

Aggregate Demand and Aggregate Supply (Chapter 14)

Part II

Robert Gober: Monument Valley



print on interleaving paper, in the collection of Whitney Museum of American Art (NY)

Questions

How does expansive fiscal policy work in a country with a flexible exchange rate?

How does monetary policy function under flexible exchange rate regime?

Outline

Aggregate demand under flexible exchange rate

- ▶ AS-AD model
- ▶ monetary policy

Shocks in AS-AD model (fixed or flexible exchange rates)

- ▶ supply and demand shocks

Reminder: short run AS curve $\pi = \tilde{\pi} + aY_{\text{gap}} + s$

- ▶ long run AS curve is vertical

Flexible Exchange Rate

Exogenous monetary policy

- ▶ Taylor rule: $i = \bar{i} + a\pi_{\text{gap}} + bY_{\text{gap}}$

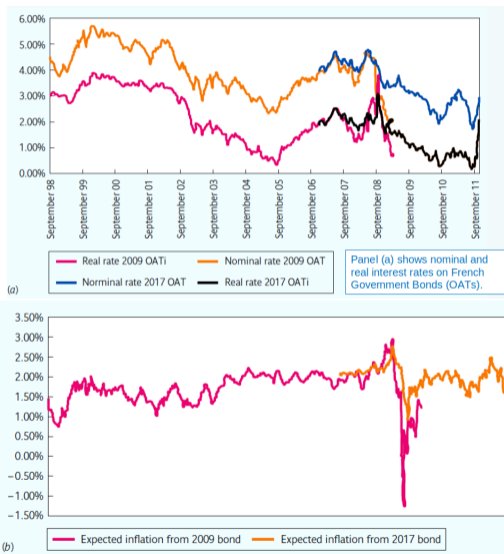
Nominal exchange rate is endogenous

Fisher equation: $r = i - \pi^e$

- ▶ π^e is ex ante expected inflation rate (not observed)
- ▶ in the long run $\bar{i} = \bar{r} + \bar{\pi}$, where \bar{r} is the long-run real interest rate
- ▶ CB determines the position of the LAD line (by choosing $\bar{\pi}$); inflation is independent from output
- ▶ note: \bar{i} is the target interest rate or the neutral interest rate
- ▶ note: real rate of holding money is $r = 0 - \pi = -\pi$

Thought experiment: what if ECB would set $\bar{\pi}$ higher than US π^* ?

Expected Inflation of France 1998-2011

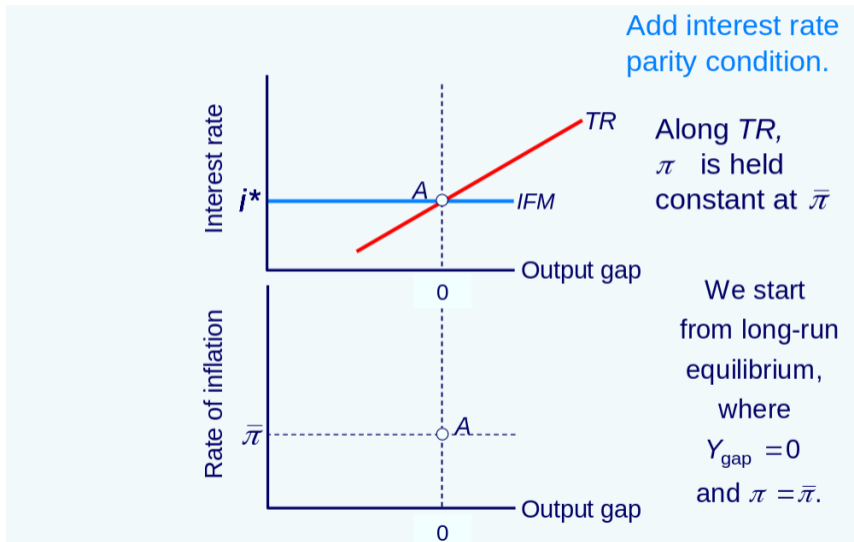


Short-Run AD Curve

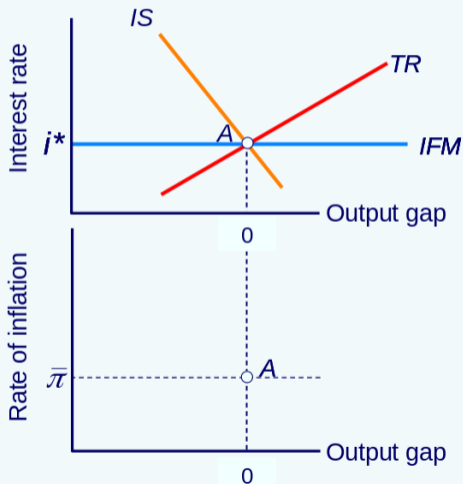
What if inflation increases?

