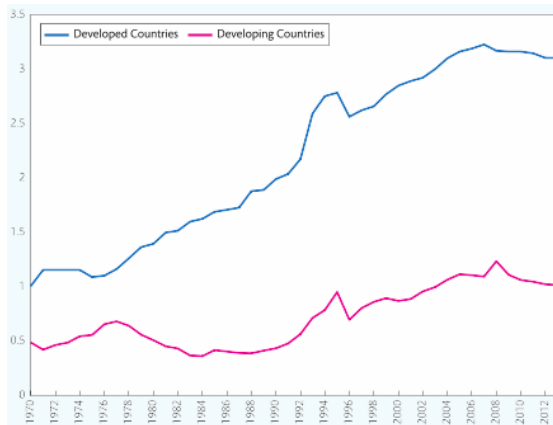
## Brief history

- ▶ part of the Bretton Woods system until early 1970's
- ▶ liberalization since 1970's

## Capital controls in crises

- ▶ capital flows can be volatile, and impact crises
- ▶ in crises countries may impose capital controls
- ▶ Latin American debt crisis 1980's, East Asian financial crises in 1990's, Russian rouble crisis in late 1990's, Icelandic banking crisis 2008, Greek debt crisis 2015

# Financial Account Liberalization 1970–2013



Chinn-Ito index

# Interest Rate Parity

Domestic rate  $i$  equals  $i^*$  (international rate)

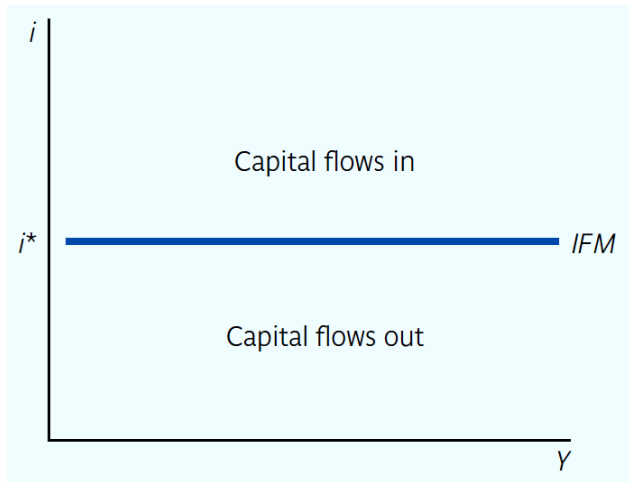
- ▶ no arbitrage: there is no arbitrage when  $i = i^*$
- ▶ if  $i < i^*$  investor would borrow at rate  $i$  and invest at rate  $i^*$ , which would be arbitrage
- ▶ note: small changes in interest rates reflect the risks, in the following risks are ignored

What would happen if  $i > i^*$ ?

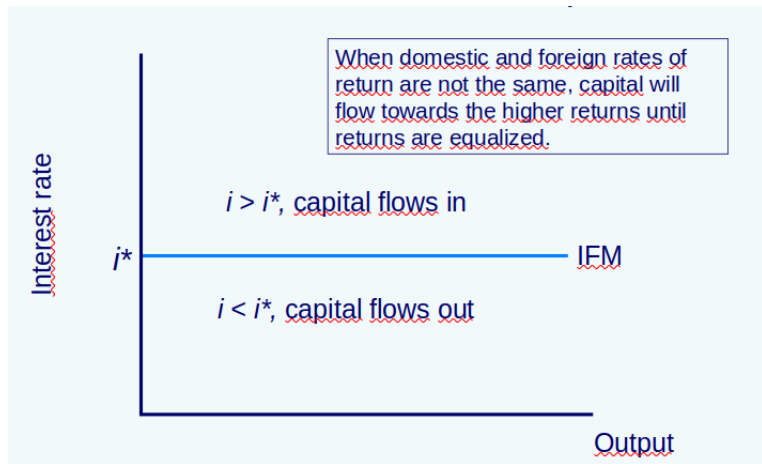
- ▶ money will flow to the country,  $i$  decreases until parity is reached



