Lessons VII and VIII: Overview

1. Overview of the BOP accounting mechanisms
2. Models of exchange rate determination (stock versus flow models): a broad overview

Overview of the BOP accounting mechanisms

FX demand and supply I

An exchange rate can be thought of as the price of one currency in terms of another currency.

With exchange rates being a price, it is reasonable to assume they are the result of supply and demand dynamics

FX demand and supply II

The BOP account is a nation-wide document, summing up all the reasons for a currency being supplied (- sign) or demanded (+ sign)

FX demand

FX demand = domestic currency supply (- sign)

- Imports of goods and services
- Income payments
- Unilateral transfers (directed abroad)
- Increase in home country - owned assets abroad (both public and private)
- Foreign debt repayment
- Decrease in domestic assets held by foreigners (both public and private)

FX supply

FX supply = domestic currency demand (+ sign)

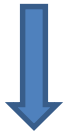
- Exports of goods and services
- Income receipts
- Unilateral transfers (directed at home)
- Purchases of domestic assets by non residents (both public and private sectors)
- Settlement on foreign credit
- Decrease in home country-owned assets abroad

Terminology I

- **Income payments**: payments by domestic residents of interest, dividends, profit and rent abroad. Income payments to foreigners are higher the higher have been foreign investments in domestic government bonds, corporate bonds, stocks, real estate and operating businesses.

Terminology II

- **Unilateral transfers**: foreign aid, nonmilitary economic development grants, private gifts, donations...



"Unilateral" stems from the fact that there is a unique flow in the direction of the payment (watch out: for most items in the balance of payments, the item being traded goes in one direction and the payment goes in the other direction).

Terminology III

- **Home country - owned assets abroad**: made up of two major sub-components, referring to the public and to the private sectors respectively.

  Public sector

  - *Official reserve assets*: liquid assets held by the CB and/or the Dept of Treasury, including gold, foreign currency in foreign banks and balances at the IMF→ whatever is purchased determines an accumulation of foreign assets, thus implying a supply of domestic currency (-sign)

Terminology IV

Private sector

- *Direct investments*: occuring when domestic ownership of a foreign operating business is sufficiently extensive to give domestic residents a measure of control.
- *Foreign securities*: supply of or demand for the domestic currency deriving from the purchase or sale by residents of foreign stocks (minority equity stakes) and bonds.
- *Claims reported by banks and non-banks*: outstanding loans and credits granted by domestic banks and other non-banking institutions.

Balance of Payments

The Balance of Payments is made up of 4 "building blocks":

1. **Current Account Balance (CAB)**
2. **Capital Account Balance (KAB)**
3. **Official Reserve Settlement (ORS)**
4. **Statistical Discrepancies (SD)**

Current Account Balance I (CAB)

- Exports of goods and services (+)
- Imports of goods and services (-)
- Income receipts (+)
- Income payments (-)
- Unilateral transfers (directed at home) (+)
- Unilateral transfers (directed abroad) (-)

Current Account Balance II

Exports of goods - Imports of goods =

Trade Balance

Exports of services - Imports of services =

Balance of goods and services

Income receipts - Income payments =

Balance of goods, services and Investment Income

Transfers received -Unilateral transfers sent =

Current Account Balance

Capital Account Balance (KAB)

- Purchases/Sales of domestic assets by non residents (+/-)
- Purchases/Sales of foreign assets by residents (-/+)
- Settlement on foreign credit (+)
- Repayment on foreign debt (-)

Official Reserve Settlement (ORS)

- Decreases/Increases in official reserves held by the CB (+/-)
- Decreases/Increases in assets other than official reserves (+/-)

Statistical discrepancies (SD)

Once called "Errors and omissions": unrecorded debits or credits in the BOP accounting

This may be due to several reasons, such as:

- Lags between the time that current-account entries are made and the time that the associated payments appear elsewhere in the balance-of-payments account.
- Many entries are just ballpark figures/estimates (e.g. data on travel expenditures are estimated from questionnaire surveys of a limited number of travelers).

BoP Accounting I

The BoP accounting is based on a **double-entry accounting principle** → every positive entry is matched by a negative entry. To make matters explicit…

- An American corporation sells $2 million worth of US-manufactured goods to Britain; the British buyer, in turn, pays from a US dollar account that is kept in a US bank.

	Credits/Debits
Export of goods	+2 mio $
Foreign assets in the US (US bank liability)	-2 mio $

BoP Accounting II

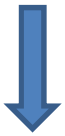
- An American corporation purchases $5 million worth of a certain product from a British manufacturer; the British company, in turn, puts the $5 million it receives into a bank account in the United States.

	Credits/Debits
Import of goods	-5 mio $
Foreign assets in the US (US bank liability)	+5 mio $

BoP Accounting III

Double-entry book keeping has a few major implications:

1. **All the entries** in the BoP **must add** to **zero,** so that **CAB + KAB + ORS +SD = 0**



BoP Accounting Identity

2. **If the BoP** entries **do not sum to zero, errors must have been made→** this will be in turn the **exact size of the SD**

Playing with the BoP Accounting Identity I

A **deficit** in the current account **must be either financed by borrowing** from abroad **or by divesting** of foreign assets, while **a surplus must be loaned abroad or invested** in foreign assets.

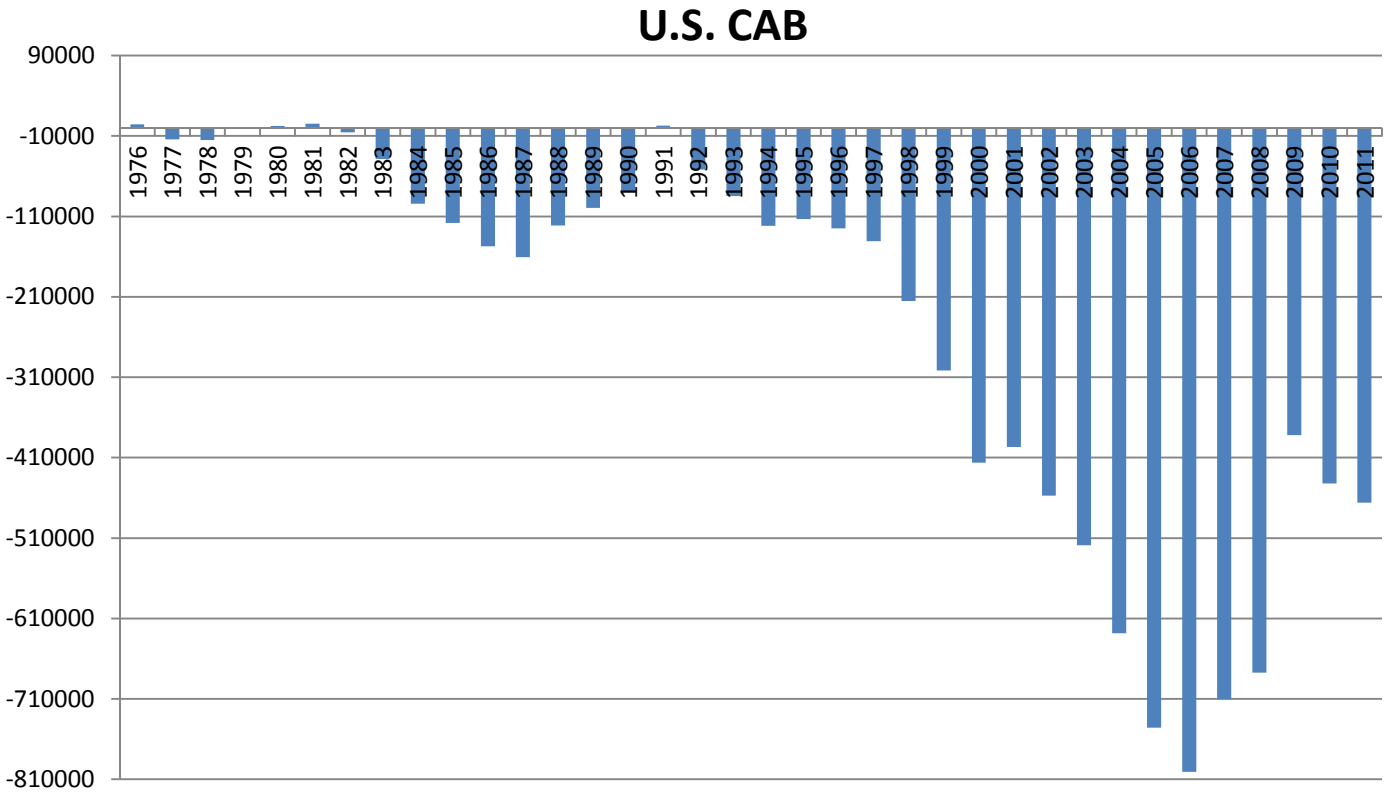
How to finance a current-account deficit: selling to foreigners domestic bills, bonds, stocks, real estate, or selling off previous investments in foreign bills, bonds, stocks, real estate, and operating businesses (via divestment)→ the reverse is true whenever there is a surplus

