

# **International Finance 4832**

## **Lecture 8: Fixed vs. Floating Exchange Rate Regimes**

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# Outline

Before:

Part I: Exchange Rates

1. Short-run: UIP, CIP, Arbitrage → Spot ER determination
2. Long-run: PPP, RIP → Expected (future) ER determination

Part II: Balance of Payments and External Wealth

1. Flows: trade of goods, services and assets; income flows; other (transfers)
2. Stock: Net Foreign Assets and the Long Run Budget Constraint (LRBC)
3. IS-LM-FX

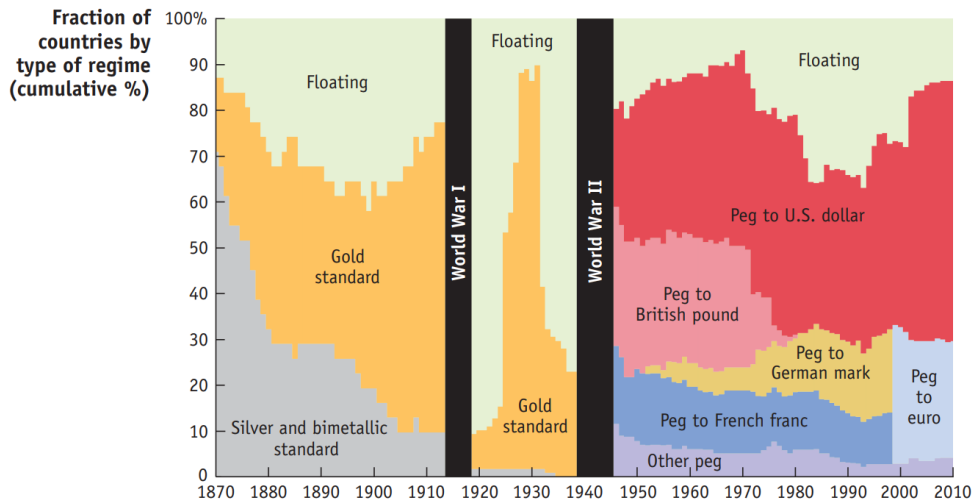
Now: Part III → Policy applications

ER Regimes in detail: Fixed vs. Floating

The Gold Standard, Bretton Woods, ERM (pre-Euro)

Exchange Rate crises and models

# Exchange Rate regimes across history



Source: Meissner (2005), "A New World Order: Explaining the International Diffusion of the Gold Standard, 1870-1913", Journal of International Economics.

# Exchange Rate Regimes

Some questions related to the graph from before:

Why do some countries fix and other float?

If there was a one-size-fits-all regime we should see convergence towards one regime → we don't see that

Why do some countries change ER regime?

What was the Gold Standard? why did it end?

What was Bretton Woods? why did it end?

What is the role of wars and recessions when deciding on a ER regime?

We answer some of these questions in this unit ...

Some spoilers: we're just hovering over different options within the trilemma, whatever compromise it's made . . .

How good/bad it is relative to other trade-offs will change depending on how the economy is evolving.

# Pros and cons of exchange rate regimes

We revisit this question ...but now in more detail and with more tools

Past experiences: UK decision to abandon the ERM in 1992 (black Wednesday)

## **ERM - European Exchange Rate Mechanism (precursor to the Euro):**

- No official peg but in practice most countries peg their currency to the German mark (DM)
- Then Germany can set its own monetary policy
- UK participates in the ERM → Fixes its ER against Germany (the DM)
- Germany experiences a shock: Unification of West and East Germany (1992)
  - Dramatic increase in Government Spending as result
  - Germany fears inflation and intends to cool down economy (by increasing rates)
- What impact would this have in other ERM members?