## International Financial Market (IFM) line



## IFM line



# Fixed Exchange Rate Regime

Central bank commits to keeping parity for its currency

- ▶ usually parity within margins
- ▶ CB supplies commercial banks with whatever volume of reserves they demand
- ▶ exchange market interventions (CB buys and sells its currency)

CB cannot simultaneously choose the exchange rate and the interest rate

- ▶ the only possible interest rate is the one consistent with interest rate parity!
- no TR curve, no monetary autonomy
- ▶ TR curve replaced by IFM curve

## Loss of Monetary Autonomy (FIX)

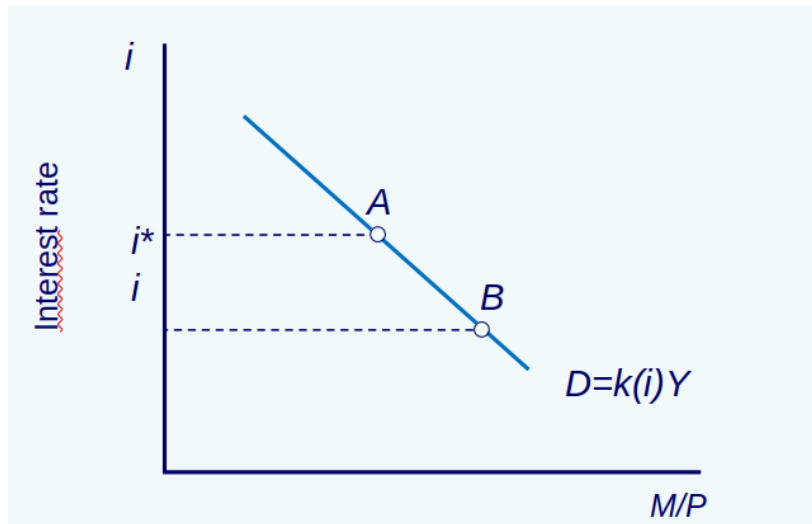
Money demand:  $M/P = k(i)Y$

- ▶ holding  $Y$  constant, increasing  $i$  reduces the demand for real balances

What happens if CB sets  $i < i^*$ ?

- ▶ capital flows out
- ▶ CB must buy its own currency on the foreign exchange market (CB reabsorbs money)
- ▶ money supply decreases, interest rate rises
- ▶ the process goes on until parity is reached

## Money market under fixed exchange rate



# Foreign Exchange Market Interventions

CB balance sheet  $M0 = R + DC$

- ▶  $R$  foreign exchange reserves
- ▶  $DC$  domestic credit

Unsterilized intervention

- ▶ purchase of foreign currency; increase in  $R$  causes  $M0$  to increase (more money in circulation)
- ▶ note: unsterilized intervention may be required to keep the parity

Sterilized intervention

- ▶ offsetting the foreign exchange market operation
- ▶ example: CB sells foreign currency causing decrease in  $M0$ , which is compensated by injecting currency via open market operation (CB buys domestic assets), both  $M0$  and  $DC$  increase in this step, and in the end  $M0$  remains in the original level
- ▶ but: this operations cannot prevent capital outflows (or inflows) indefinitely
- ▶ used for shielding money stock from foreign interventions

# China

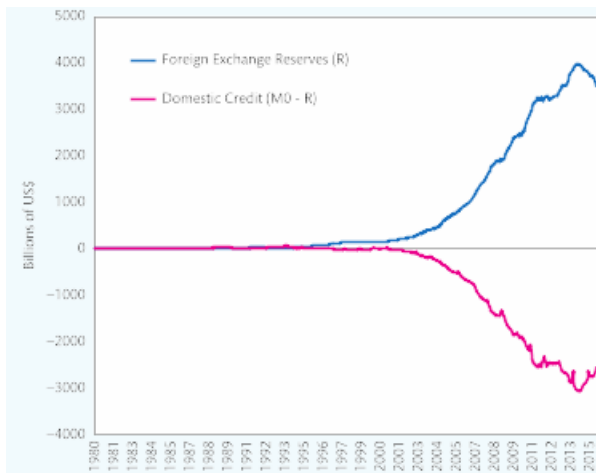
1995 China started pegging RMB to US dollar