Playing with the BoP accounting identity II

This stems from the BoP Accounting Identity

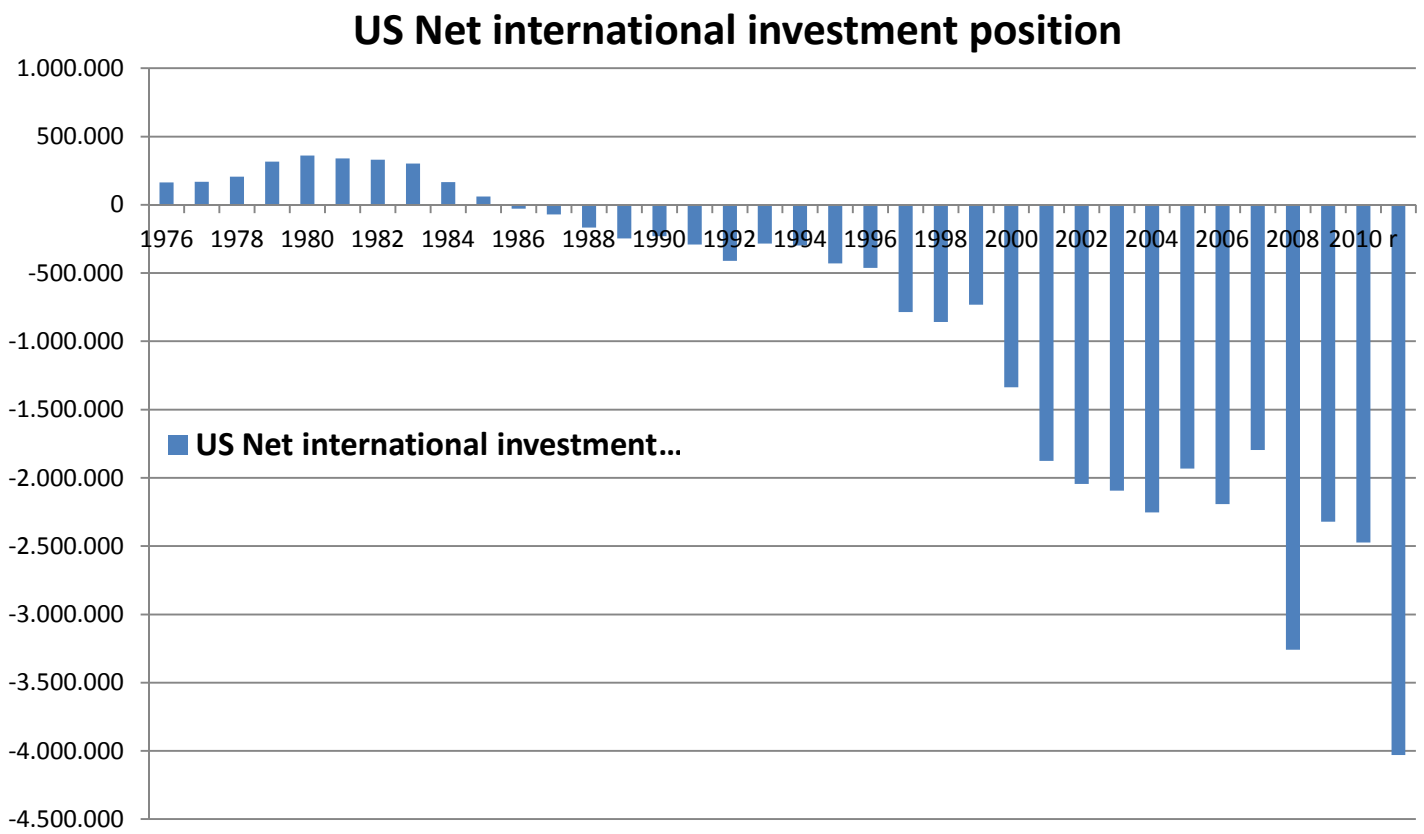
KAB + ORS +SD = - CAB

Some facts…I



Source: U.S. Bureau of Economic Analysis

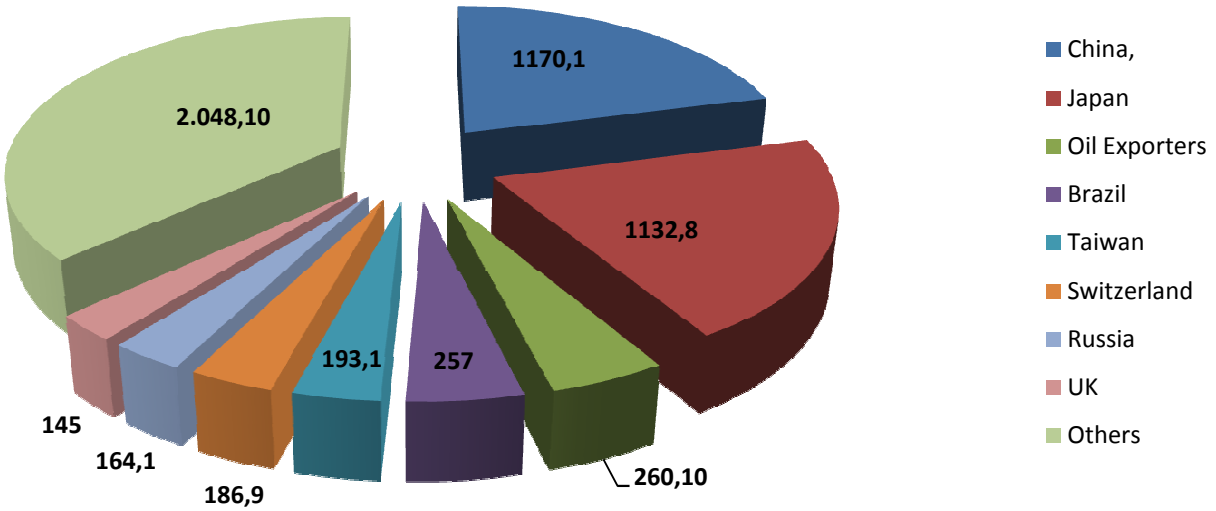
Some facts…II



Source: U.S. Bureau of Economic Analysis

Some facts…III

Can you explain the link between the two previous charts?



Source: Department of the Treasury/Federal Reserve Board

Is it all that bad?

- CAB is a meaningless concept (former Treasury Secr. O'Neill)
- CAB is irrelevant: integrated asset markets make adjustment easier (Greenspan)
- U.S. is the best place for the world to invest (Laffer)
- It's all fault of excessive global saving

It just depends…

The firm and the economy I

The CAB can be seen as a firm's income statement:

- BoP Credit entries ⟺ Firm's revenues
- BoP Debit entries ⟺ Firm's costs

The firm and the economy II

If the firm has a **surplus** on its income statement, it can **add to its investments or build up reserves against possible losses in the future**. If the firm has a **deficit** in its income statement, it must **borrow, raise more equity, or divest** itself of assets purchased in the past.

The firm and the economy III

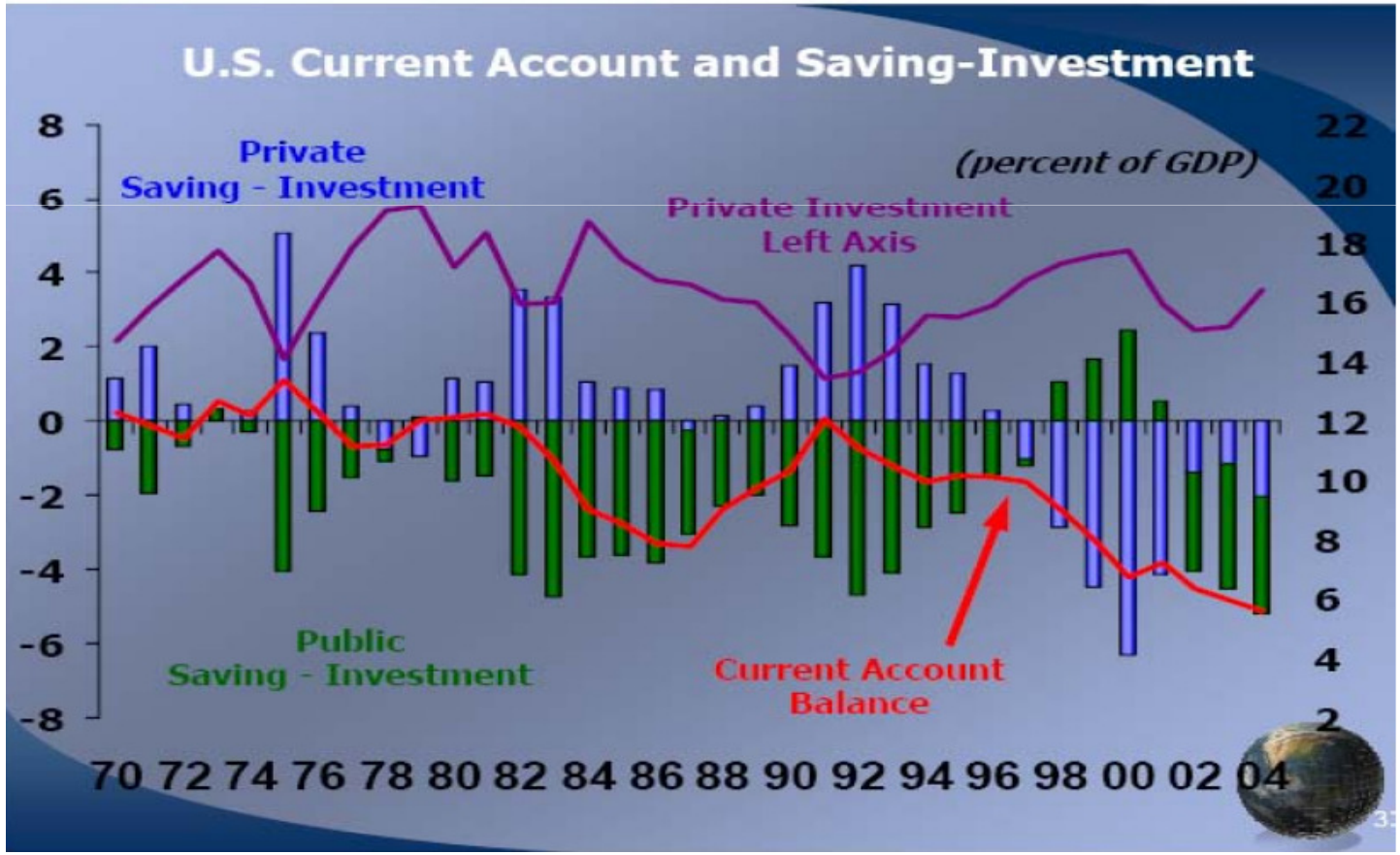
If this were the whole story, all CAB deficits should be conceived as imbalances that have to be corrected as such.

This said, what if costs > revenues because the firm is expanding/ enhancing its K stock through heavy investments in new technologies…?