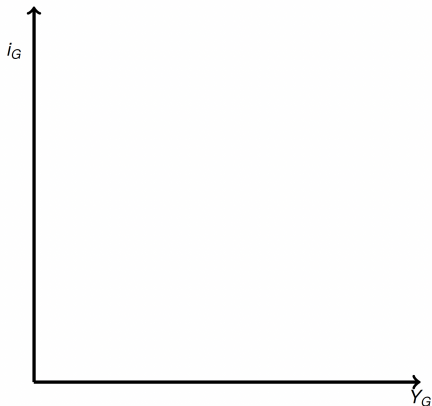
## Germany's view

We can now use our own framework: IS-LM-FX

$\uparrow G \rightarrow$  IS shifts to the right (higher output for any interest rate)

Germany wants to cool down the economy:  $\uparrow i$  by lowering Money Supply  $\rightarrow$  LM shifts to the left

Figure: Goods Market in Germany



# The UK

First pursued a peg since 1970:

- ▶ In order to promote European unification
- ▶ But also looking for a nominal anchor to control inflation
- ▶ Germany has been very succesful throughout history at controlling inflation so it was a natural candidate for pegging currency to
- ▶ Officially the ERM is set in 1990 and has no defined peg, only participants  
In practice countries pegged to Germany
- ▶ UK had experienced a recent economic slowdown  
The last thing they are thinking of doing is to increase the interest rate
- ▶ Now with Germany's higher rate the FR curve shifted up in the FX market, what to do?
  - ▶ Break the peg and float → Increases output (via depreciation)
  - ▶ Maintain peg by increasing interest rate → lowers (an already low) output (risk a recession)
- ▶ In this environment: commitment of UK to maintain peg was **very questionable**

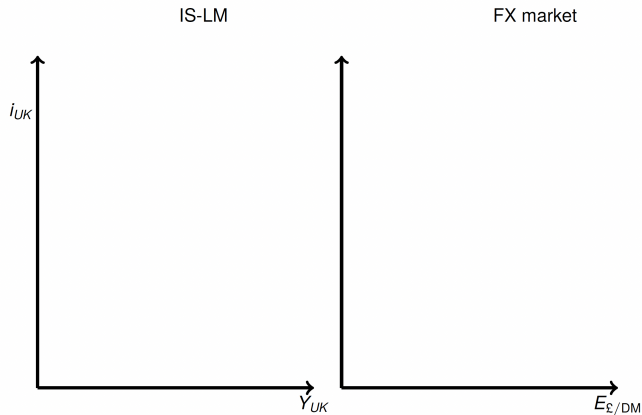
## Choice 1: Float and "Prosper"

FR shifted up (by Germany's policy)

UK does not raise interest rate: LM does not shift

$E$  depreciates  $\rightarrow \uparrow TB \rightarrow IS$  shifts to the right

Figure: UK decides to float





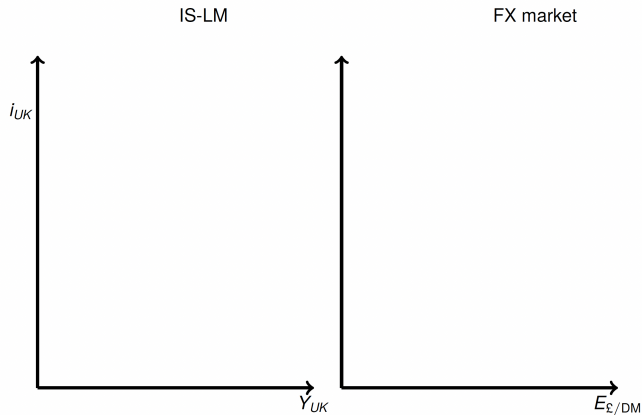
## Choice 2: Peg and "suffer"

FR shifted up (by Germany's policy)

UK contracts money supply and raises interest rates

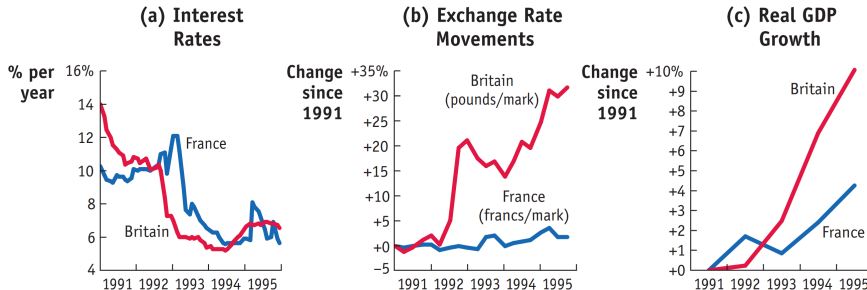
A recession is generated given decision of keeping peg ( $E$  does not change)