- ▶ to prevent appreciation and loss of competitiveness
- ▶ large current account surplus, financial inflows
- ▶ massive foreign exchange reserves
- ▶ issuing debt, reducing DC (to prevent inflation)
- ▶ in 2014 pressure for currency depreciation
- ▶ decline of reserves, upward shift of IFM (investors required higher risk premium)
- ▶ lower growth
- ▶ some capital controls were imposed

Recent development

- ▶ capital outflow, lower growth

# China





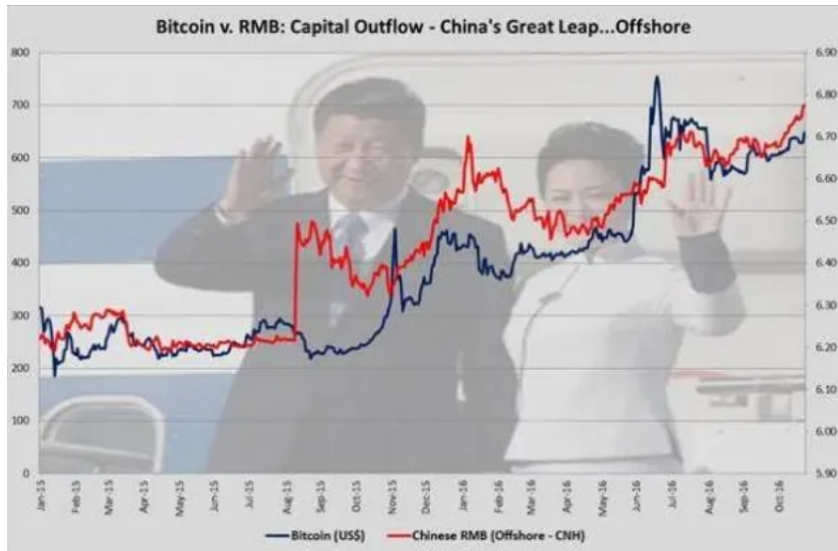
# RMB and Bitcoin

RMB (offshore) and Bitcoin have been highly correlated

Capital flows out

- ▶ demand for other currencies, due to regulation Bitcoin is attractive
- ▶ BTC become a mean to circumvent capital controls that were placed to slow RMB depreciation
- ▶ to prevent capital outflows 2017 PBOC imposed a ban on Bitcoin exchanges, 6 % drop in BTC price
- ▶ up to 2017 BTC was used by some as a capital outflow proxy

# China



# Examples of Shocks (FIX)

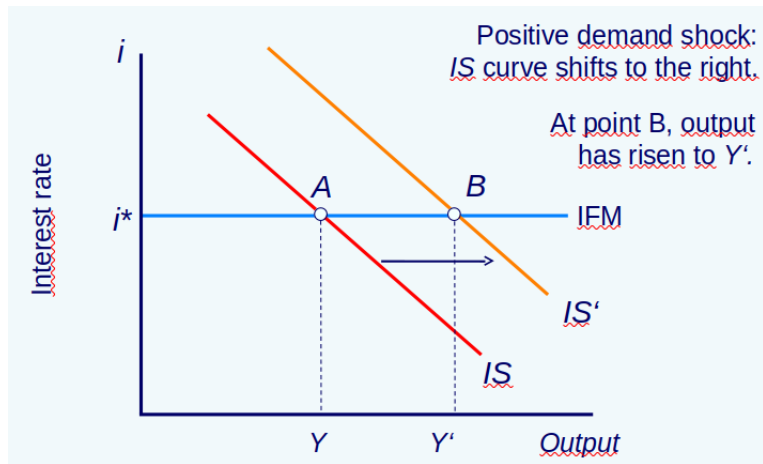
## Increased government spending

- ▶ expansion is stronger than without capital mobility
- ▶ note with Taylor rule: higher demand is met by a higher interest rate which crowds out some of the demand