- ▶ according to Taylor rule CB raises interest rate i (TR curve shifts to left)
- ▶ short-run equilibrium output decreases
- ▶ negative relationship between inflation and output
- ▶ decreasing short run AD curve

AD under Flexible Exchange Rates



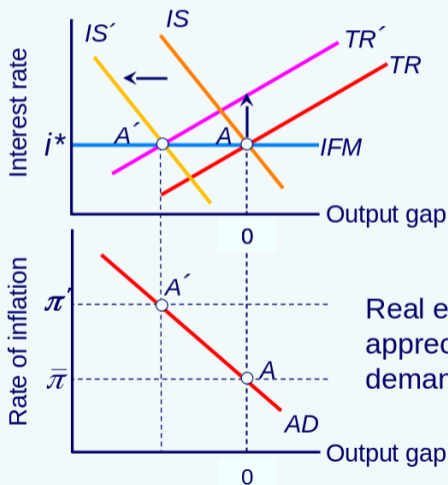
AD under Flexible Exchange Rates



Recall:
position of IS
curve is now
endogenous,
shifting with
the real
exchange
rate so it
passes
through A in
upper figure.

AD under Flexible Exchange Rates

Now
suppose
domestic
inflation
increases
to π' .



Higher inflation
triggers higher
interest rate via
Taylor rule: TR
shifts up to TR' .

Real exchange rate
appreciates, reducing
demand (point A').

Summary: Obtaining the AD Curve

Inflation shifts the Taylor rule

- ▶ increase in inflation leads to upward shift, temporarily $i > i^*$

Real exchange rate changes

- ▶ real exchange rate is $\sigma = SP/P^*$
- ▶ increase in inflation leads to increase in σ (P increases faster than P^*) and $i > i^*$ increases S temporarily (capital inflow)

Exchange rate change impacts IS curve

- ▶ increase in σ leads to downward shift of IS curve (more consumption to imports)

Returning back to IFM line

- ▶ there should be no arbitrage; hence parity $i = i^*$
- ▶ (parity is reached when the nominal exchange S rate adjusts)
- ▶ (for an increase in inflation there is depreciation of the currency after the temporary appreciation)

Inflation and Exchange Rate

IS-TR-IFM: $i = i^*$

Return on domestic bond $(1 + i)$

Return on foreign bond with nominal interest \tilde{i}

- ▶ return when investing one unit of domestic currency $(1 + \tilde{i})S_t/S_{t+1}^e$
- ▶ implication: $i = i^* = (1 + \tilde{i})S_t/S_{t+1}^e - 1$ (uncovered interest rate parity)

If $i > \tilde{i}$

- ▶ then $S_t/S_{t+1}^e > 1$, i.e., nominal exchange rate is expected to weaken

Increasing the inflation target increases S_t/S_{t+1}^e

- ▶ note: increasing the inflation target means increasing interest rates

AD Curve Comparisons

Note: in this slide price levels instead of inflation

Closed economy $AD(M/P, G, T)$

- ▶ closed: no trade to outside, no capital flows

Open economy $AD(M/P, \sigma, G, T)$ or $AD(M/P, \sigma)$ (flexible exchange rates)

OE with **fixed exchange rate**

- ▶ $\sigma = \bar{S}P/P^*$, where \bar{S} is the fixed exchange rate and P and P^* are the domestic and foreign price indices, respectively

OE **flexible exchange rate**

- ▶ S in $\sigma = SP/P^*$ is not fixed, it adjusts
- ▶ note also the role of monetary policy
- ▶ fiscal policy is ineffective: for example increase in G is offset by IS curve shifting due to higher interest rates by Taylor rule

Example: Finding the AD Curve (FLEX)

$$DD = 800 + 0.6Y - 2500i + NX(Y^*, Y, \sigma)$$

$$NX(Y^*, Y, \sigma) = [0.036Y^* - 80\sigma] - [0.1Y + 20\sigma], \quad Y^* = 10000$$