Figure: UK decides maintains peg



# The UK experience post ERM

Figure: UK and France in the 1990's



Source: econstats.com, IMF-IFS, IMF-WEO

What happened? → UK opted out of the ERM

In subsequent years UK did better than other countries in the ERM (e.g., France)

Given this experience, to this day the idea of pegging is unpopular in the UK  
(thus, not adopting the Euro as currency, Brexit, etc)

# Key factors for regime choice

Main features at the core of Fixed vs. Floating Regime choice:

1. Economic Integration → trade, labor mobility, capital flows
2. Economic Similarity → shocks (positively or negatively correlated)

(1) increases benefits of Fixed ER regime

(2) lowers costs of Fixed ER regime

Other features:

Choice of nominal anchor, political reasons (e.g., promotion of regional integration), external wealth volatility (NFA)

# Economic Integration

Definition: Market linkages in goods, capital and labor markets (among regions)

Fixed ER:

- ▶ Facilitates cross border trade and investment
- ▶ lower transaction costs
- ▶ Easier for labor to flow

A very volatile rate discourages trade of goods, of assets, migration (to location with volatile currency)

*With higher integration, the efficiency gains of fixing the ER increases*

# Volume of trade and exchange rate regimes

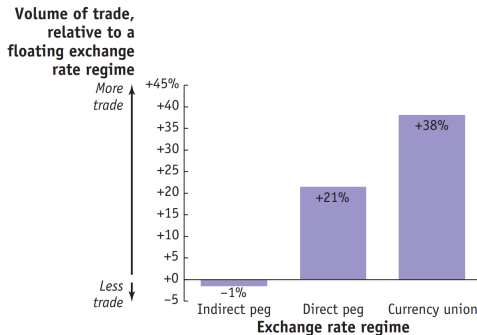
Klein and Shambaugh (2006):

Compare trade for countries with different ER regimes

Common currency and direct pegs seem to increase trade volumes

Indirect pegs: Country A pegged to C, country B pegged to C, but no official peg between A and B

- Does not associate with higher trade



Source: Klein and Shambaugh (2006), "Fixed Exchange Rates and Trade", Journal of International Economics.

## Economic similarity

If countries face similar shocks, the loss of independent monetary policy is less costly

The cost of fixed ER lowers (with positively correlated shocks)

Because **policy incentives** of home and foreign economy **are more aligned**

This prevents situations where one economy wants to lower the interest rate and other wants to increase it

With more similarity it is more likely that when Foreign wants to boost (cool down) economy Home wants it too

- Making irrelevant (in practice) whether home had monetary autonomy to start
- Interest rate would have gone in the direction home wanted anyway

This is a convenient application of the trilemma: sacrifice monetary independence to achieve the other goals

*As economic similarity rises, the stability cost of having a Fixed ER decreases*

## A useful diagram to pick a regime

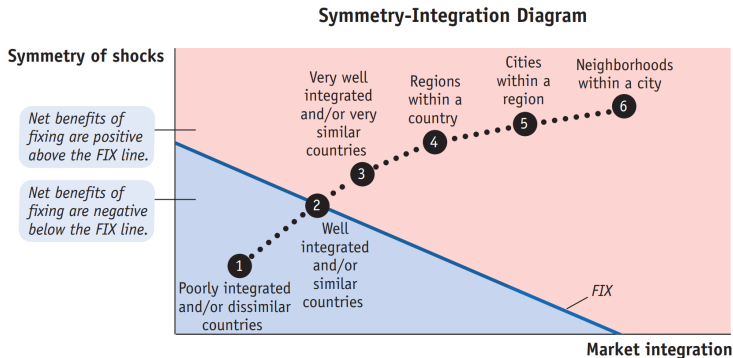
Higher integration  $\longrightarrow$  more benefits from a fixed ER regime

More symmetry  $\longrightarrow$  lower costs from implementing a fixed ER regime

Imagine we plot the integration on the x-axis and the symmetry (level of) on the y-axis ...

And that we locate economies on their respective (integration, symmetry) coordinates ...

The further to the north-east ... it's better to set a peg ... towards the origin economies prefer to float ...