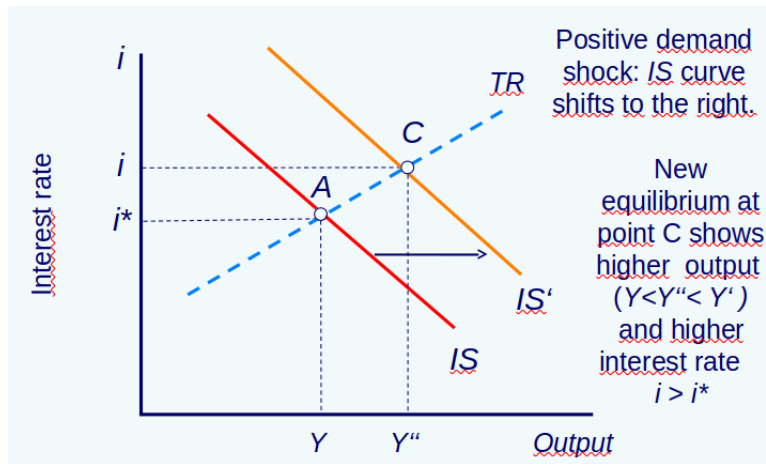
## Tighter international monetary conditions

- ▶  $i^*$  increases, IFM line shifts up
- ▶ interest rates must rise domestically, the economy contracts
- ▶ financial crisis: US  $i^*$  first (panic) rose and then declined (FED stepped in), the rest of the world followed

## Demand Shock with Capital Mobility (FIX)



## Demand Shock without Capital Mobility



# International Financial Shock

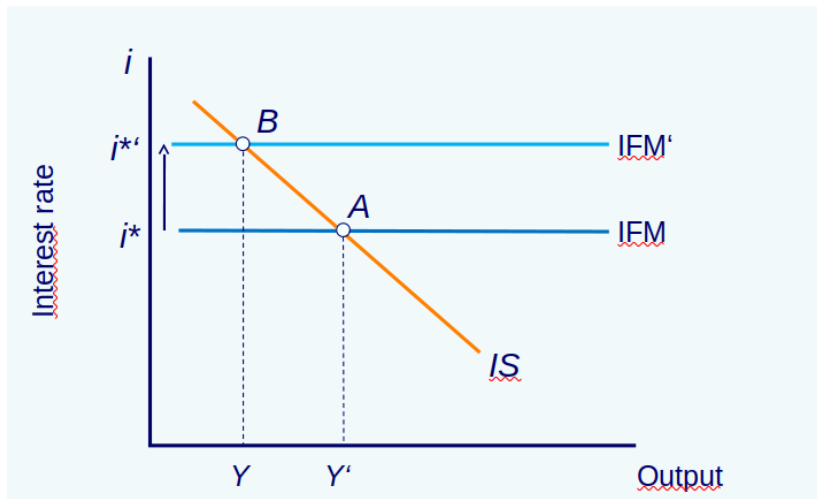
## Fixed exchange rate

- ▶ IFM moves from IFM to IFM'
- ▶ output declines
- ▶ new equilibrium at  $B$

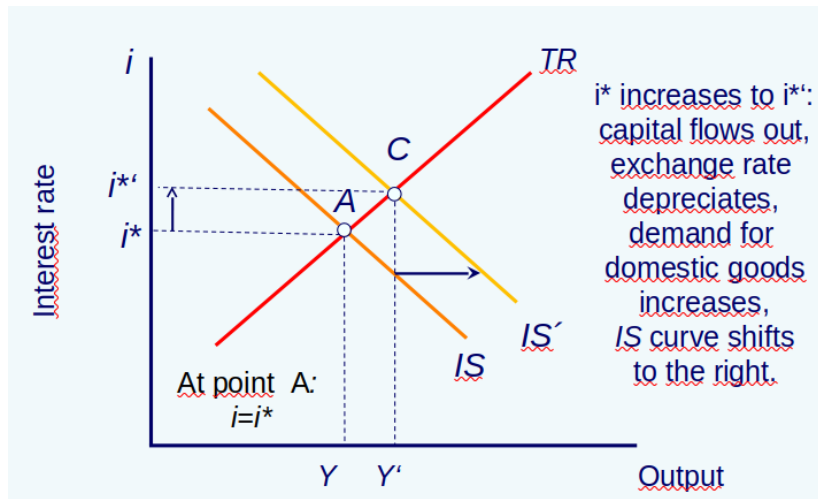
## Flexible exchange rates

- ▶ exchange rate depreciates, increased competitiveness, shift of IS curve to the right
- ▶ new equilibrium with higher output

