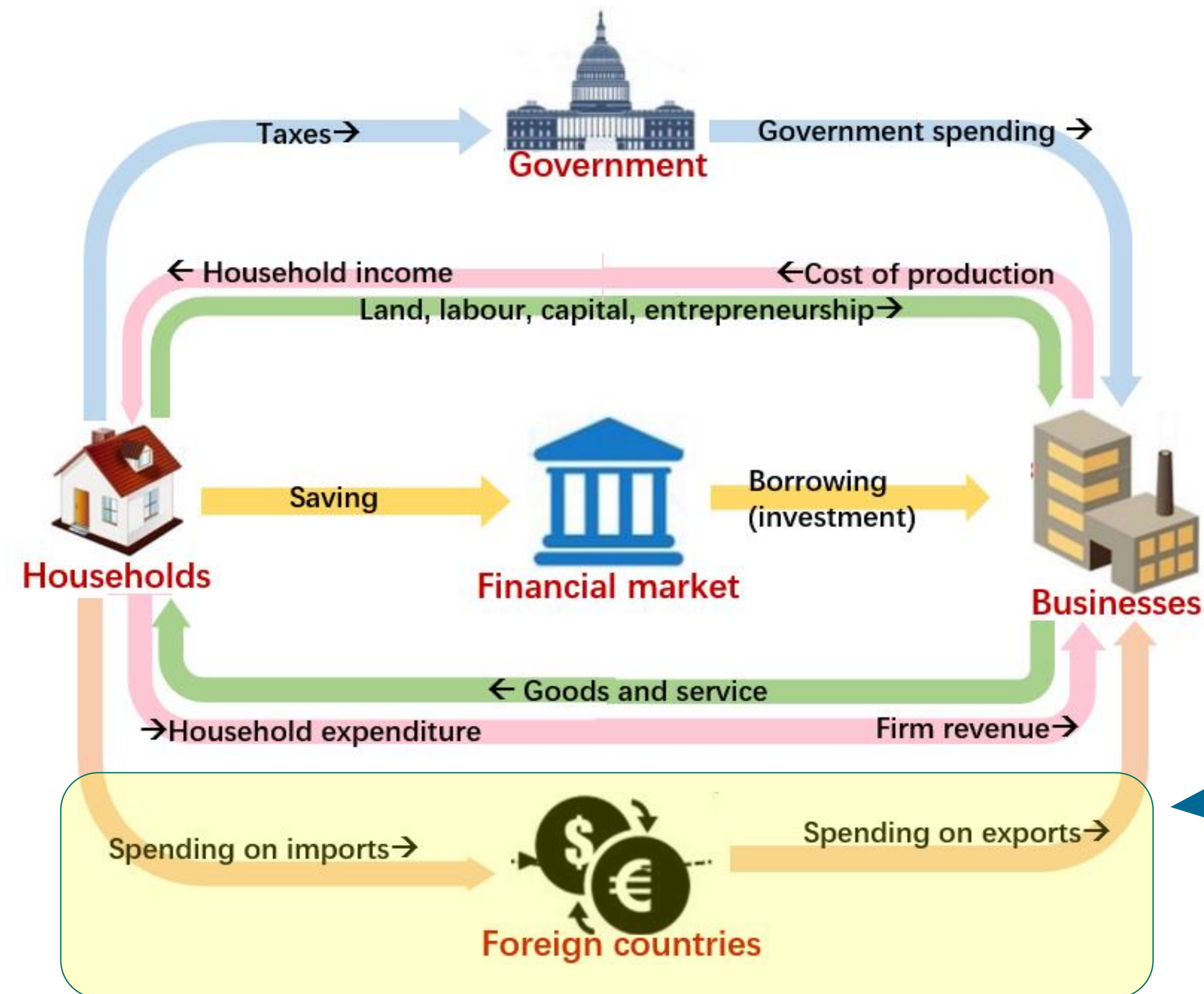


Exchange rates



Demand and supply of foreign exchange 3



Foreign exchange refers to foreign national currencies, i.e. for any country, it refers to currencies other than its own.