## Trilemma in action: Do pegs decrease with monetary autonomy in practice?

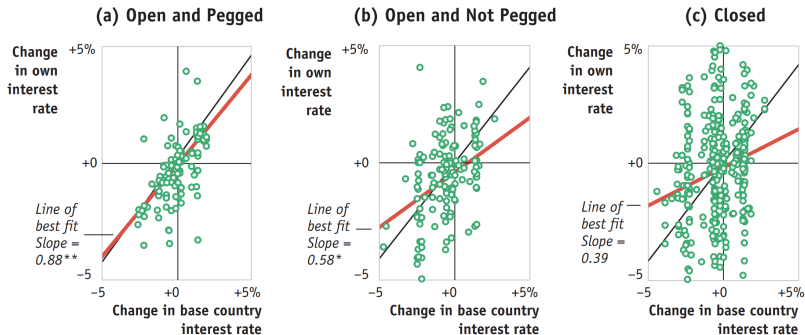
Before: in theory it does, we get it from the UIP

But the UIP is a theoretical result that does not hold exactly in practice

depends on forming good expectations, risk premium, etc

In practice:  $i \approx i^*$  as expected (from theory)

countries that run a peg end up with interest rates whose changes mimic those of base country



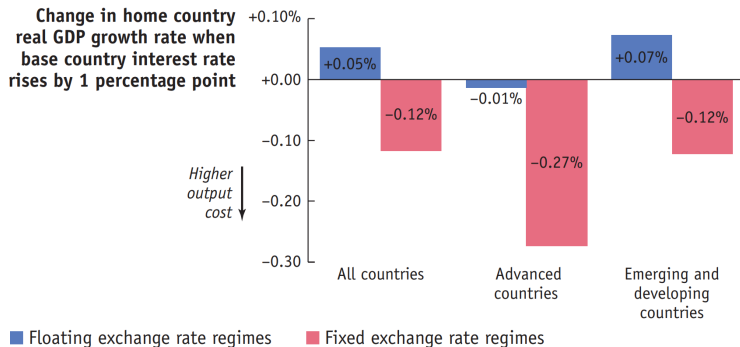
Source: Shambaugh (2004), "The Effect of Fixed Exchange Rates on Monetary Policy", Quarterly Journal of Economics.



## The Trilemma: Output cost of a Fixed ER regime

Does matching a base country interest rate affects domestic growth in practice?

Intuition: Base country moves interest rates in directions that home may now want and that could be recessionary



Source: Di Giovanni and Shambaugh (2008), "The Impact of Foreign Interest Rates on The Economy: The Role of the Exchange Rate Regime", Journal of International Economics.

# Summary

Main benefit of Fixing the Exchange Rate: More stable trade and investment flows

Other benefits:

- ▶ Induced fiscal discipline → Prevents government from carrying out seigniorage, i.e., monetizing their own debt to run larger fiscal deficits (cannot print money to pay debt)
- ▶ Prevents valuation of foreign currency debt → related to "original sin" or inability to borrow in own currency

Costs of a Fixed ER regime:

- ▶ Lack of monetary policy autonomy
- ▶ Potential output volatility and recessionary effects (e.g., when base country raises  $i^*$ )  
Predicted by IS-LM-FX and found in the data
- ▶ Costs are higher for less integrated and less similar economies (asymmetric shocks)

## Fixed Exchange Rate Systems

# Outline

Before:

Fixed Exchange Rate vs Floating: Costs and Benefits

1. New: Explanation of when the cost of losing monetary policy is small
2. Associate peg to undesired output movements and volatility
3. ...but also to (i) fiscal discipline; (ii) stable external wealth

Now: **Fixed Exchange Rate Systems:** Pegs involving many countries

1. Not just one home and foreign economy as before
2. Most notable examples: Gold Standard, Bretton Woods, ERM (and the Euro)

Next: Exchange Rate Crises and Models

## Fixed exchange rate systems

So far we considered unilateral pegs  $\longrightarrow$  one country (home) deciding to peg to another (foreign)

Examples: Ecuador vs. US Dollar; Denmark vs. Euro; home to foreign

In that unilateral case a center country has all the policy autonomy and discretion

Alternative: Fixed Exchange Rate System

- ▶  $N$  countries participate ( $i = 1, \dots, N$ )  $\longrightarrow$  multilateral agreement
- ▶ The other  $N - 1$  countries fix their currency against the reserve currency
- ▶ The  $N$ -th country (the center) provides the reserve currency
- ▶ Examples: Bretton Woods (USD is the reserve), ERM (German mark is the reserve in practice)