## Fixed Exchange Rate



## Flexible Exchange Rate





# Parity Change (in Fixed Exchange Rate Regime)

Fixed but adjustable exchange rate

- ▶ nothing prevents from changing the exchange rate level

Revaluation

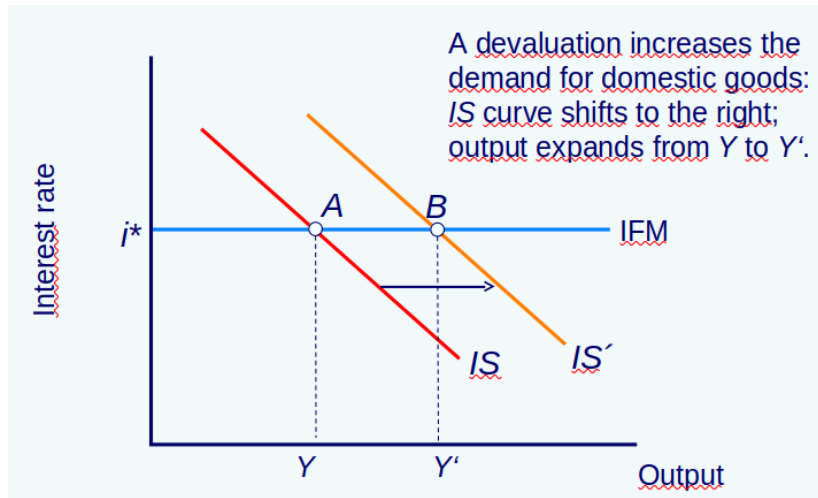
- ▶ increase of the external value of the currency
- ▶ change of the nominal exchange rate translates directly to the real exchange rate

$$\sigma = SP/P^*$$

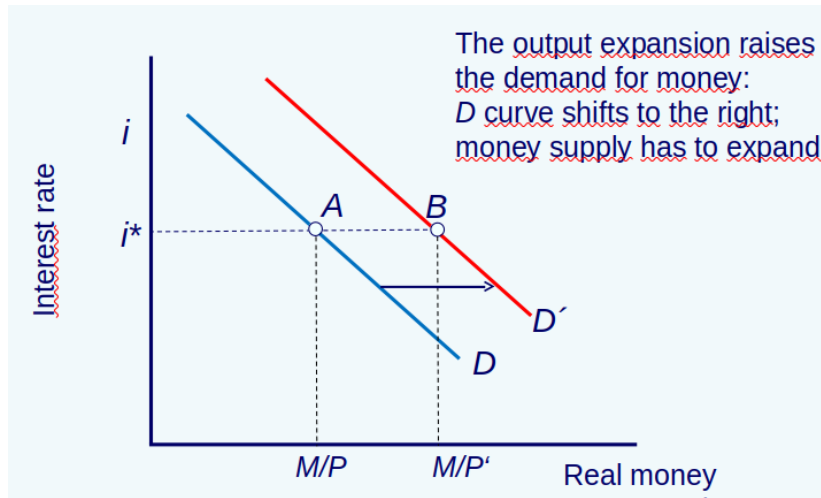
Devaluation

- ▶ decrease of the external value of the currency, lowers  $\sigma$  (raises competitiveness)
- ▶ exports rise, imports decline, net exports increase
- ▶ IS curve shifts outwards
- ▶ monetary expansion

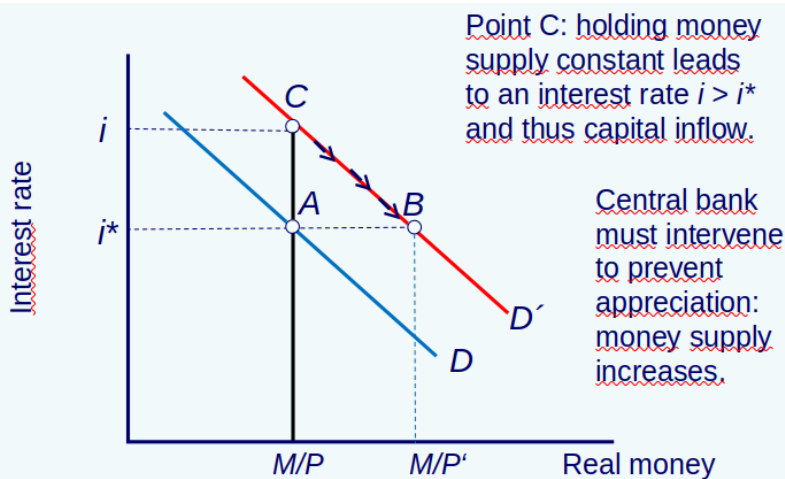
## Devaluation (FIX)