$$\sigma = \bar{\sigma}(1 + \pi)$$

- ▶ assume that the initial real exchange rate is $\bar{\sigma} = 1$

$$\text{IS curve } Y = 2 \times 1160 - 5000i - 200\sigma$$

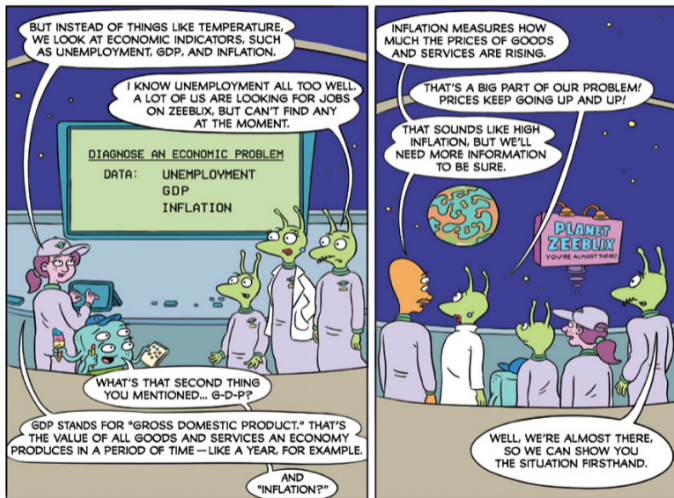
- ▶ $Y = 2320 - 5000i - 200(1 + \pi)$

$$\text{Taylor rule } i = [Y - 1000 + 20\pi]/5000$$

AD Curve

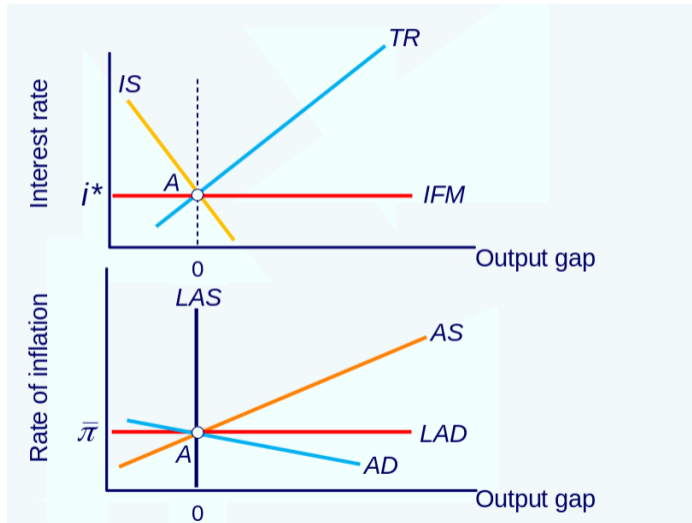
- ▶ $Y = 2320 - 5000[Y - 1000 + 20\pi]/5000 - 200(1 + \pi)$ which yields
 $2Y = 3220 - 220\pi$
- ▶ $Y = 1610 - 110\pi$

NY Fed: The Story of Monetary Policy



[Link to full comic book.](#)

Monetary Policy under Flexible Exchange Rates



Monetary Policy (FLEX)

Taylor rule

- ▶ the rule may change, e.g. new target inflation

What happens when $\bar{\pi}$ increases?

- ▶ LAD shifts up, LAS is unchanged (the real side stays the same)
- ▶ short run: reduction of i
- ▶ exchange rate depreciation
- ▶ output rises, unemployment decreases, inflation increases
- ▶ underlying inflation catches up, AS curve shifts upwards
- ▶ increasing inflation leads to increasing interest rates and exchange rate appreciation (TR and IS curve shift)
- ▶ return to long run output with higher inflation

Monetary Policy under Flexible Exchange Rates

Taylor rule: $i = \bar{i} + a\pi_{\text{gap}} + bY_{\text{gap}}$

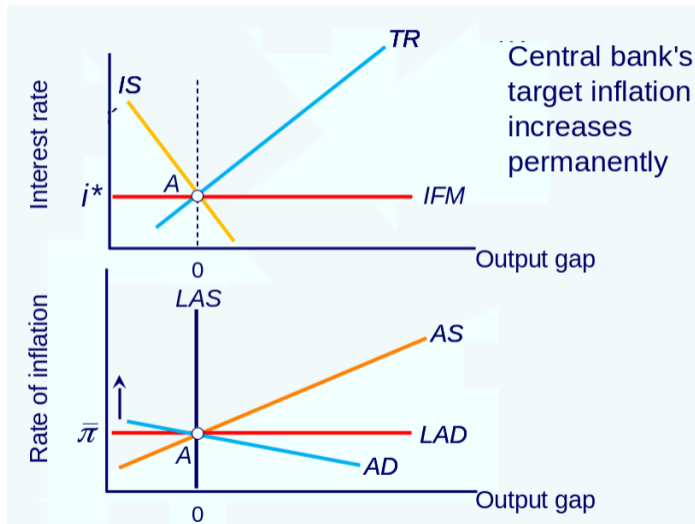
With Fisher equation: $i = \bar{r} + \bar{\pi} + a(\pi - \bar{\pi}) + bY_{\text{gap}}$

► rearranging: $i = \bar{r} + (1 - a)\bar{\pi} + a\pi + bY_{\text{gap}}$

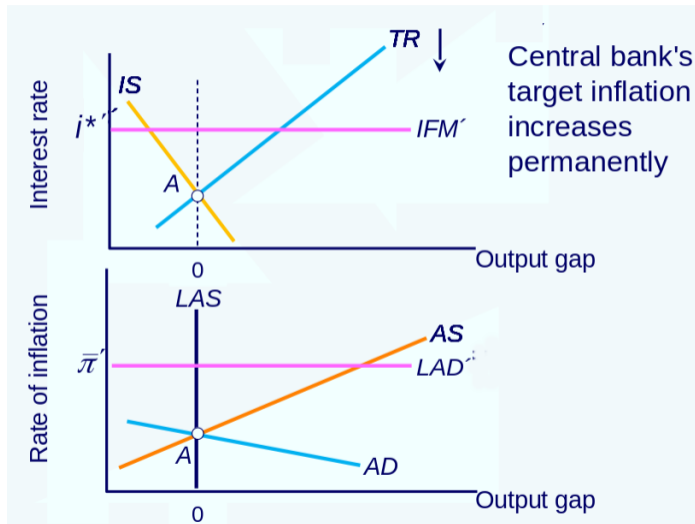
If $a > 1$, increase in $\bar{\pi}$ lowers i , TR curve shifts down