Japan



Conan wants to buy a cool trench coat from Sherlock Holmes



Conan goes to the bank and wants to convert 9000 Japanese Yen into 50 British Pounds.

→ Demand British Pound

→ Supply Japanese Yen



→ 'sell' Japanese Yen

→ 'buy' British pound

Sherlock Holmes in U.K wants to be paid in British Pound.

U.K

Price: £50



The foreign exchange market:

individuals, firms, banks, other financial institutions and governments buy and sell currencies.



The exchange rate today for GBP/JPY is 1:180

The foreign exchange market involves any location where one currency can be exchanged for another.

→ The demand for foreign currencies generates a supply of domestic currency;
→ The demand for the domestic currency generates a supply of foreign currencies.

Exchange Rate

Exchange rate: the rate at which one currency can be exchanged for another, or the number of units of foreign currency that correspond to the domestic currency; can be thought of as the 'price' of a currency, which is expressed **in terms of another currency**.

Expression: exchange rate is always expressed in terms of another currency:

- the 'value' or 'price' of 1 euro in terms of dollars.
→ Number of dollars per euro: **1.5 dollars = 1 euro**
 - to buy 1 euro, 1.5 dollars must be given up.
 - 1.5 dollars can be gotten if one euro is given up.
 - the 'value' or 'price' of 1 dollar in terms of euro.
→ Number of euros per dollar: **0.67 euro = 1 dollar**
- **These two expressions are equivalent.**



AUD/USD	0.9394	1.0738
USD/CAD	1.0735	1.0738
USD/CHF	0.9022	0.9022
USD/DKK	5.5357	5.5382
EUR/USD	1.3467	1.3470
GBP/USD	1.7062	1.7065

→ In reality, the demand for EURO is equivalent to the supplies of all other currencies offered in the foreign exchange market to buy EURO.

Exchange rate system

7

2. Fixed exchange rate system



1. Floating (flexible) exchange rate system

3. Managed float exchange rate system

1. Floating exchange rates

8

In a **floating(flexible) exchange rate system**, exchange rates are determined by **market forces**, or the forces of demand and supply, with **no government or central bank** intervention in the foreign exchange market.