The final judgement

A negative CAB is **not necessarily** a matter of concern as long as the deficit results from capital investments (infrastructures, new technologies…) and is not the result of current operating and debt costs exceeding current revenues

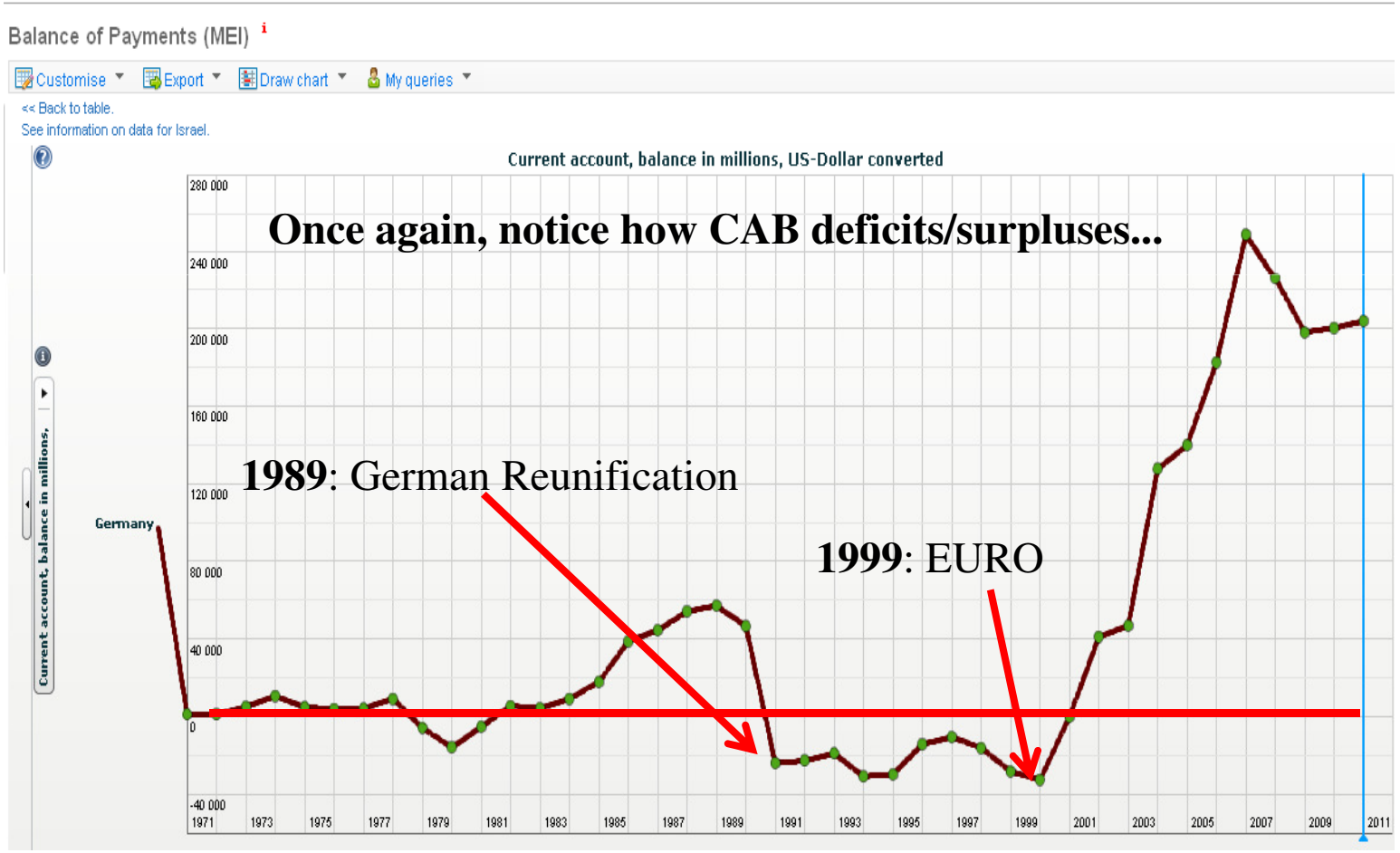
Back to the US: where does CAB<0 come from?



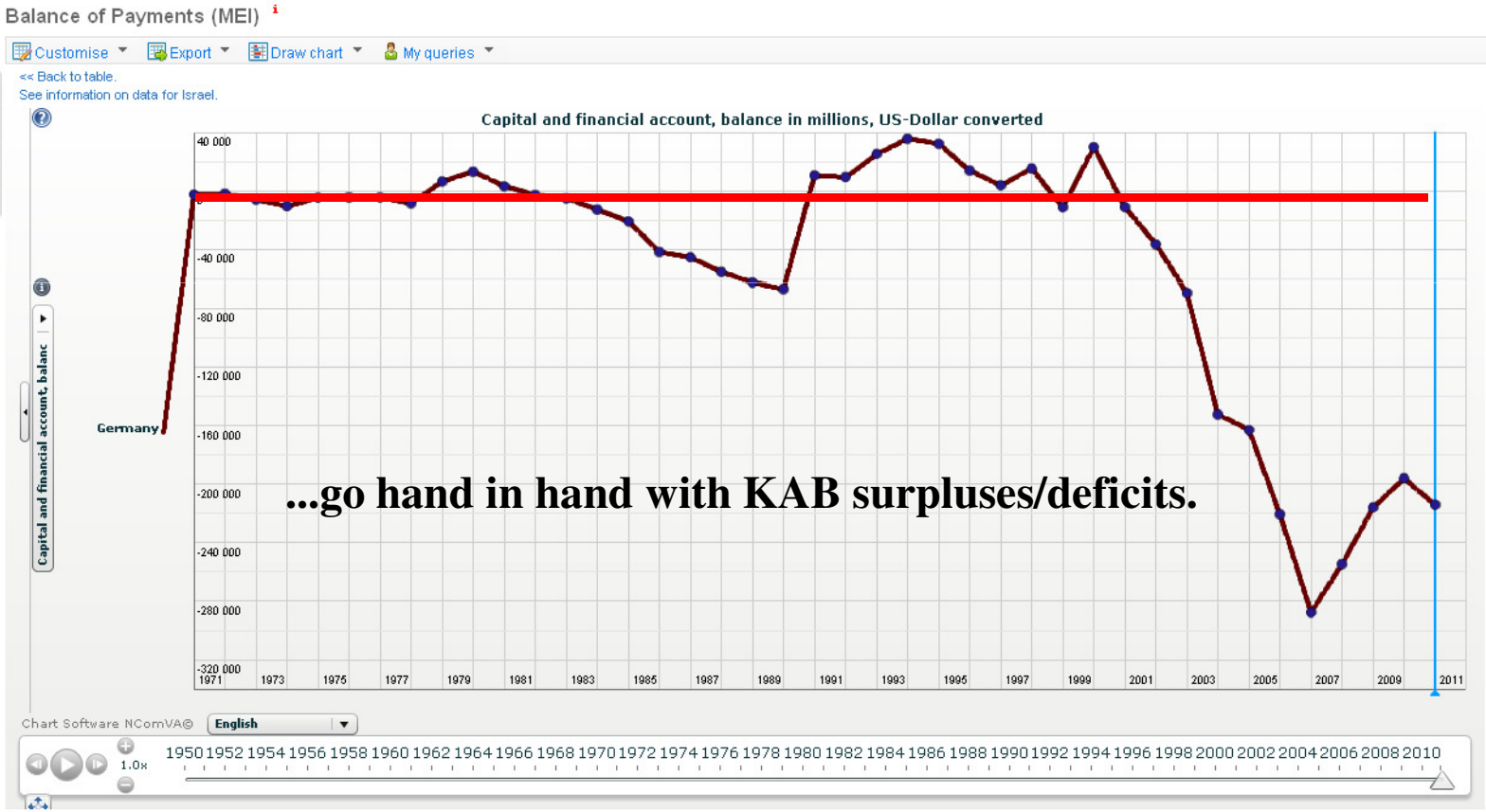
Terminology

"**Twin deficits**" (or "Double deficits") is a shorthand summary to describe the co-existence of two parallel deficits: one on the government budget and the other on the CAB

What about the rest of the world? I (Germany_CAB)

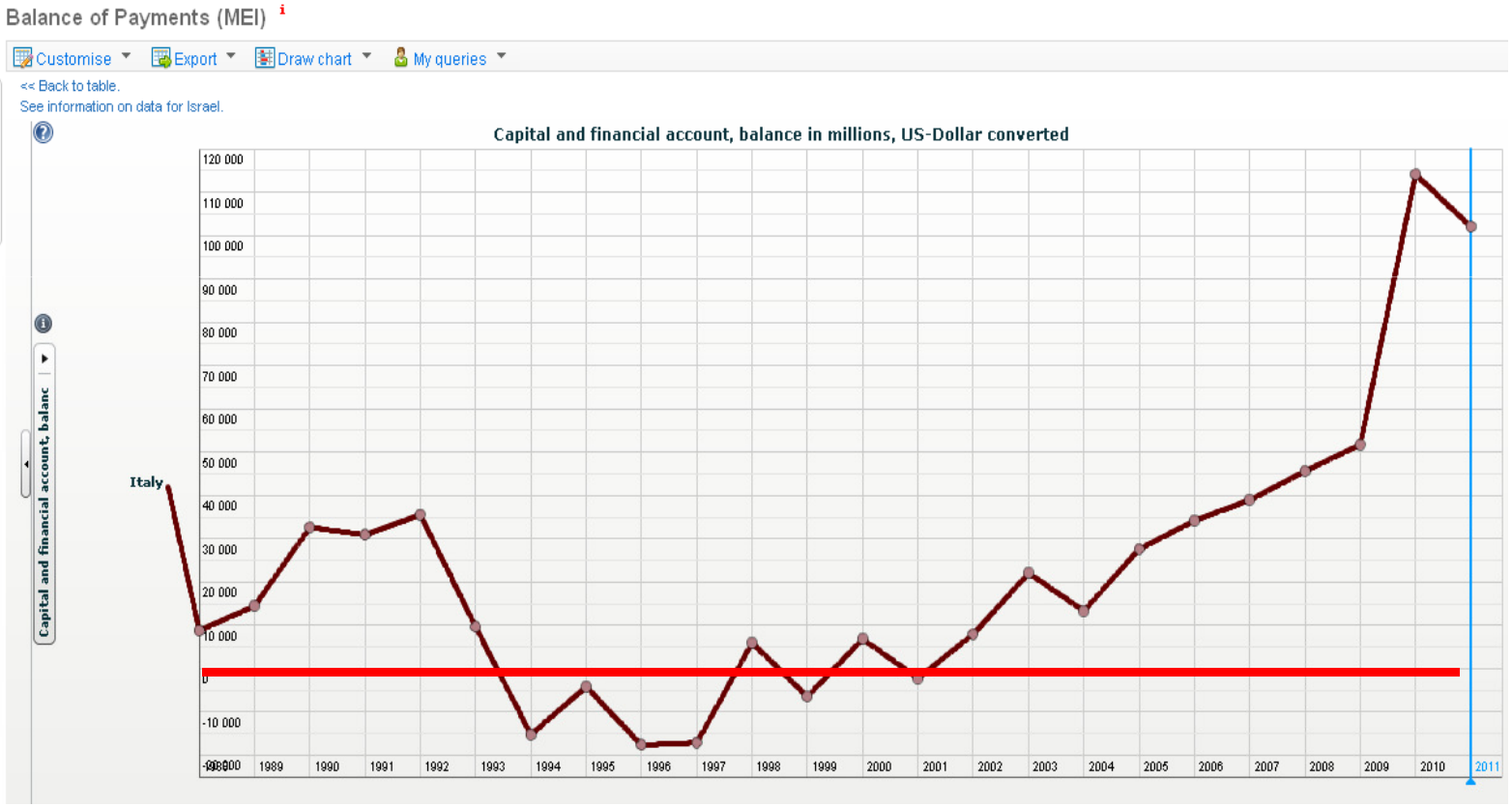


What about the rest of the world? II (Germany_KAB)