► if $a \in [0, 1)$, TR would shift up, situation is generally unstable

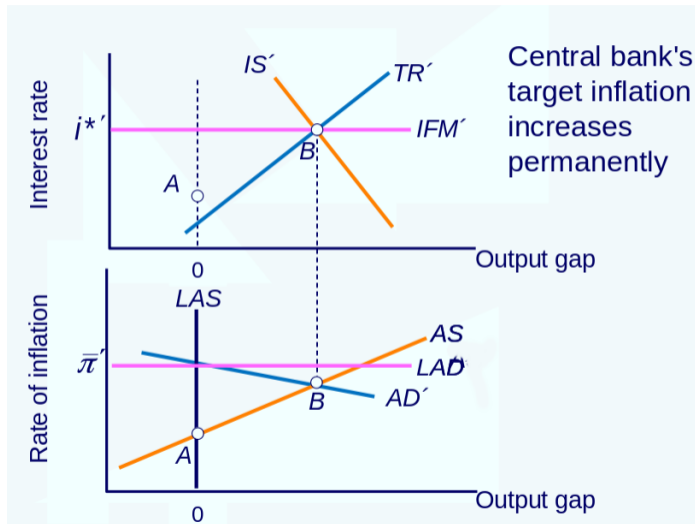
Monetary Policy under Flexible Exchange Rates



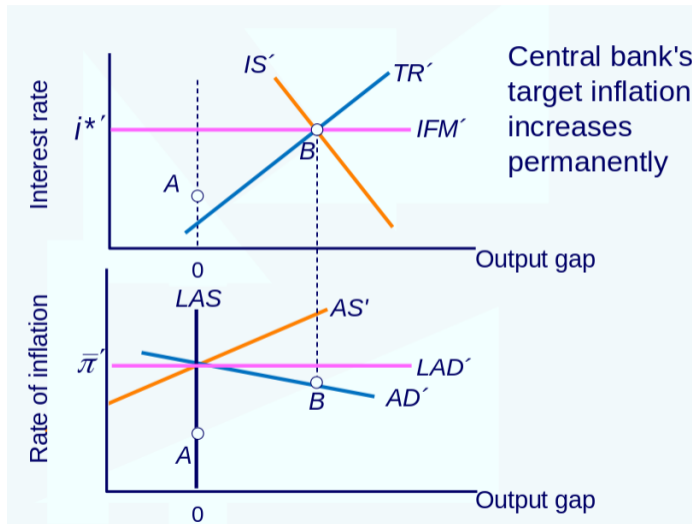
Monetary Policy under Flexible Exchange Rates



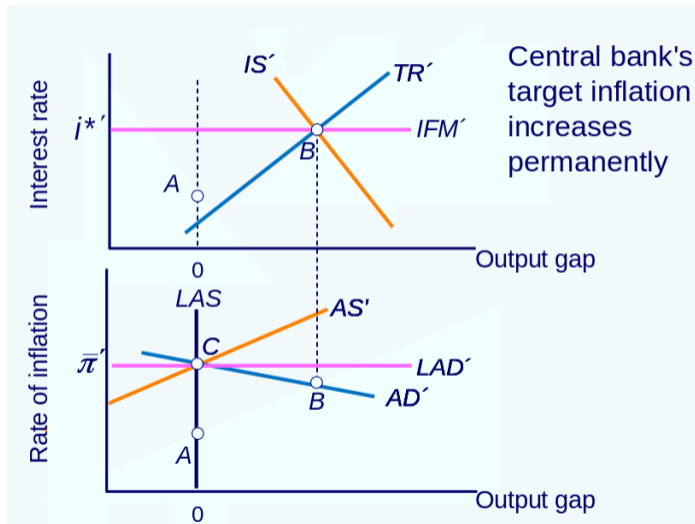
Monetary Policy under Flexible Exchange Rates