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## Devaluation (FIX)



# Devaluation (FIX)

## Finland until Euro membership

- ▶ "devaluation cycle": currency was devaluated once in a decade

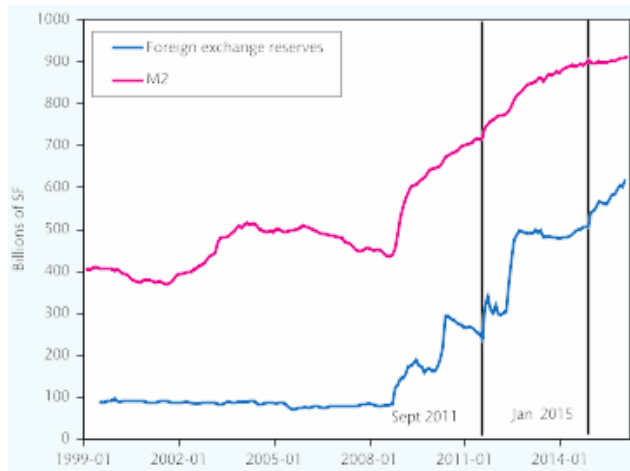
## Credibility problem

- ▶ investors suspect devaluation, expectations change
- ▶ pressure to CB; has to buy domestic currency to prevent it from weakening, in the end foreign reserves may deplete and there is devaluation
- ▶ an alternative: increase domestic interest rate (apply capital controls)
- ▶ 1990's Finland: interest rate of bank loan was about 8.72
- ▶ without Euro interest rates would presumably be higher even today
- ▶ asymmetry: easier to prevent currency from revaluating (just print money, inflation concern)

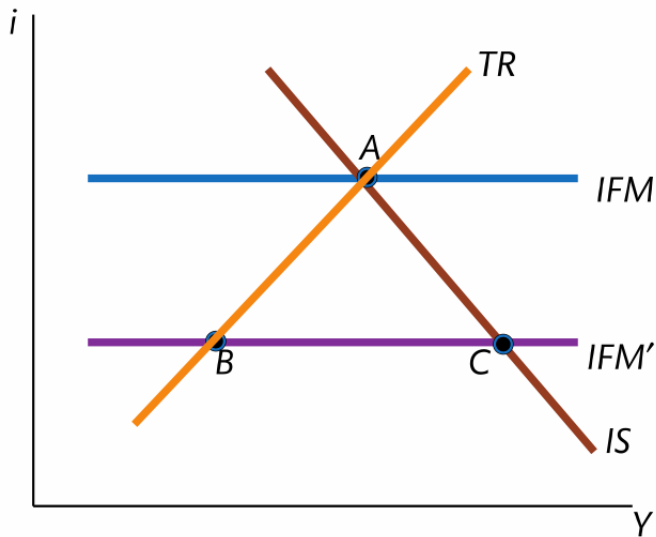
## Switzerland after the Financial Crisis



## Switzerland after the Financial Crisis



## Switzerland after the Financial Crisis





# Flexible Exchange Rates

Central bank is not committed to any fixed exchange rate

- ▶ CB has ability to conduct monetary policy (Taylor rule is effective again)
- ▶ the value of the exchange rate is determined by market forces
- ▶ external competitiveness is endogenous
- ▶ IS curve is endogenous