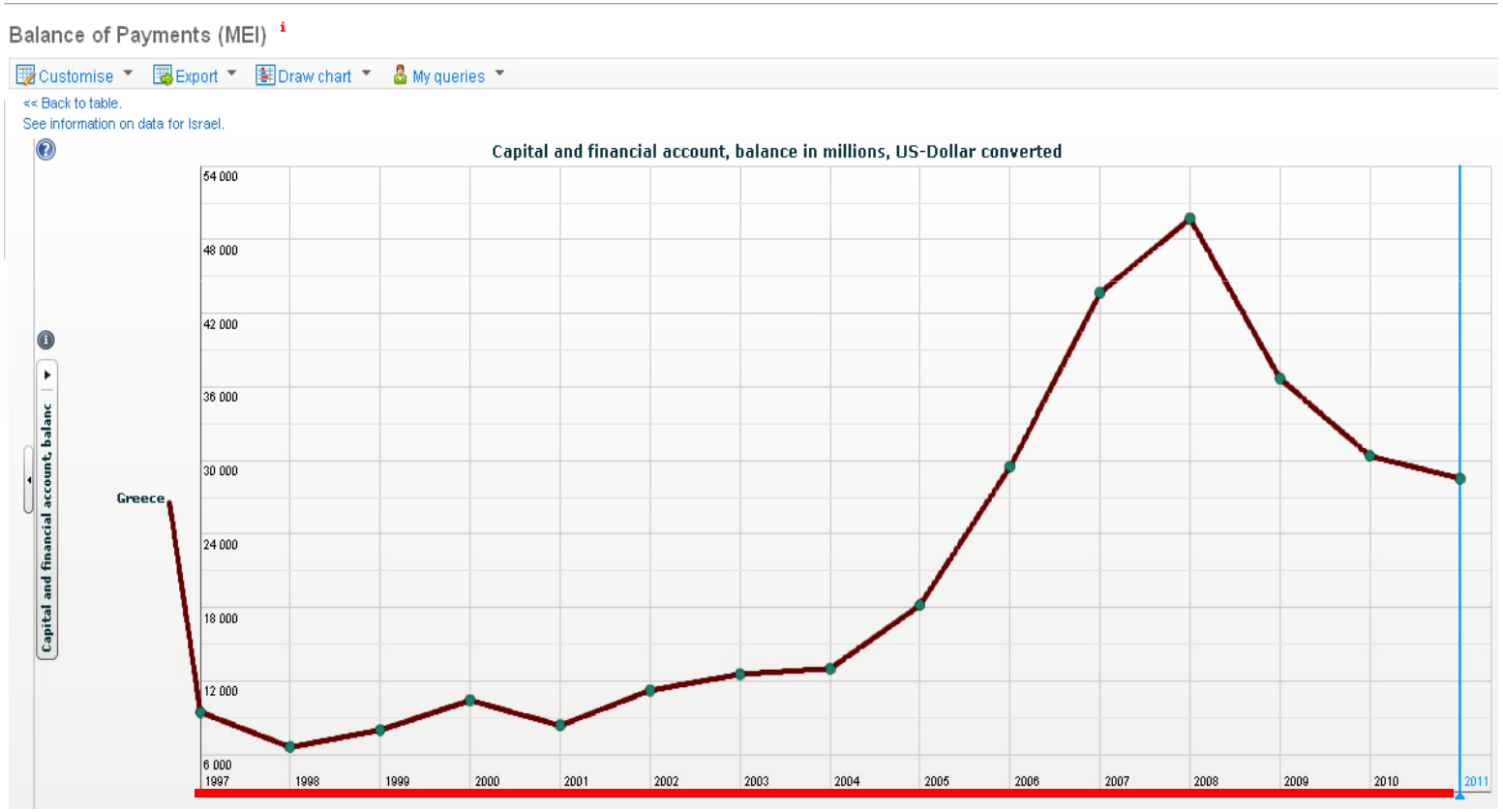
What about the rest of the world? III (Italy_CAB)

What about the rest of the world? IV (Italy_KAB)

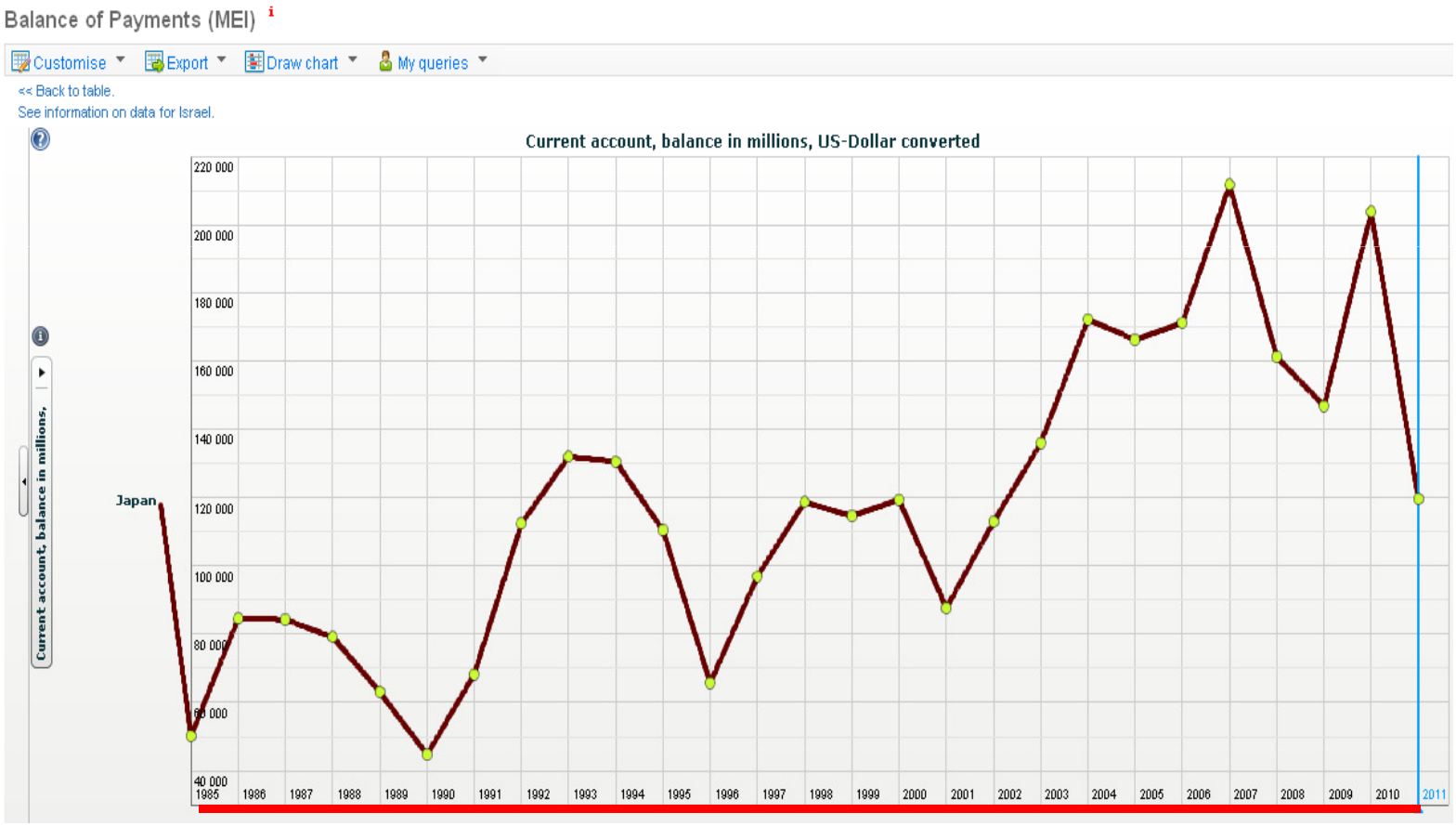


What about the rest of the world? V (Greece_CAB)

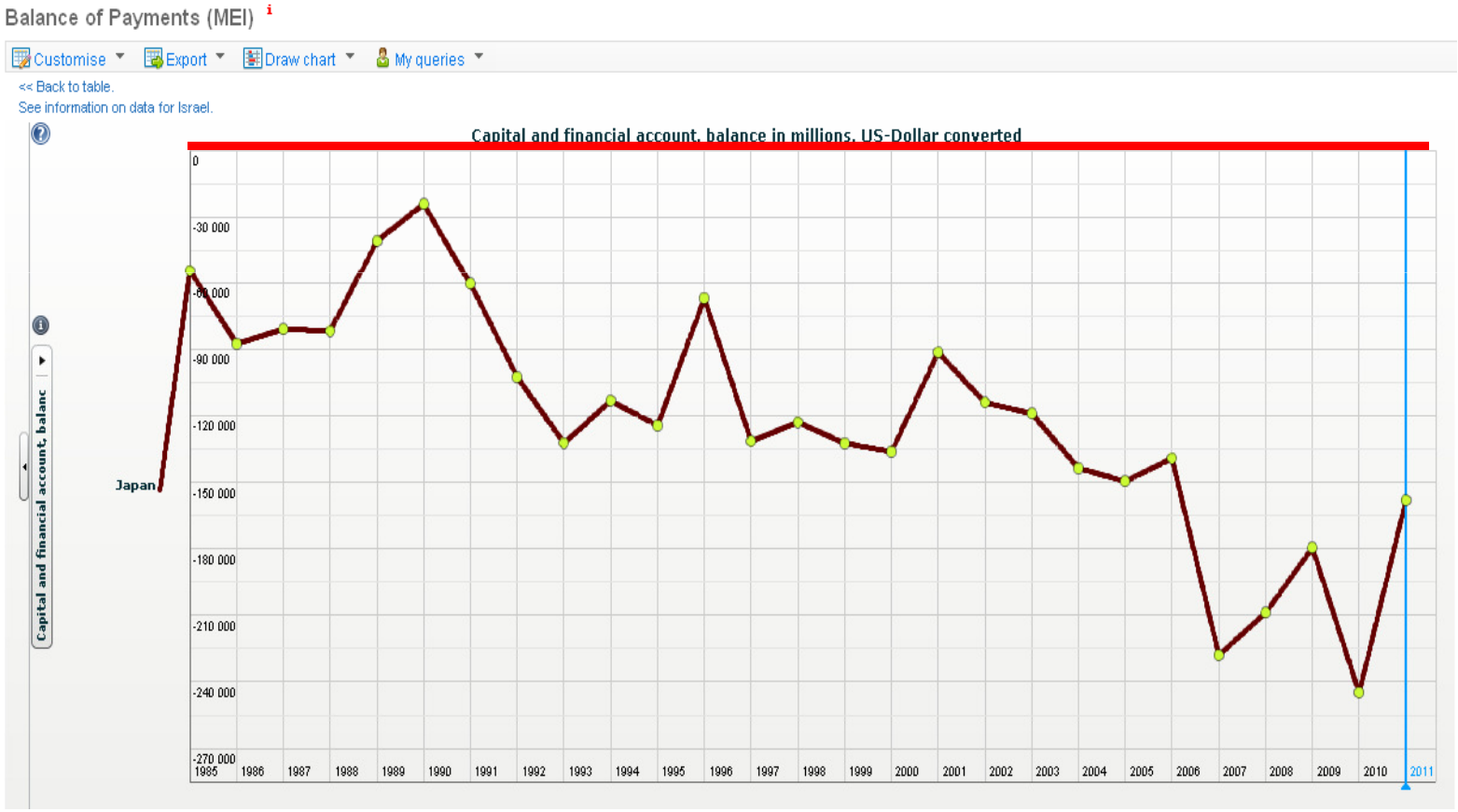
What about the rest of the world? VI (Greece_KAB)