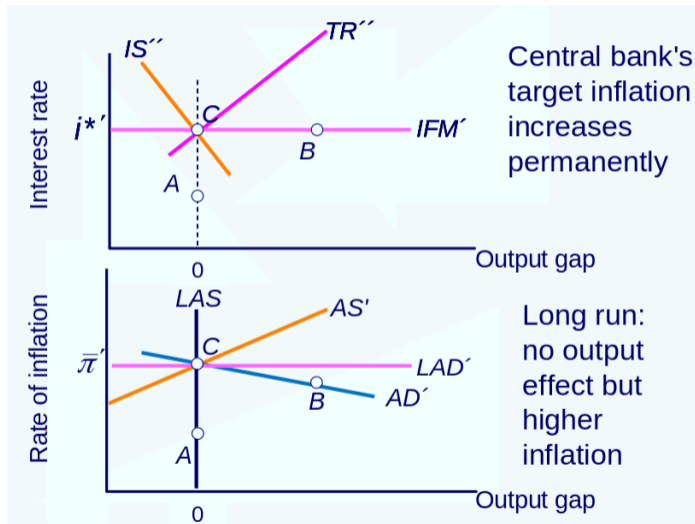
Monetary Policy under Flexible Exchange Rates



Monetary Policy under Flexible Exchange Rates



Monetary Policy under Flexible Exchange Rates



Different Time Horizons

Short run

- ▶ 1–2 year, price stickiness, Mundell-Fleming model

Medium run

- ▶ 2–5 years, transition from short run to long run
- ▶ short run AS curve shifts when underlying inflation catches up
- ▶ wage and price indexation speeds up the process

Supply Shocks (FIX/FLEX)

Sudden losses of human or physical factors of production

- ▶ natural disasters
- ▶ new inventions (IT, electricity, etc)

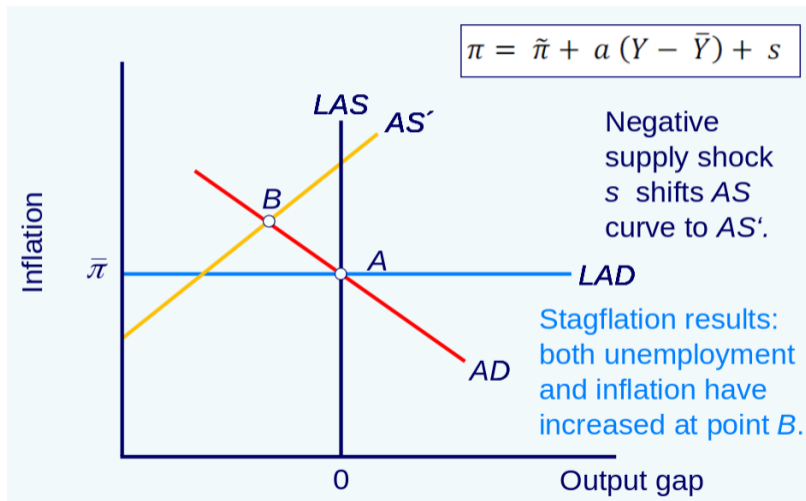
AS curve $\pi = \tilde{\pi} + a(Y - \bar{Y}) + s$

- ▶ unfavorable supply shock $s > 0$
- ▶ AS curve is shifted up
- ▶ stagflation: increasing inflation and declining real growth
- ▶ price increase may initiate wage increase (slowing down shift of AS back)

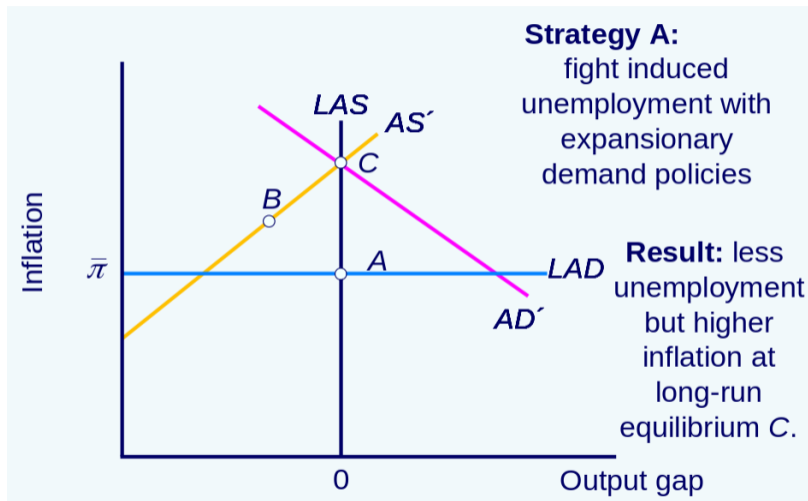
Possible policy responses

- ▶ expansionary demand policy (AD shifted up)
- ▶ preventing inflation (managing the forward looking component of $\tilde{\pi}$)
- ▶ note: fixed exchange rate may be hard to maintain