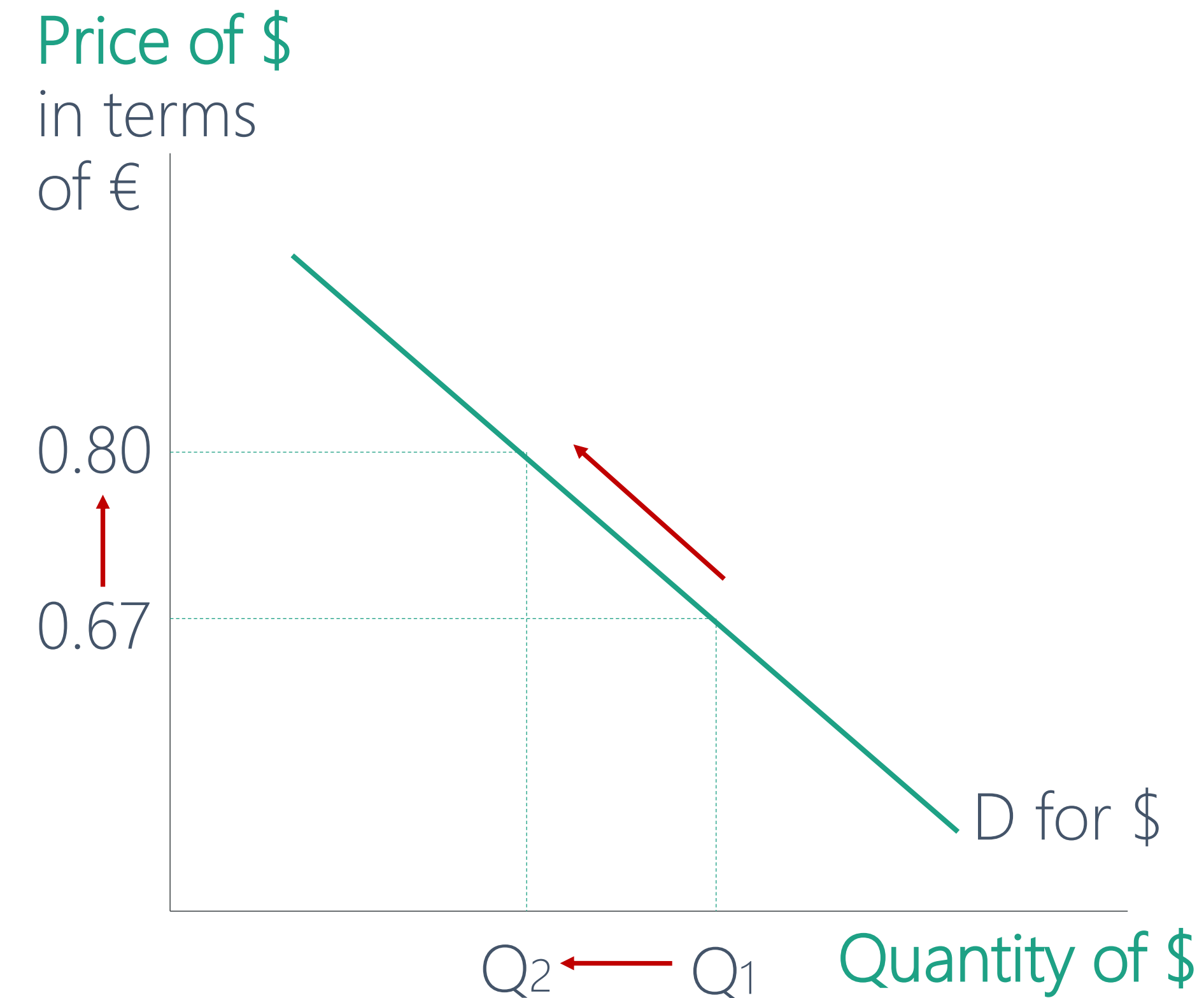
The downward sloping demand curve

9

In a simplified world with two currencies, the US dollar and the euro.

The **demand curve** represents the **demand for dollars**. It comes from euro zone residents who need dollars to carry out transactions in the U.S:

- EU importers buying goods from the U.S
 - EU investors who wants to invest in the U.S
 - EU consumers going on holiday to the U.S
 - ...
- As the price of dollars in terms of euros increases from 0.67 to 0.80, U.S exports in the EU will become more expensive relative to the home-produced goods.
 - The demand for these U.S exports will fall in EU
 - The demand for dollars to buy these exports will fall
 - EU residents buy fewer dollars.



➤ So at **higher prices** (or exchange rates) **less dollar will be demanded**, vice versa.