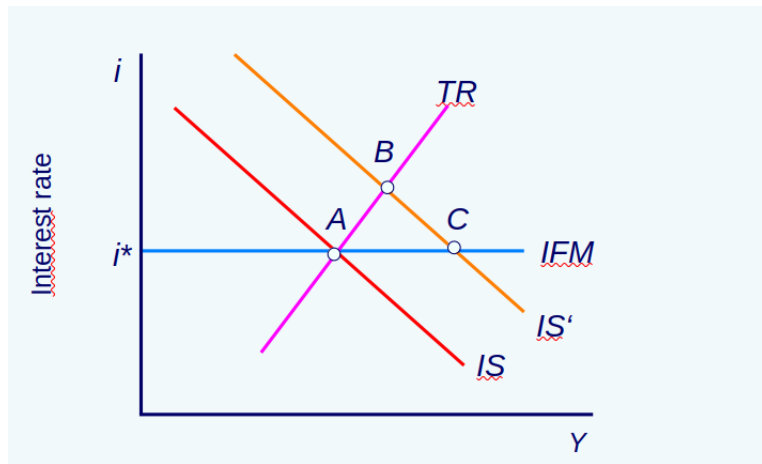
In the long run  $i = i^*$

- ▶ temporary deviations are possible

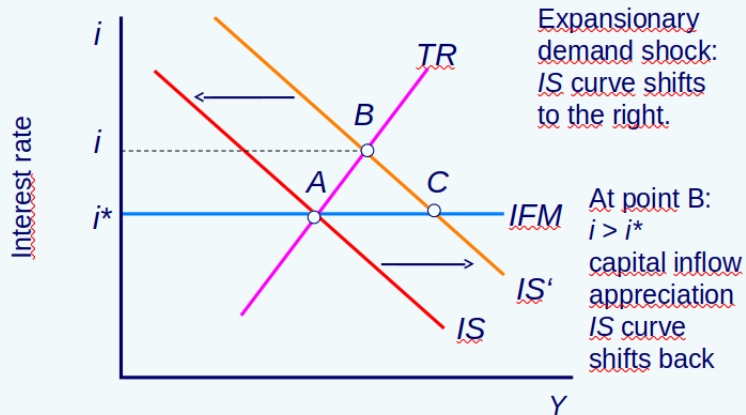
Some examples

- ▶ UK, Sweden

## Demand Shock (FLEX)



## Demand Shock (FLEX)



# Monetary Policy Shock (FLEX)

Monetary policy shock, decrease of  $\bar{i}$

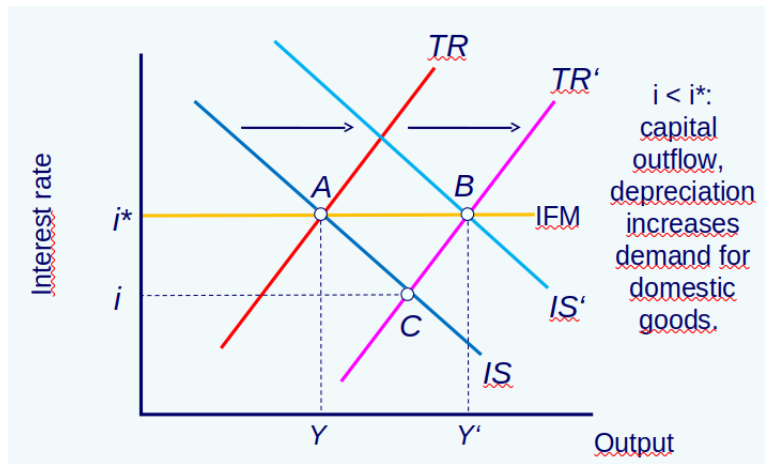
- ▶ TR curve shifts right
- ▶ capital flows out as long as  $i < i^*$
- ▶ currency depreciates (real depreciation)
- ▶ economy becomes more competitive
- ▶ output increases
- ▶ is this a paradox?