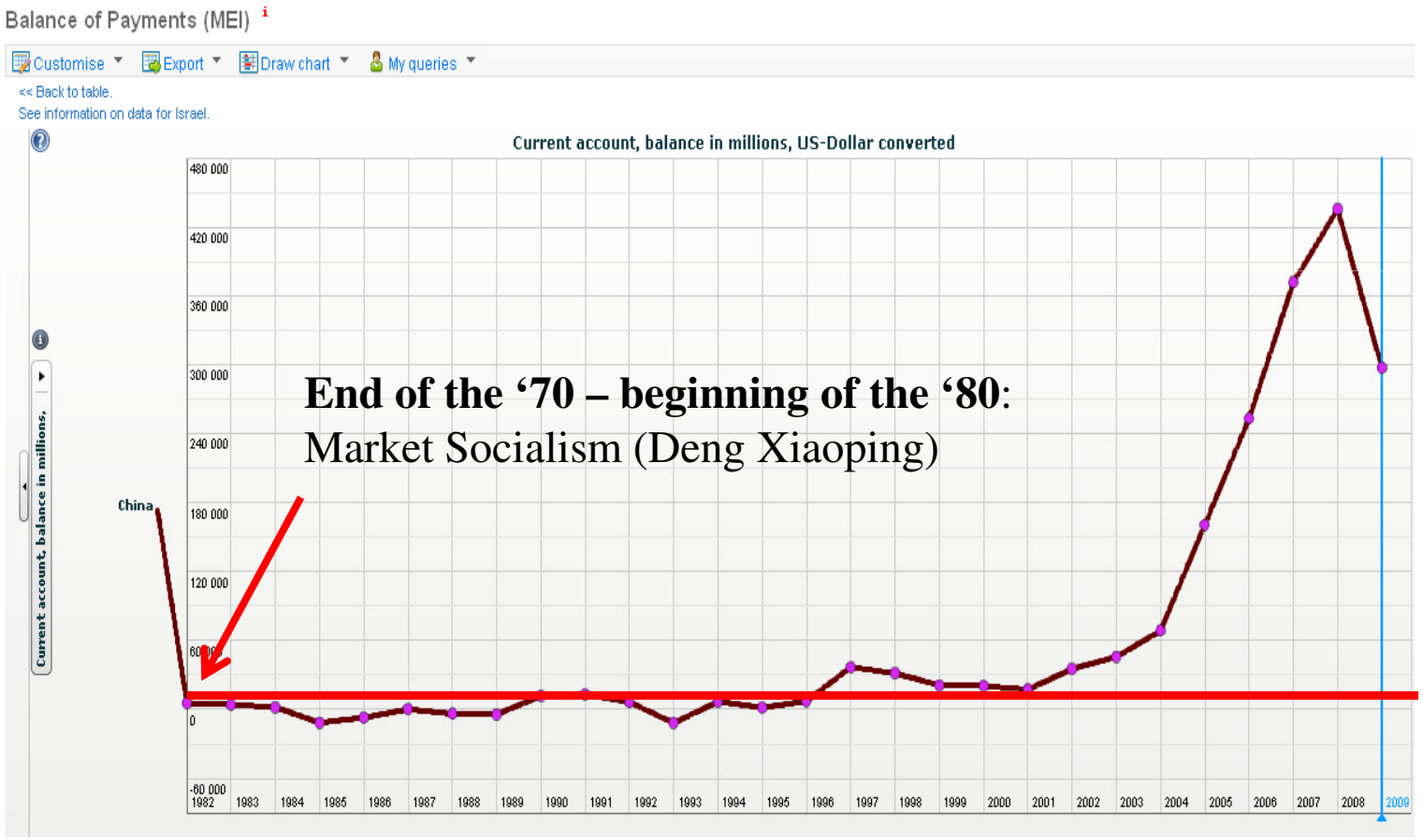
What about the rest of the world? VII (Japan_CAB)



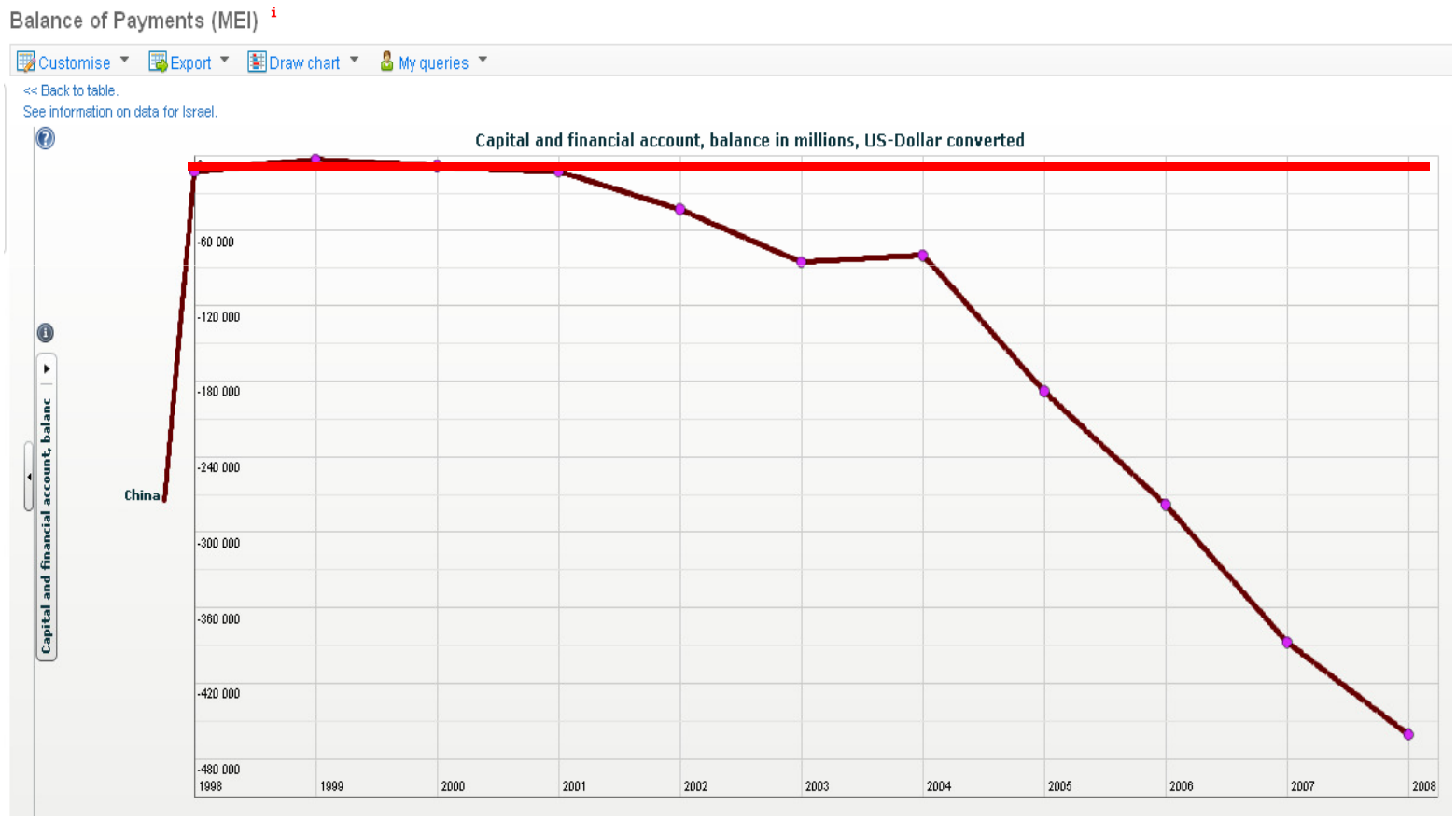
What about the rest of the world? VIII (Japan_KAB)



What about the rest of the world? IX (China_CAB)



What about the rest of the world? X (China_KAB)



The Whole Spectrum of Global Trade Imbalances

Large Trade Deficits

Large Trade Surpluses

USA

Peripheral Europe

China

Japan

Germany

The BoP and the objectives of economic policy I

Common wisdom: even though running CAB deficits may be healthy if it is due to importing K equipment, it is better to achieve trade surpluses than deficits.

Objection: even running persistent surpluses may be detrimental, provided that indefinite trade surpluses mean a country is living below its means.

The BoP and the objectives of economic policy II

National income accounting identity:

$$Y = C + I + G + (Ex - \text{Im})$$

Y= GDP

C= Private Consumption

I= Gross Investment

G= Public Expenditures

Ex-Im= Net Exports

The BoP and the objectives of economic policy III

$$(Ex - \mathrm{Im}) = Y - (C + I + G)$$

Running a persistent surplus…

…means producing more than it is absorbed by the economy in the form of C, I and G

The BoP and the objectives of economic policy IV

Persistent trade **deficits** ⟺ a country is living **above its means**

Persistent trade **surpluses** ⟺ a country is living **below its means**

How far it can go?