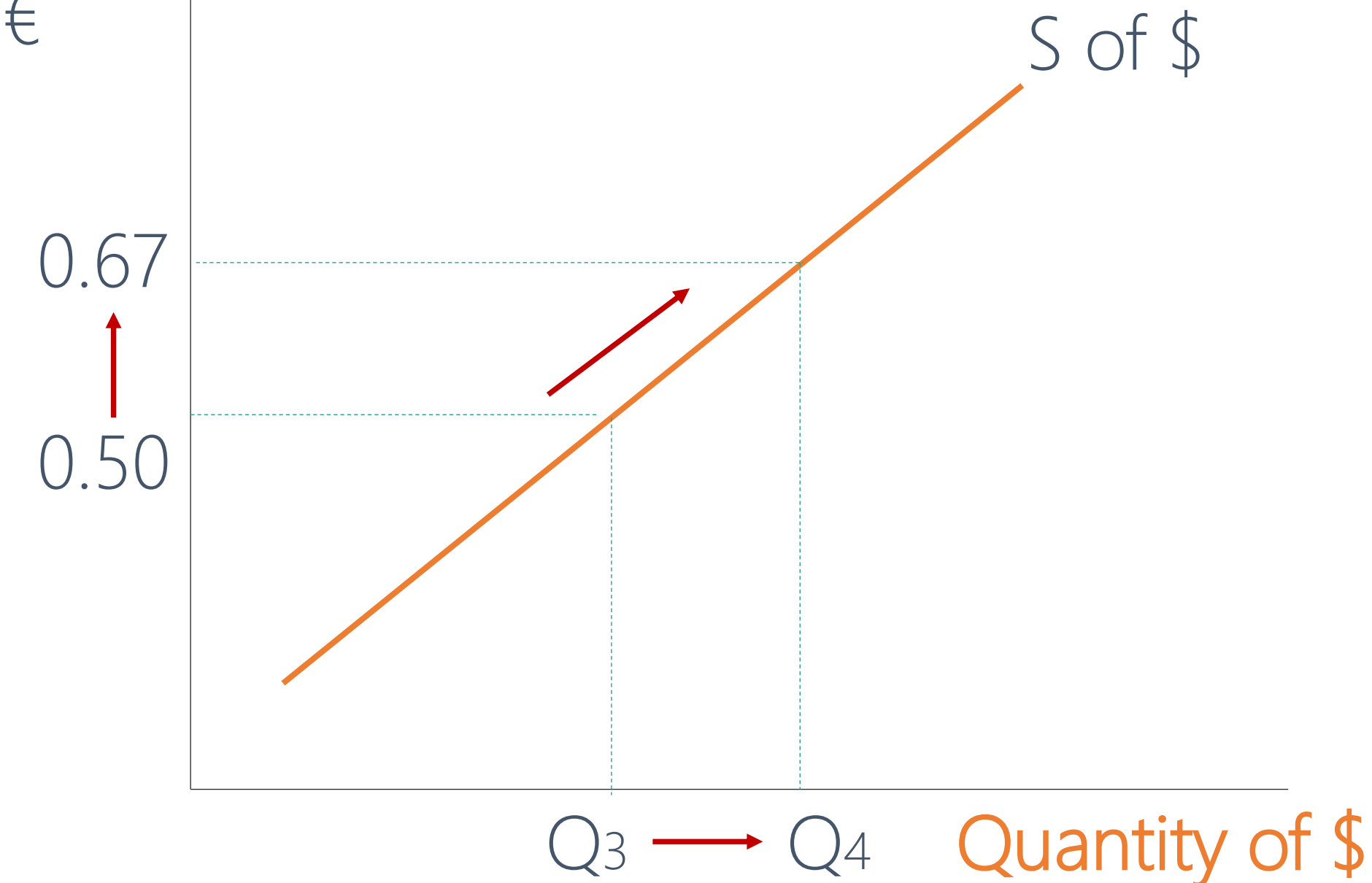
The upward sloping **supply curve**

10

The supply of dollar comes from US residents who would like to 'sell' dollars to buy euros:

- US residents who would like to import goods from EU
 - US residents who want to take a holiday in EU
 - US residents who plan to invest in EU
 - ...
- If the price of dollars increases from €0.5 to €0.67 per dollar, then by selling 1 dollar, US residents can buy €0.67 (rather than €0.5) worth of EU goods.
 - The price of imports from EU falls
 - Consumers are willing to buy cheaper EU goods rather than more expensive US goods.
 - More dollars are supplied to buy the euro.

Price of \$
in terms
of €



➤ So at **higher prices** (or exchange rates) **more dollars will be supplied**, vice versa.