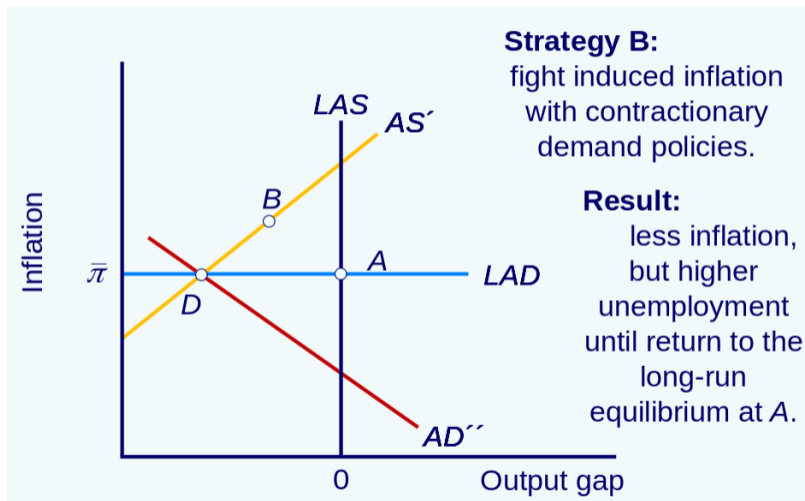
Supply Shocks



Supply Shocks



Supply Shocks



Demand Shocks (FIX/FLEX)

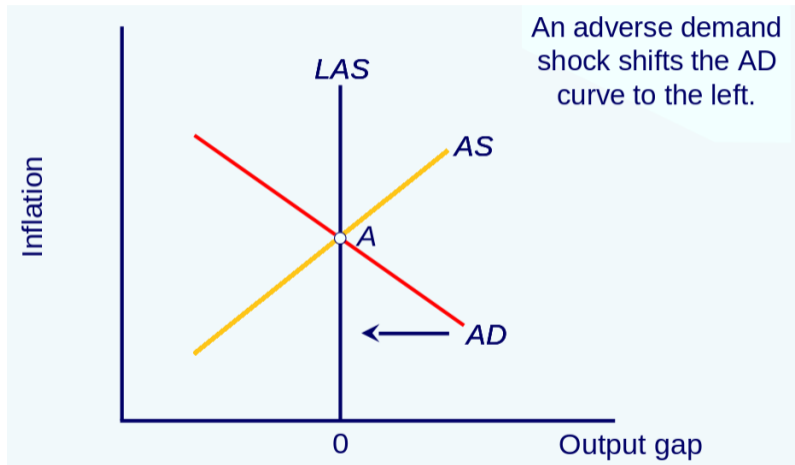
Examples

- ▶ German reunification (positive shock)
- ▶ global financial crisis (negative shock)

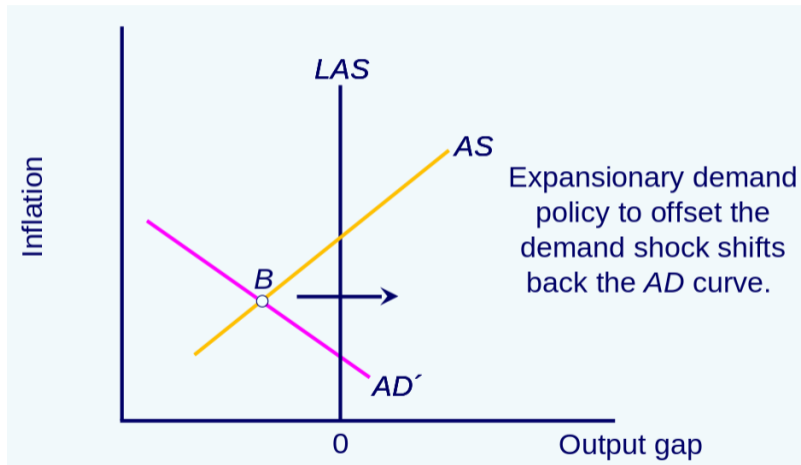
Demand shock shifts AD curve

- ▶ monetary or fiscal policy can shift the curve back
- ▶ example: low interest rates after GFC