ORS and FX regimes I

Official reserve dynamics and exchange rate regimes

- When **exchange rates are fixed**, **central banks participate actively in the FX markets** to prevent their currency from falling/rising (**non-zero OR's balance**).
- When **exchange rates are floating**, **CBs do not enter the FX markets**, leaving the exchange rate to be determined by the market forces of supply and demand (**zero OR's balance**).

ORS and FX regimes II

Does it mean that all currencies deemed to be flexible always go hand in hand with zero OR's balances?

Not really! Indeed, there is a continuous effort to smooth excessive fluctuations in the domestic currency value, even when exchange rates are said to be flexible

Dirty Float

The BoP accounting identity and FX rate regimes I

CAB + KAB + ORS +SD = 0

Assume SD = 0 and consider a purely flexible exchange rate regime (ORS = 0)

CAB + KAB = 0

Any CAB deficit/surplus…

…is equal to the corresponding KAB surplus/deficit

The BoP accounting identity and FX rate regimes II

Long run implications

If CAB<<0 and KAB>>0, the country is likely to run into trouble in the long term

A country has to pay for its excess of imports over exports by borrowing abroad or divesting itself of investments made in the past. This is sustainable in the short run, but not in the long run:

1. For how long will foreigners be willing to lend money?
2. Negative spiral: the CAB also includes income payments and receipts, so that it will become more and more negative, as time goes by.

The BoP accounting identity and FX rate regimes III

CAB + KAB + ORS +SD = 0

Assume SD = 0 and consider a purely fixed exchange rate regime (ORS ≠ 0)

ORS = - (CAB + KAB)

The increase/decrease in official reserves…

…equals the combined deficit/surplus in the current account and in the capital account

The BoP accounting identity and FX rate regimes IV

Long run implications

If CAB+KAB<<0 and ORS>>0, the country is likely to run into trouble in the long term

The CB is buying up its own currency against gold and FX reserves to offset the net excess supply due to the (CAB+KAB) deficits. However, even assuming a very large stock of reserves, this cannot keep going on indefinitely: eventually, the country is likely to run out of credit.

BoP Imbalances and the Current Financial Crisis I

Understanding global trade and capital imbalances helps us gain a **deeper insight** into the **current financial crisis**.

Imbalances need **NOT** be destabilizing in and of themselves!

Trade imbalances can persist even for a very long time, whenever they have been incurred to finance new **productive investment.** Once these projects have become fully operative, however, **imbalances should be gradually reabsorbed** (higher production of goods and services, lower imports, more resources available to pay foreign debt back).

BoP Imbalances and the Current Financial Crisis II

What if trade imbalances have been brought about by policy distortions (e.g tariffs, quotas, currency manipulation, poorly regulated financial environments…)?

Adjustment can be violent and is very likely to lead to **financial instability** and **economic recession**.

BoP Imbalances and the Current Financial Crisis III

MAIN IMBALANCES of RECENT YEARS

LARGE TRADE SURPLUS COUNTRIES

All over the years, they have implemented a wide range of policies to **force savings up** at the **expense of households** (China, Japan, Germany…)

LARGE TRADE DEFICIT COUNTRIES

They have experienced an **unsustainable increase in debt** → e.g. USA: huge trade deficit, overly abundant K inflows and low interest rates have all fuelled the real estate bubble that finally led to the sub-prime crisis - (USA, Peripheral Europe – PIIGS…)

BoP Imbalances and the Current Financial Crisis III

What to do then?

Re-adjustment should be **twofold**: **heavily indebted countries** must necessarily **deleverage** (i.e. reduce debt), while **surplus countries** should conversely focus on economic policies aimed at **boosting internal consumption**.

Austerity alone is NOT enough

BoP Imbalances and the Current Financial Crisis IV

Assume that the foregoing twofold adjustment process were gradually completed…

What do you think will be the long run effect on FX rates (EUR, USD, RMB…)?

Will these currencies appreciate/depreciate?

Could you explain why?

Models of exchange rate determination: a broad overview

Flow vs Stock models

Flow models: focus on the currency flows of supply and demand

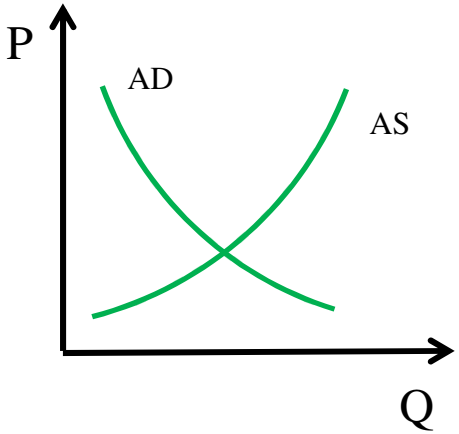
Amounts demanded or supplied **per period of time**

Stock models: focus on the stocks of currencies

Amounts existing **at a given point in time**

Watch out I

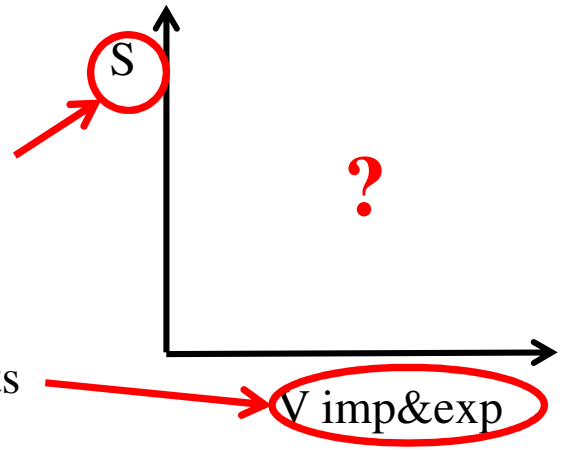
Traditionally,



when FX are brought into the picture…

FX rate→ the price of "currency i" in terms of "currency j"

Value of imports and exports



Watch out II

Notice we do **not** plot quantities on the horizontal axis as we normally do with supply/demand curves

Values involve the **multiplication of prices and quantities**

Flow models I

The BoP records the flows of payments into and out of a country

All the exchange rate models based on the BoP go under the name of "Flow models"

Flow models II

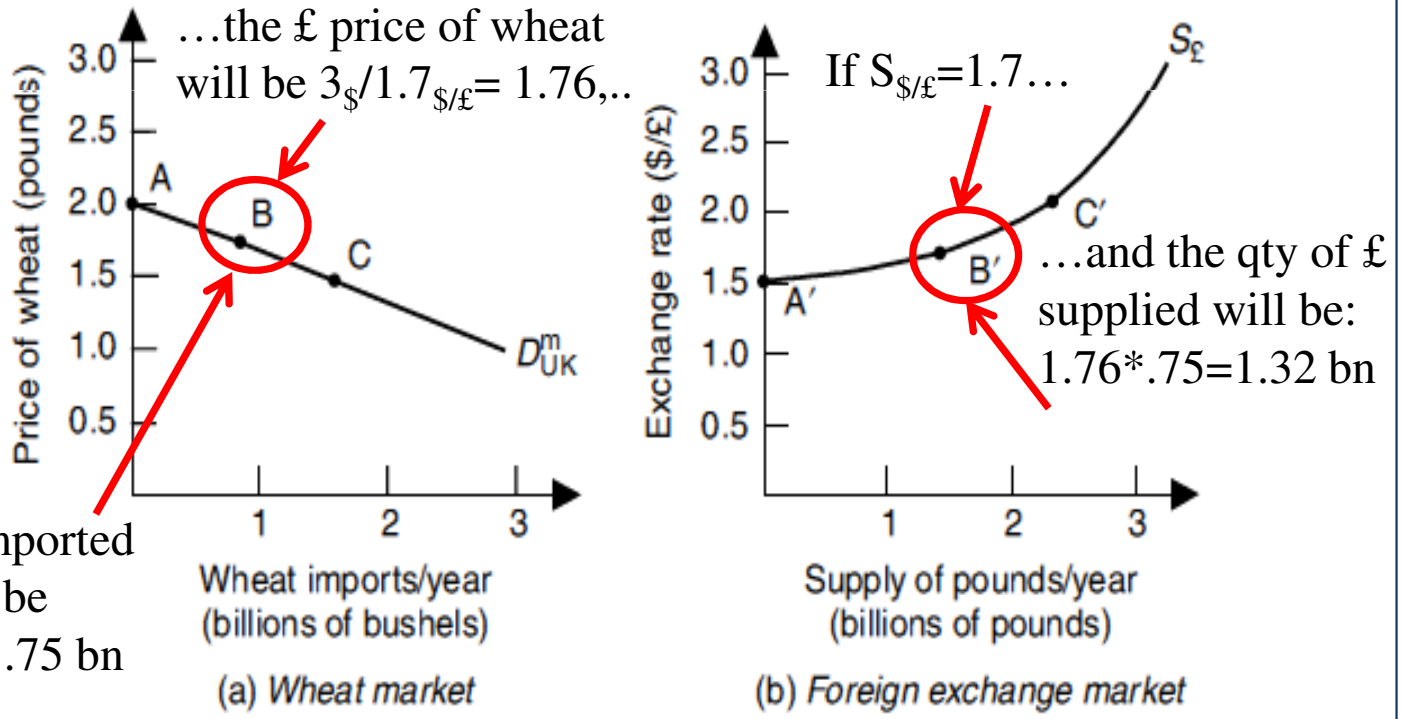
Deriving a currency's supply curve

Demand for imports→ the importing country's currency has to be sold to buy the exporter's money: the quantity of domestic currency supplied equals the value of imports

Qty of imported goods · Domestic price of imported goods

Flow models III

UK imports of wheat from US (assuming wheat's $ price=3$/bushel)