## Fixed exchange rate systems (cont.)

This arrangement has the same fundamental asymmetry problem:

The center has all the monetary autonomy and the other countries lost it

This is called the  $N$ -th currency problem → recipe for political conflict

However, there is a difference: pegging does not occur "de-facto" but as the result of an agreement

- ▶ In that sense is an attempt of policy cooperation
- ▶ at least economic conditions of participants are somewhat considered when setting policy of center
- ▶ Together with other visible efforts: IMF and World Bank creation to facilitate post-war cooperation

**Cooperation:** Maybe an explicit cooperative arrangement would be a better choice

We will see how two types of cooperation work:

1. Interest rate adjustments
2. Exchange rate adjustments

## Interest rate adjustments

Suppose home is in a recession and the foreign country (center) is not  $\rightarrow$  home wants to lower  $i$

**Non-cooperative solution:** Center does not change rate ( $i^*$ ), home keeps peg and suffers a recession

**Cooperative solution:** Center lowers  $i^*$  allowing home to lower  $i$  without losing peg  $\rightarrow$  avoiding recession

Cooperation implies a compromise by center:

Foreign output deviates from level desired by the Center (risking inflation, for example)

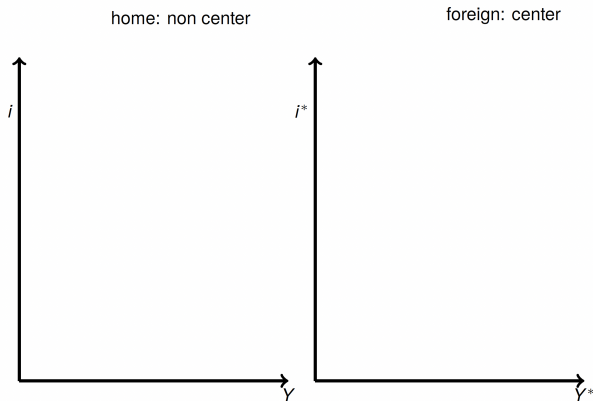
## Non-cooperative solution

Setup: negative demand shock at home  $\rightarrow$  IS shifts left

$Y$  at home is lower than desired ( $Y_0$ )

Foreign country does nothing

Home should contract LM and worsen recession to maintain peg





## Cooperative solution

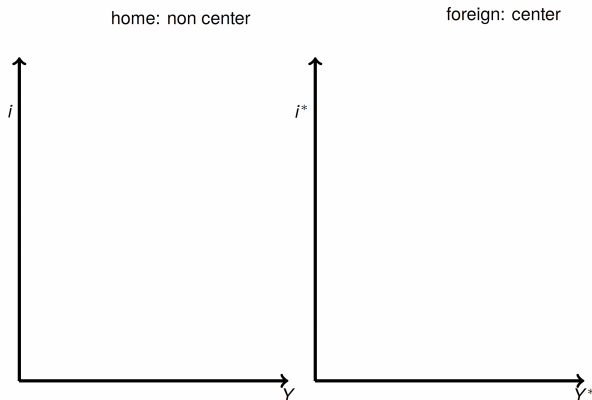
Foreign country shares shock burden by accepting higher  $Y^*$  than desired  $\rightarrow$  shifts  $LM^*$  to the right ( $\uparrow i^*$ )

IS contracted at home, but foreign helped so home does not have to worsen recession with interest rate raise ( $i$ )

Instead, home can bring output closer to its desired level ( $Y_0$ ) by lowering interest rate: LM shifts to the right

Home ends with higher output than without cooperation

**Cooperative equilibrium:** Mild recession at home; higher than desired output at foreign economy



## Interest rate adjustments: equilibria

Initial setup: Negative demand shock at home

**Non-cooperative equilibrium:** Deep recession at home; nothing happens at foreign economy

**Cooperative equilibrium:** Mild recession at home; higher than desired output at foreign economy

The burden of the shock is shared but overall (in the aggregate) the cooperative outcome is better

# Cooperation

The cooperative equilibrium requires sharing the pain of the shocks

In reality, it's hard to make countries behave cooperatively

It requires commitment and willingness to bear short-run pain for long-run gains

Long-run gains here: smoother income, trade

Not easy, for example, Germany did not compromise in 1992

Problem: A center country in a reserve currency system has too much power that is unwilling to give up