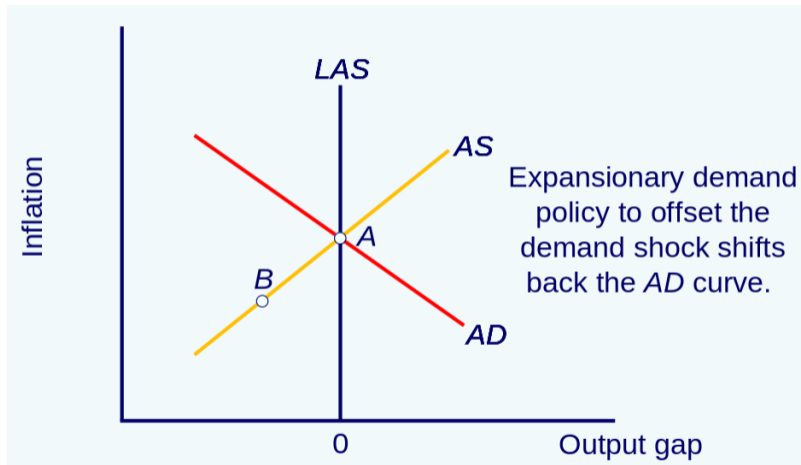
Demand Shock



Demand Shock



Demand Shock



Disinflation: Flexible Exchange Rates

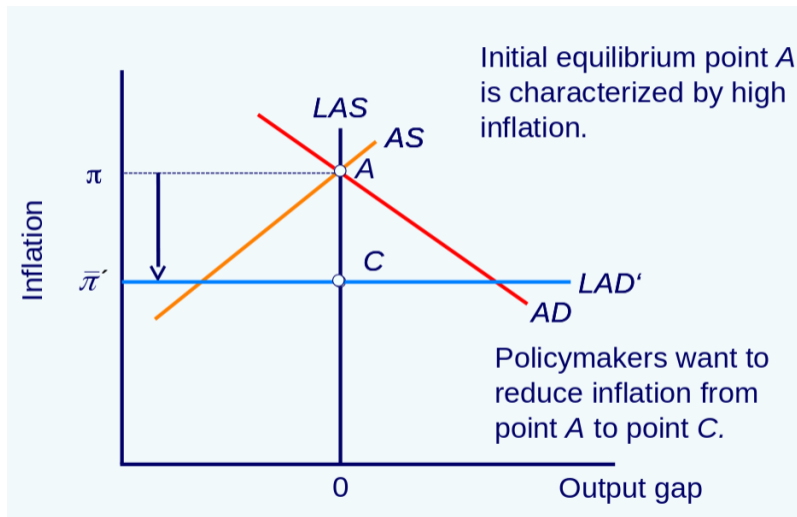
Reducing the rate of inflation

- ▶ CB chooses the target inflation rate

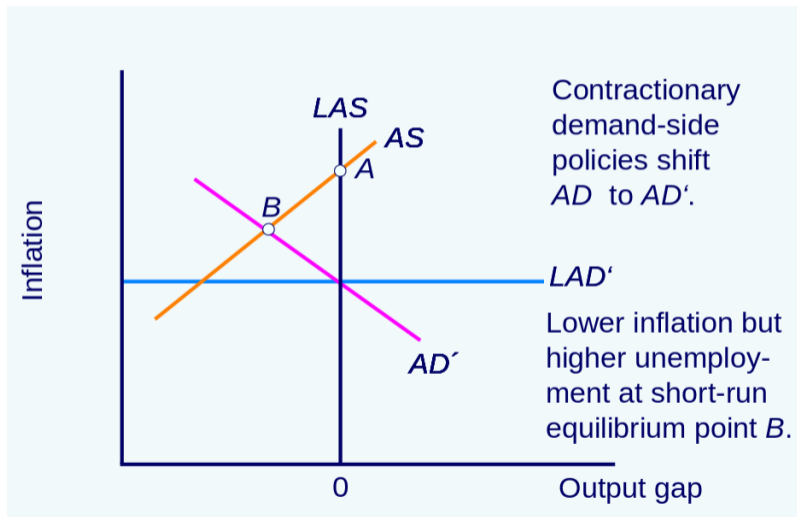
Decreasing the target inflation rate

- ▶ LAD shifts down, TR curve shifts up
- ▶ real interest rate appreciates
- ▶ current account worsens, demand declines (AD shifts left)
- ▶ inflation decreases, unemployment increases
- ▶ underlying inflation shifts down, so does AS curve

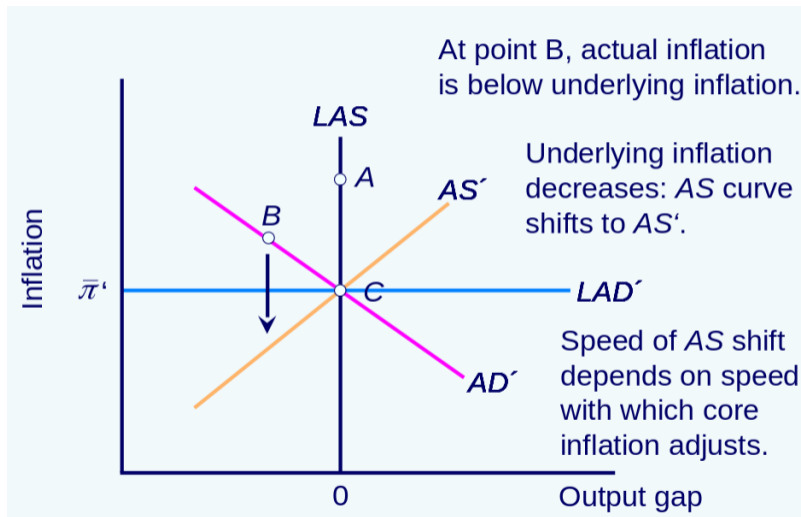
Disinflation (FLEX)



Disinflation (FLEX)



Disinflation (FLEX)