Flow models IV

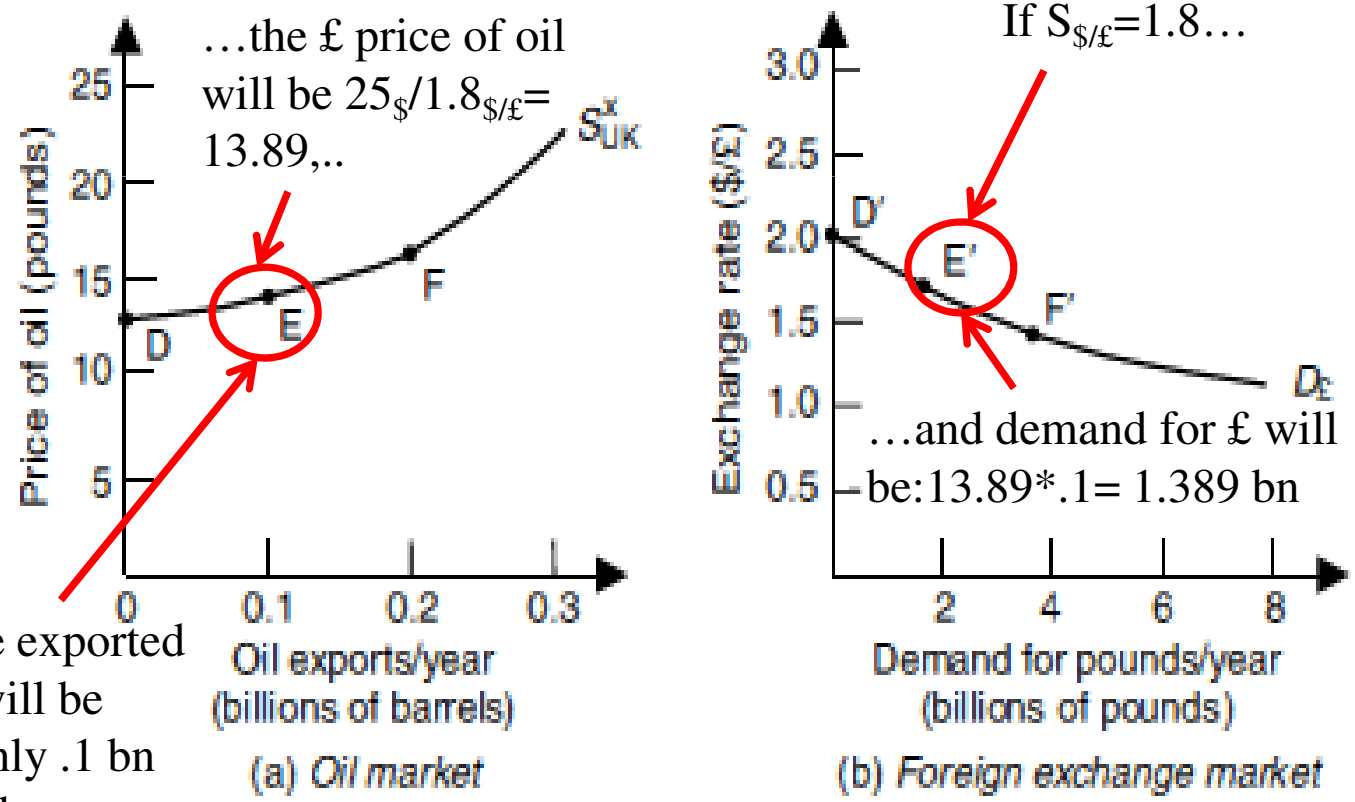
Deriving a currency's demand curve

Demand for exports→ the exporting country's currency has to be bought to pay the exporter: the quantity of domestic currency demanded equals the value of exports

Qty of exported goods · Domestic price of exported goods

Flow models V

UK exports of oil to US (assuming oil's $ price=25$/barrel)



Flow models VI

Intersection of the supply and demand curves

exchange rate that equates the value of exports and imports

supply of a country's currency = demand for the same country's currency

The stability of FX rates

Does the supply curve have to slope upwards just as well as the demand curve slopes downwards?

Terminology

Elasticity: given a generic demand function $q = fx(p)$, elasticity is defined as

$$E_q(p) = q'(p) \cdot \frac{p}{q(p)}$$

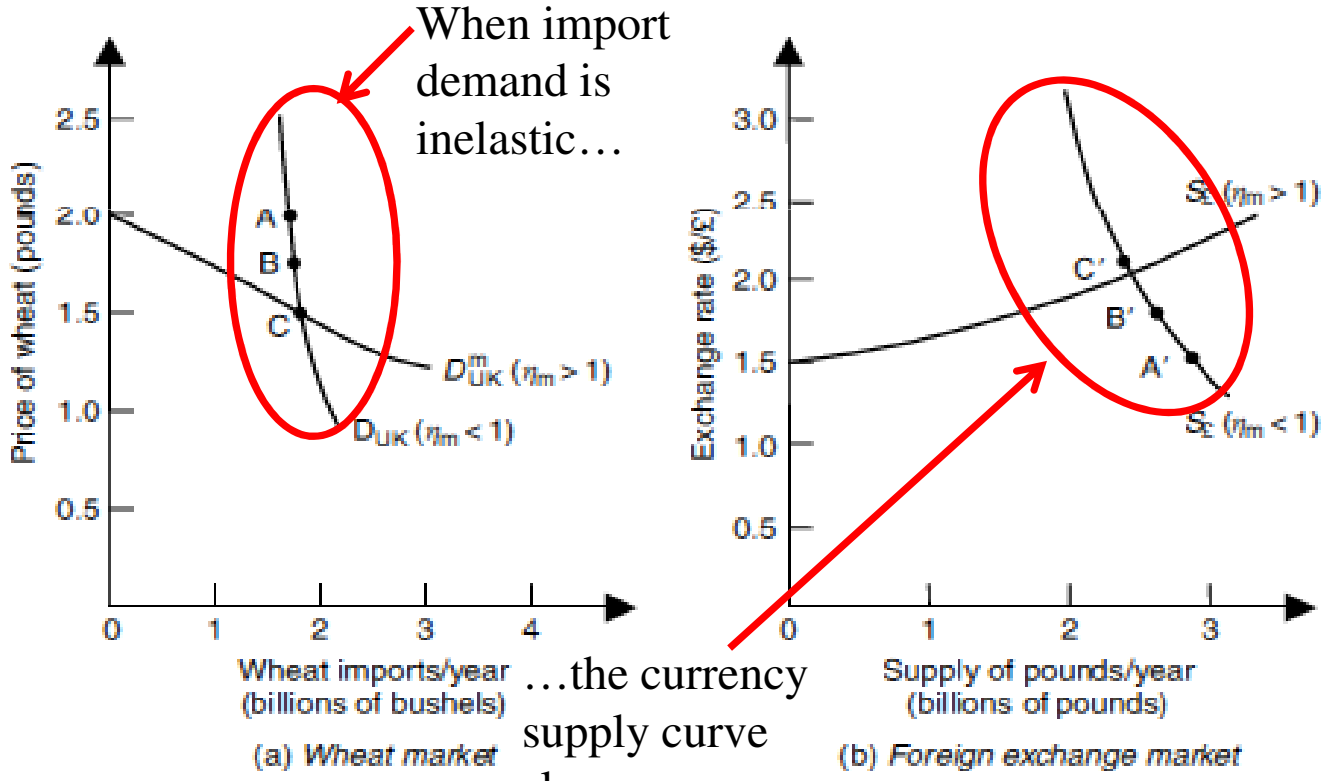
- $|E_q(p)|>1$ → the demand is elastic

$$\Delta Q >> \Delta P$$

- $|E_q(p)|<1$ → the demand is inelastic

$$\Delta Q << \Delta P$$

Import demand's elasticity and the currency supply curve I



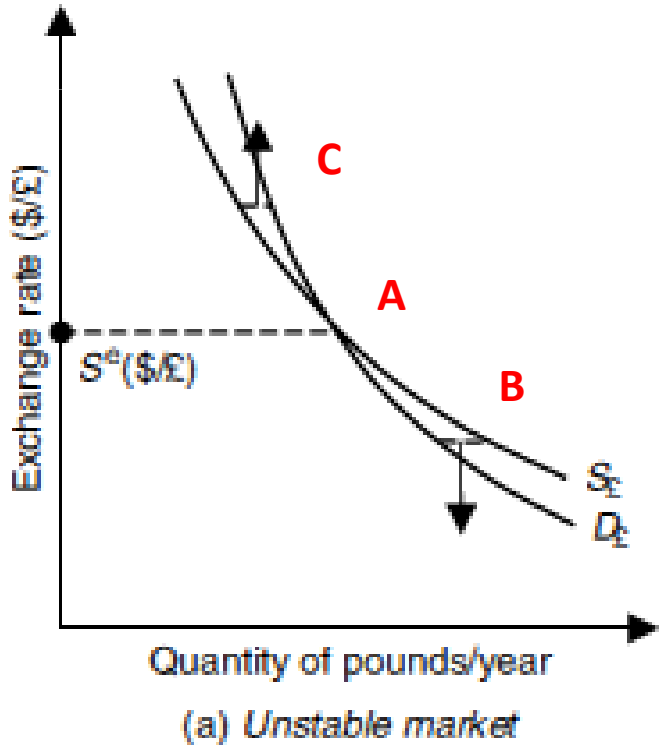
Import demand's elasticity and the currency supply curve II

Can you explain why?

Whenever the import demand curve is ….., a domestic currency appreciation is associated with a …than proportional increase in the demanded qty. Consequently Δ(Value of Imports)… and the currency supply curve thus slopes downwards.

What does a downward sloping supply curve implies? I

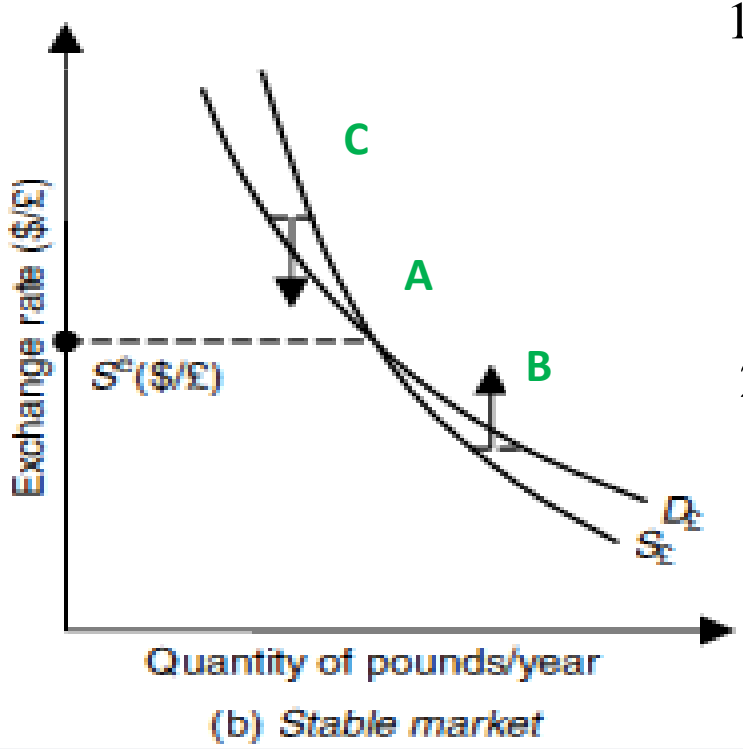
a) The currency demand curve is steeper than the currency supply curve