Money demand curve is shifted up

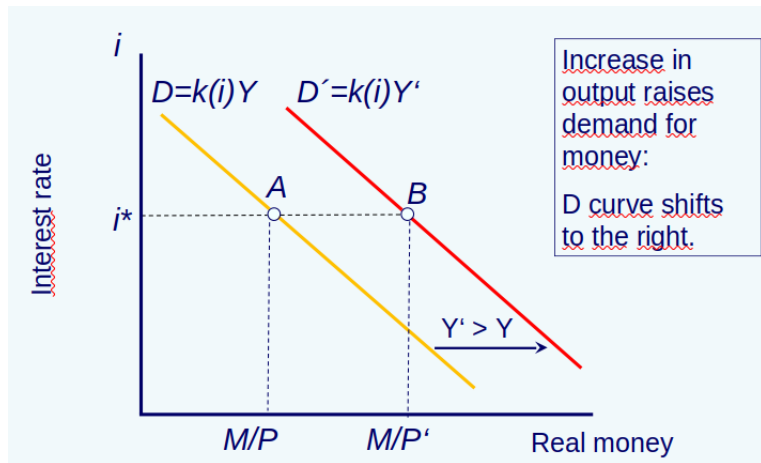
- ▶ additional money created flows abroad
- ▶ exchange rate depreciates
- ▶ demand is increased and hence output as well

Effectively monetary policy becomes exchange rate policy

## Monetary Policy Shock (FLEX)



## Monetary Policy Shock (FLEX)

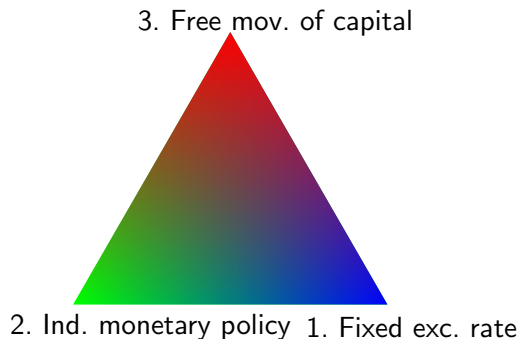


# The Impossible Trinity

Only two of the three is possible

1. Fixed exchange rate
2. Independent monetary policy
3. Free movements of capital

# The impossible trinity



On which edge would you place?

- ▶ EU, UK, US
- ▶ China
- ▶ Hong Kong



# Shifts of the IFM Curve (FLEX)

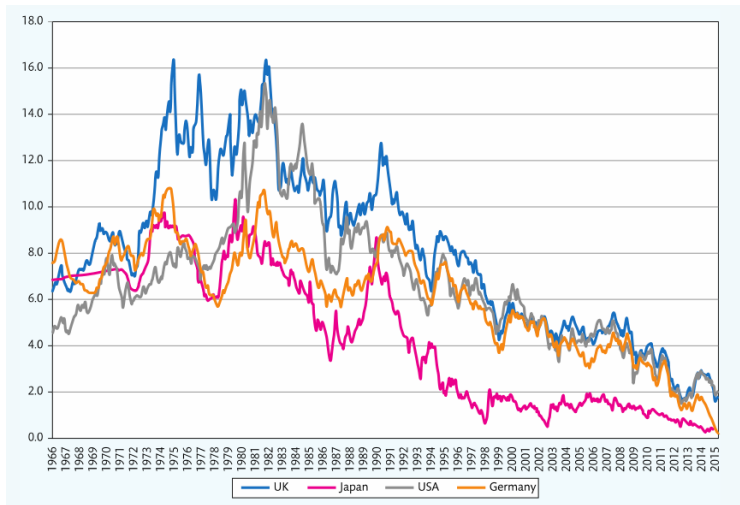
If  $i^*$  increases  $i$  must follow

- ▶ for example stricter monetary policy
- ▶ foreign GDP decreases
- ▶ IFM moves up
- ▶ capital outflow until  $i = i^*$
- ▶ depreciation of the exchange rate
- ▶ increased competitiveness
- ▶ economy expands, IS curve shifts

Beggar thy neighbor policy

- ▶ monetary expansion abroad (lower foreign interest rates)
- ▶ increases foreign GDP
- ▶ decreases elsewhere

# US Rates Driving the Rest of the World



10-year gov't bond rates

# Summary of the Mundell-Fleming Model

Disturbance +/-	Fixed exc. rates Effect on GDP	Flexible exc. rates Effect on GDP
IS shift +	increase	no effect
TR shift -	no effect	increase
IFM shift +	decrease	increase

Policy instrument	Fixed exc. rates	Flexible exc. rates
Exog. monetary policy	exchange rate	interest rate
Endog. monetary policy	interest rate	exchange rate

# Exchange Rate Regimes in EU