Really hard when: Countries experience asymmetric shocks (happens often)

## Exchange rate adjustments

Consider two countries that are both non-center: home and foreign

Both countries peg to a third one. The Center currency is the US Dollar  $\rightarrow$  Pegs:  $\bar{E}_{h/\$}$ ,  $\bar{E}_{f/\$}$

Suppose home is in a recession and the foreign country is not

Home would like to devalue their currency to shift the IS to the right

Devalue: Increase the rate at which you peg  $\uparrow \bar{E}_{h,\$}$  (revalue: decrease)

Notice this is still compatible with a peg if change is permanent as expected depreciation in the LR is still zero

Prompts a real depreciation at home (IS shifts  $\rightarrow$ ) but also an appreciation in the foreign economy (IS\* shifts  $\leftarrow$ )

**Cooperation:** Mild adjustment of peg at home

Home depreciates a bit, foreign appreciates (IS  $\rightarrow$  at home; IS\*  $\leftarrow$  at foreign but mildly too)

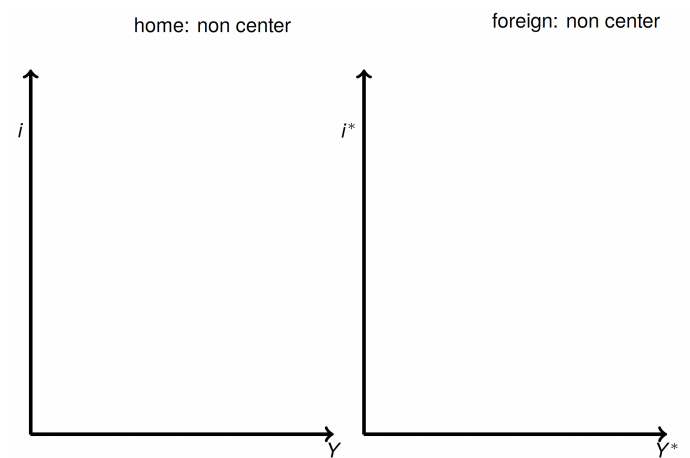
**Outcome:**  $Y^h$  closer to desired level (pre-shock),  $Y^f$  is lower but not by much

**Non-cooperation:** Strong adjustment of peg at home (IS shifts  $\rightarrow$  by more)

**Outcome:**  $Y^h$  hits ideal level but foreign economy goes through a huge negative demand shock and recession

Even worse potential outcome: retaliation by foreign economy  $\rightarrow$  devaluates as well  $\rightarrow$  regulatory war

## Cooperative and Non-cooperative solution



## Exchange rate adjustments

Adjusting the peg can be a cooperative or non-cooperative action

**Cooperative:** when done in terms agreed by other countries

The other countries are accepting the recessionary effects (harder pill to digest than unwanted boom)

**Non-cooperative:** With no foreign agreement → called **Beggar-Thy-Neighbor Policy**

Home improves position at the expense of foreign economy

- Home exports the recession to neighbor (foreign)
- May lead to retaliation and "regulatory wars" → breaking the peg altogether and eroding the value of the currencies

The Gold Standard

## Pegging to a commodity price

Key drawback of fixed exchange rate systems: Asymmetry (N-th currency problem)

Center has little incentive to give up on its autonomy to cooperate

Setup that avoids problem: **Commodity based peg**

Main example in history: The Gold Standard

No Center country  $\rightarrow$  peg is not made with respect to any location's currency

Instead: Currency is pegged at  $\bar{P}_g \rightarrow$  local currency price of gold

Important: idea is to allow arbitrage to stabilize the international monetary system

Then, some key features are:

*Principle of Free Convertibility:* Central banks commit to buy & sell gold for paper money at prices defined by peg

No restrictions on gold imports or exports

The relevant measure of money supply in participant countries becomes: Gold reserves + Money in circulation



## The gold standard

Each country sets a fixed local currency price of an ounce of gold:

$\bar{P}^{uk} \rightarrow$  British pounds per ounce of gold

$\bar{P}^{fr} \rightarrow$  French francs per ounce of gold

The implied, or *par exchange rate* is:

$$E_{F/\pounds}^{par} = \frac{\bar{P}^{fr}}{\bar{P}^{uk}}$$

Take a look at the units:  $\frac{\frac{\text{francs}}{\text{gold}}}{\frac{\text{pounds}}{\text{gold}}} = \frac{\text{francs}}{\text{pounds}}$

(you end up with a measure of how many francs you must pay for a pound ... i.e, an exchange rate!)