1. The equilibrium FX rate (A) is affected by a shock pushing $S_{\$/£}$ downwards (B)→ **excess supply** that drives the **FX rate even lower**→ **Unstable FX rate**
2. The equilibrium FX rate (A) is affected by a shock pushing $S_{\$/£}$ upwards (C)→ **excess demand** that drives the **FX rate even higher**→ **Unstable FX rate**

What does a downward sloping supply curve implies? II

b) The currency supply curve is steeper than the currency demand curve



(b) *Stable market*

1. The equilibrium FX rate (A) is affected by a shock pushing $S_{\$/£}$ downwards (B)→ at this rate, the **demand exceeds the supply** and this will **push $S_{\$/£}$ back towards A→ Stable FX rate**
2. The equilibrium FX rate (A) is affected by a shock pushing $S_{\$/£}$ upwards (C)→ at this rate, the **supply exceeds the demand** and this will **push $S_{\$/£}$ back towards A→ Stable FX rate**

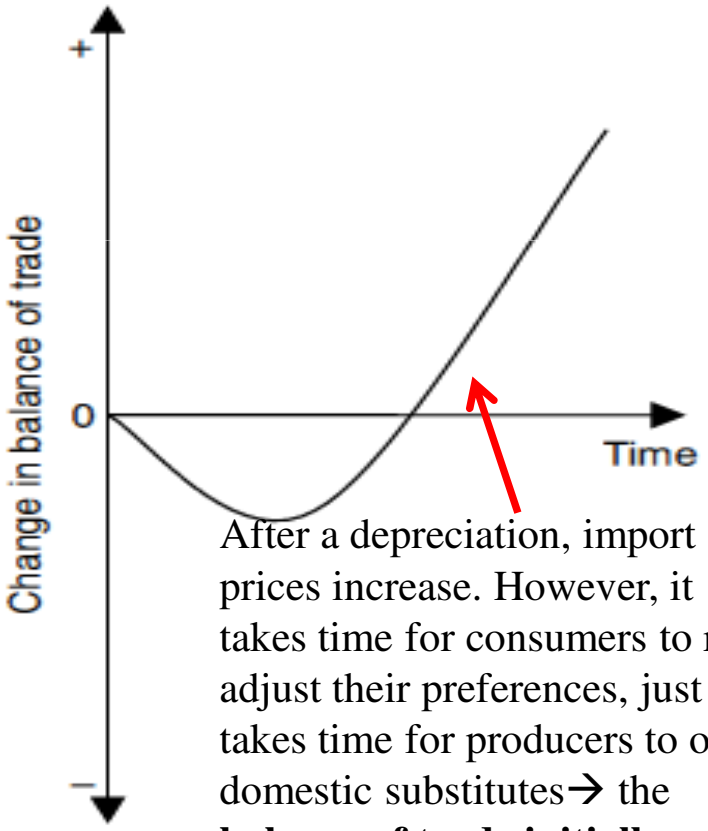
FX rate's instability

A downward sloping currency supply curve is a **necessary condition** for FX instability.

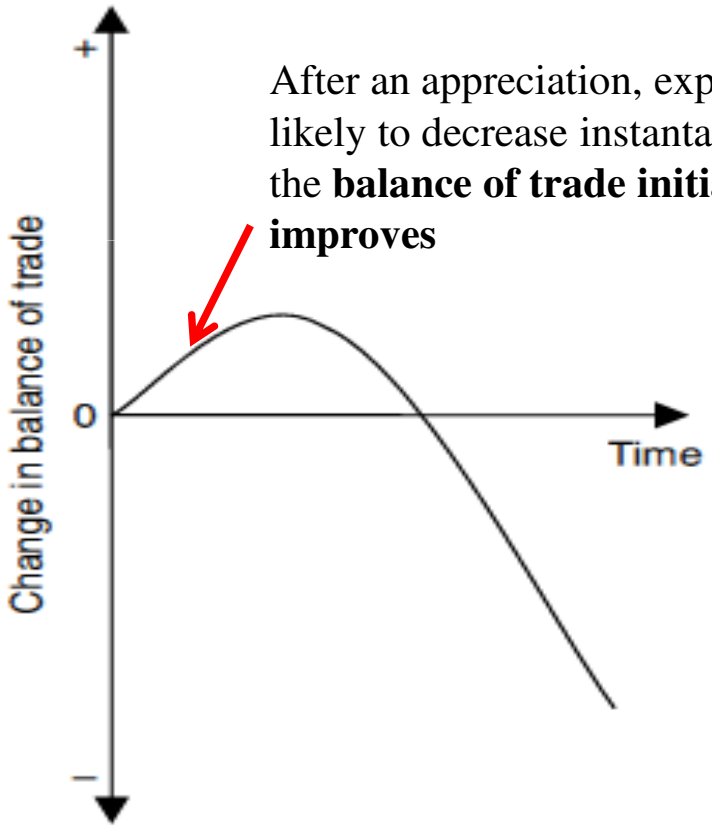
When the demand is inelastic:

1. Currency depreciation may bring about an increase in imports' value (ΔP more than offsets ΔQ)
2. If exports do not sufficiently increase to compensate for inelastic imports' demand, the Balance of Trade necessarily worsens

The J curve



After a depreciation, import prices increase. However, it takes time for consumers to re-adjust their preferences, just as it takes time for producers to offer domestic substitutes→ the **balance of trade initially worsens**



After an appreciation, exports are not likely to decrease instantaneously→ the **balance of trade initially improves**

Stock models

Exchange rate determination depends on the existing *stocks* of currencies relative to the willingness of people to hold them.

The available models differ primarily in the range of assets considered and in the level of price flexibility

Remark: "Stock models" are also known as "Asset-based models"

The Monetary Model

Underlying intuition: a change in the demand relative to the supply of one currency versus another will modify the exchange rate.

E.g. *Ceteris paribus*, Currency A is going to appreciate, whenever the demand for Currency A increases (relative to its supply) by more than the demand for Currency B (relative to its supply)

The real demand for money at home…

The real domestic demand for money depends…

$$\frac{M_D}{P_D} = Y_D^{\alpha} r_D^{-\beta}$$

…on real GDP…

…as well as on interest rate levels

$$P_D = M_D Y_D^{-\alpha} r_D^{\beta}$$

…and abroad

$$\frac{M_F}{P_F} = Y_F^{\alpha} r_F^{-\beta}$$

$$P_F = M_F Y_F^{-\alpha} r_F^{\beta}$$

Watch out

- Why should real money demand increase with real GDP?

The more goods and services people buy, the more money they need to hold to make transactions

- Why is real money demand inversely related to interest rate levels?

The opportunity cost of holding money is higher the higher are the interest rates foregone on alternative investment opportunities (e.g. bonds, stocks…)

Money Mkt Equilibrium I

Economic agents adjust their money holdings until when

Real Money Demand = Real Money Supply

<u>Adjustment chain: an example</u>

RMD<RMS, excess supply is used to buy securities, $P_{securities}\uparrow$, $r_{securities}\downarrow$, opportunity cost of holding money↓, RMD↑

Money Mkt Equilibrium II

If Real Money Demand = Real Money Supply, M_D and M_F represent **both** money demand and supply

From the PPP…

$$P_D = S_{D/F} \cdot P_F$$

$$S_{D/F} = \frac{P_D}{P_F}$$

…to the monetary model

$$S_{D/F} = \frac{P_D}{P_F} = \frac{M_D Y_D^{-\alpha} r_D^{\beta}}{M_F Y_F^{-\alpha} r_F^{\beta}}$$

Or equivalently

The monetary model

$$S_{D/F} = \left(\frac{M_D}{M_F}\right)\left(\frac{Y_D}{Y_F}\right)^{-\alpha}\left(\frac{r_D}{r_F}\right)^{\beta}$$

The value of F expressed in terms of D…

…increases, if the domestic money supply grows more than the foreign money supply…

…goes up, if the foreign GDP increases by more than the domestic GDP…

…rises, whenever domestic interest rates are higher than the foreign rates. (**Can you recall the UIRP predictions?**)

Flow vs Monetary models I

What are the consequences of higher real economic activity?

Flow model	Monetary model
Higher GDP goes hand in hand with higher spending (including imports)→ this will eventually lead to **currency depreciation**	The main claim is that you cannot overlook the link between the goods and services mkt and the financial mkt→ ignoring the relationship between GDP and real money demand may lead to seriously misleading conclusions→ **currency appreciation**

Flow vs Monetary models II

What are the consequences of higher domestic interest rates?

Flow model	Monetary model
Higher domestic interest rates will increase the demand for domestic interest bearing securities→ the demand for the domestic currency goes up leading to **currency appreciation**	A higher interest rate means a high opportunity cost of holding money→ RMD < RMS→ **currency depreciation**

Overshooting I

The stock models rely on the PPP assumption that P_D and P_F are the prices of two baskets containing all goods and services: what if this claim were relaxed?

Overshooting: the situation whereby exchange-rate changes are larger in the short run than in the long run.

Overshooting II

PPP is likely to hold for internationally traded products, whereas goods that are not internationally traded tend to exhibit stickier prices

Prices of traded goods increase in proportion to the country's money supply because they move directly with the exchange rate, but prices of non-traded goods increase only slowly.

The overall price level increases less than the money supply, leaving RMD<RMS

Eventually, the excess supply of money is eliminated via rising prices of nontraded goods, but in the interim the excess supply of money causes increased spending on goods and bonds.

Overshooting III

The increased spending on bonds drive their P up and their y down. K leaves the country until the country's currency is low enough that it is expected to appreciate

In order for the currency to be expected to appreciate, the exchange rate must overshoot, going lower than its final equilibrium level→ will the exchange rate be driven back towards equilibrium?

Overshooting IV

In the long run, prices of non-traded goods do catch up. The exchange rate appreciates back to its new equilibrium, after overshooting beyond the new (lower) long-run equilibrium level

To put it into practice I

a. The Central Bank of China aims at preventing a further appreciation of the RMB against the US$: is it consistent with the Chinese government's desire to fight inflation? Please, explain.

b. What does the monetary model predict about the effect of higher expected inflation on the exchange rate?

To put it into practice II

c. Given the following data for country X

Current Account Item	USD (mio)
Commodity Exports	**577.3**
Commodity Imports	**-1085.5**
Services	**-209.5**
Investment income	**-63.4**
Interest due on foreign debt	**-41.2**
Transfers	**616.7**

Please, find the CAB.

Do you think Country X is a developed/developing country? Why?