The Great Inflation

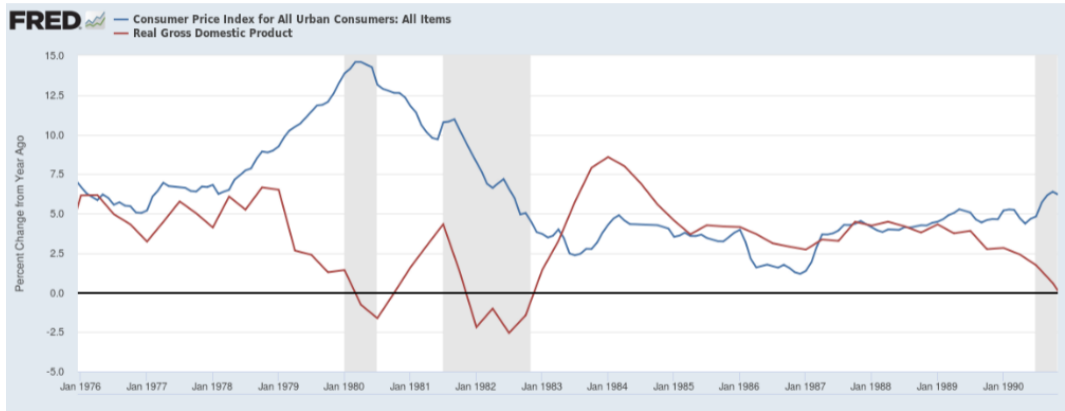
Period of high inflation in the US from 1965 to 1982

- ▶ "the greatest failure of American macroeconomic policy in the postwar period" (Siegel 1994)
- ▶ root cause: an excessive growth in the supply of money
- ▶ reason for "bad mp": pursuit of full employment (misunderstanding Phillips curve as a long run relationship)
- ▶ collapse of the Bretton Woods: no monetary policy anchor for USD
- ▶ oil crises, fiscal imbalances (e.g. Vietnam war) which made mp more challenging

Paul Volcker as the chair of Fed

- ▶ monetary targeting (targeting money growth rate)
- ▶ two recessions after which the period was over!

Volcker Disinflation



Role of Central Banks

Fixed Exchange Rates: exchange rate as anchor

- ▶ committing to fixed peg, signals commitment to decrease inflation (in case it is high)

Flexible Exchange Rates

- ▶ independent central bank that can credibly tackle inflation
- ▶ inflation targeting strategy

Iceland (FLEX) and Ireland (FIX) in the Financial Crisis

Similar starting points

- ▶ large financial sector, large foreign investments

Crises

- ▶ decline in credit and stock prices (decreasing Tobin's q)
- ▶ IFM curve shot up
- ▶ AD curve shifted left
- ▶ declines in GDP; Iceland (10.4% in 2009–2010), Ireland (12.1% in 2008–2010)

Differences

- ▶ Ireland in fixed exchange rate regime
- ▶ Iceland in flexible exchange rate regime

Iceland and Ireland in the Financial Crisis

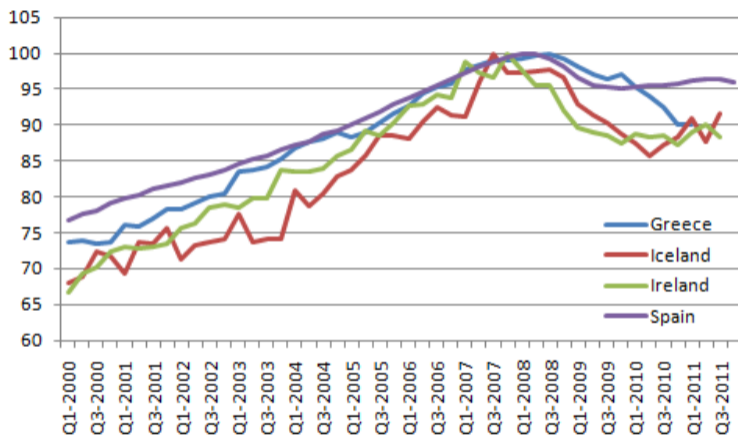
Iceland

- ▶ currency depreciated
- ▶ inflation increased
- ▶ capital controls, expropriation of foreign investors
- ▶ central bank lending money
- ▶ recapitalization of banks
- ▶ AD curve back up

Ireland

- ▶ deep recession
- ▶ deflation
- ▶ recapitalization of banks
- ▶ protection of investors
- ▶ government debt increased
- ▶ central bank lending money

Iceland and Ireland in the Financial Crisis



Volume of GDP indices, seasonally adjusted and rebased to top=100

Wage Bargaining and Inflation

Staggered wage negotiations

Synchronized wage negotiations

Indexation of wages

- ▶ reduces staggering
- ▶ side-effects: rush to be the first, reduced support for anti-inflation policies
- ▶ lack of (downward) flexibility
- ▶ illegal in many countries

Hard pegs

- ▶ using exchange rate as an anchor to make it (politically) costly to devalue
- ▶ purpose is to decrease inflation expectations and thus reduce wage increases

An "Essay" Question

Assume flexible exchange rate regime

Price of primary commodities (that are imported) rise sharply

What will happen?

- ▶ to nominal interest rate
- ▶ to foreign exchange rate
- ▶ to output and inflation
- ▶ to price of primary commodities