Since  $\bar{P}$ 's don't change  $\rightarrow$  the exchange rate is fixed

Arbitrage brings the observed sport rate  $E_{f/\pounds}$  close to  $E_{F/\pounds}^{par}$

This is why arbitrage and Free Convertibility is important

Implies taking as relevant money supply: Gold + Money in hands of public

## Arbitrage in a gold standard

Arbitrage (allowing for it) would bring observed rate close to the fixed Par rate:

Suppose the observed (actual) exchange rate was:  $E_{F/\pounds} < E_{F/\pounds}^{par} = \frac{\bar{P}^{fr}}{\bar{P}^{uk}}$

Intuition: Gold in UK is relatively cheap (relative to France). Can buy gold in UK and sell it in France for a profit:

0. Start with 1 oz of gold
1. Change 1 oz of gold for  $\bar{P}^{fr}$  francs at Banque de France → now have:  $\bar{P}^{fr}$  francs
2. Change  $\bar{P}^{fr}$  francs for  $\frac{\bar{P}^{fr}}{E_{F/\pounds}}$  in the FX market → now have:  $\frac{\bar{P}^{fr}}{E_{F/\pounds}}$  pounds
3. Change  $\frac{\bar{P}^{fr}}{E_{F/\pounds}}$  pounds for  $\frac{\bar{P}^{fr}}{E_{F/\pounds}} \frac{1}{\bar{P}^{uk}}$  oz gold at Bank of England → now have:  $\frac{\bar{P}^{fr}}{E_{F/\pounds}} \frac{1}{\bar{P}^{uk}}$  oz gold

Started with 1 oz gold, ends with  $\frac{\bar{P}^{fr}}{E_{F/\pounds}} \frac{1}{\bar{P}^{uk}} > 1$  oz gold

Implication: Pound is cheap compared to Franc so in a way arbitrageurs sell Francs and buy pounds in the FX market ("in a way": trading gold inbetween)

If this is possible, people sell francs and buy pounds in mass → **Pushing  $E_{F/\pounds}$  up and closer to  $E_{F/\pounds}^{par}$**

## Arbitrage in a gold standard

When  $E_{F/\pounds} < E_{F/\pounds}^{par}$

- ▶ Gold flows out of England and into France
- ▶ This increases money supply in France, decreases it in England
- ▶ Thus, appreciating ER until  $E_{F/\pounds} = E_{F/\pounds}^{par}$
- ▶ For this to work gold needed to flow freely between countries and Central Banks had to buy sell if requested
- ▶ As a result the FX market is stabilized around the fixed rates

**Still in the trilemma:** money supply changes are not dictated by central banks

Neither country has control of the money supply: there is no central country in the gold standard.

This eliminates asymmetry (of other fixed ER systems)

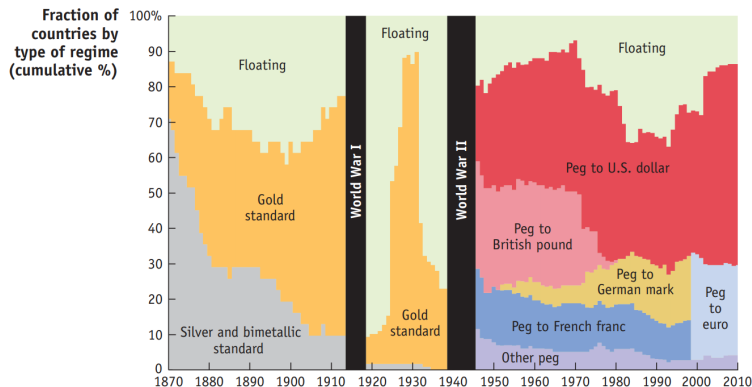
## Exchange rate regimes over the years

The gold standard gained prominence before and in between the world wars

But wars and crises broke down the system

Countries really needed to commit for it to work ...

...and as we saw, in times of need (e.g., recessions) defending a peg is a harder choice



Source: Meissner (2005, JIE)

## The gold standard

It was not as smooth as intended:

1870: About 15% of countries on gold standard

1913: About 70% of countries on gold standard

Gold standard collapse during WWI

1920s: about 90% of countries on gold standard

1939: about 25% of countries on gold standard

Most countries left the gold standard in the 1930's (around the Great Depression)

The US stayed but removed free convertibility

# Rise of the gold standard (pre WWI)

Late 1800s - 1914

- ▶ First era of globalization: large and increasing trade, capitals and labor flows  
Steamships, telegraph, railroads, improvements in finance
- ▶ Gains of fixing the exchange rate are high
- ▶ Other trade barriers are lowered: Tariffs and quotas

**Price stability was viewed as more important than stabilization policy**

"Normal times" → i.e., no crises/recessions

Snowball effect led to specific adoption of gold → it could have been other price, e.g., Silver

## Gold standard history

By 1914, 70% of countries on the gold standard

WWI ends the first era of globalization

Trade falls dramatically (as much as 50% in aggregate, i.e., including neutral countries)

Protectionism: Tariffs and quotas raised

With less integration:

- ▶ Fixed Exchange Rate regimes are not seen very beneficial anymore
- ▶ Instead, ability to use stabilization policy (with monetary policy) is seen as more relevant

Countries use inflation tax to fund the war

Print money to monetize higher fiscal spending

Gold standard falls apart

## End of the gold standard

After WWI: brief return to gold standard

Great depression of 1929 → urgent need for stabilization policy

(reminder) Stabilization policy: Use of (monetary) policy to boost economy when needed to smooth GDP cyclical fluctuations

Depression comes with deflation and need for more money

- If gold standard is maintained: further deflation

Countries begin devaluing their currencies in a non-cooperative fashion: *beggar-thy-neighbor*

Gold reserves were low so countries started to hold reserves in main currencies

- Stability depended on commitment of those "main" central banks to gold standard

Traders started speculating against the major currencies

In the midst of the speculative chaos:

Countries imposed capital controls and started floating against the gold → gold standard became poorly coordinated and uncooperative

As the WWII started the gold standard is done

Trilemma: Economies left GS/no monetary policy corner and flocked toward the other two (K controls or floating)



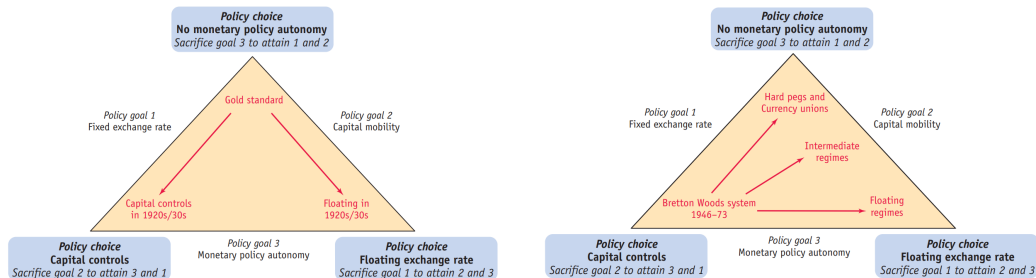
# The gold standard and the trilemma

Countries that stuck with the gold standard suffered the most:

Economies that floated had 26% higher GDP by 1935

Economies that set capital controls 21% (Obstfeld and Taylor, 2004, pp 143)

Figure: Left: Trilemma Before and after WWI ; Right: Trilemma since the WWII



After WWII: attempt to coordinate the monetary system → Bretton Woods

Vestige of gold standard (fixed ER) but with capital controls

# Bretton Woods system

Vestige of gold standard (fixed ER) but with capital controls

**Bretton Woods system:** Countries peg to US dollar ...but the US dollar was pegged to the gold price

**Idea:** impose capital mobility restriction and thus get: Monetary Policy Autonomy + Stable ER (trilemma)

**Problem:** Containing capital mobility was very hard

Capital controls were circumvented easily → it was hard to maintain USD peg without giving up on (monetary) policy autonomy

**Result:** Increasingly frequent devaluations → beggar-thy-neighbor → speculation

System broke down in 1971-1973

**Reaction:** Countries moved to the other corners of the trilemma

Group 1: Floating ER + Free Capital (i.e., monetary policy autonomy): US, Japan, UK, Australia, Canada

Group 2: Fixed ER and some capital controls: Germany, South America

Others: Middle ground of trilemma (dirty floats, managed floating)