The equilibrium 'price' of dollar

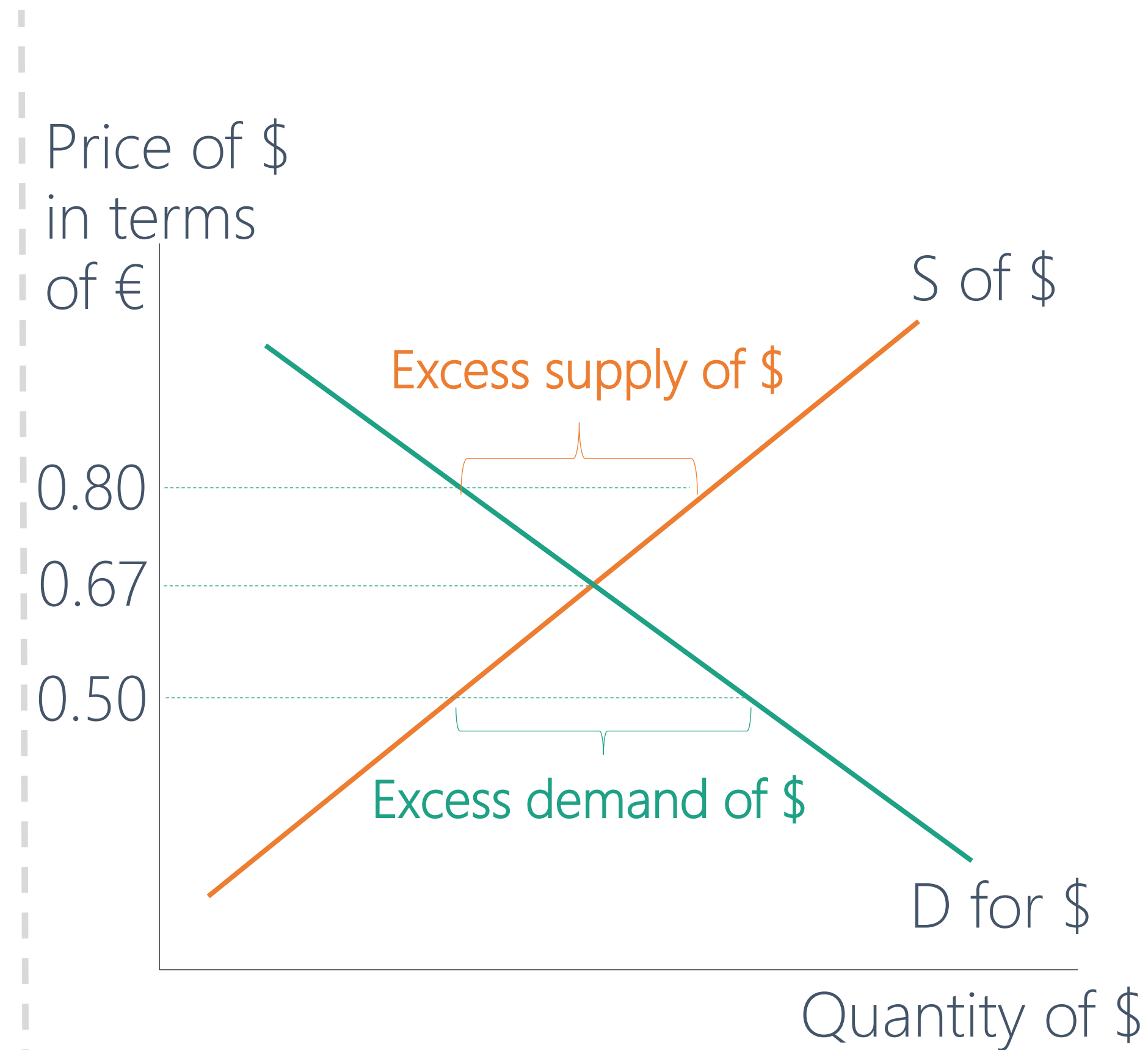
11

In a floating exchange rate system, the **equilibrium exchange rate** is determined by the forces of demand and supply at the point where the quantity of a currency demanded equals quantity supplied, without any government or central bank intervention.

- The intersection of the **demand** and **supply** curves determines the equilibrium 'price' of the dollar in terms of the euro.

→ equilibrium exchange rate: 0.67 euro per dollar.

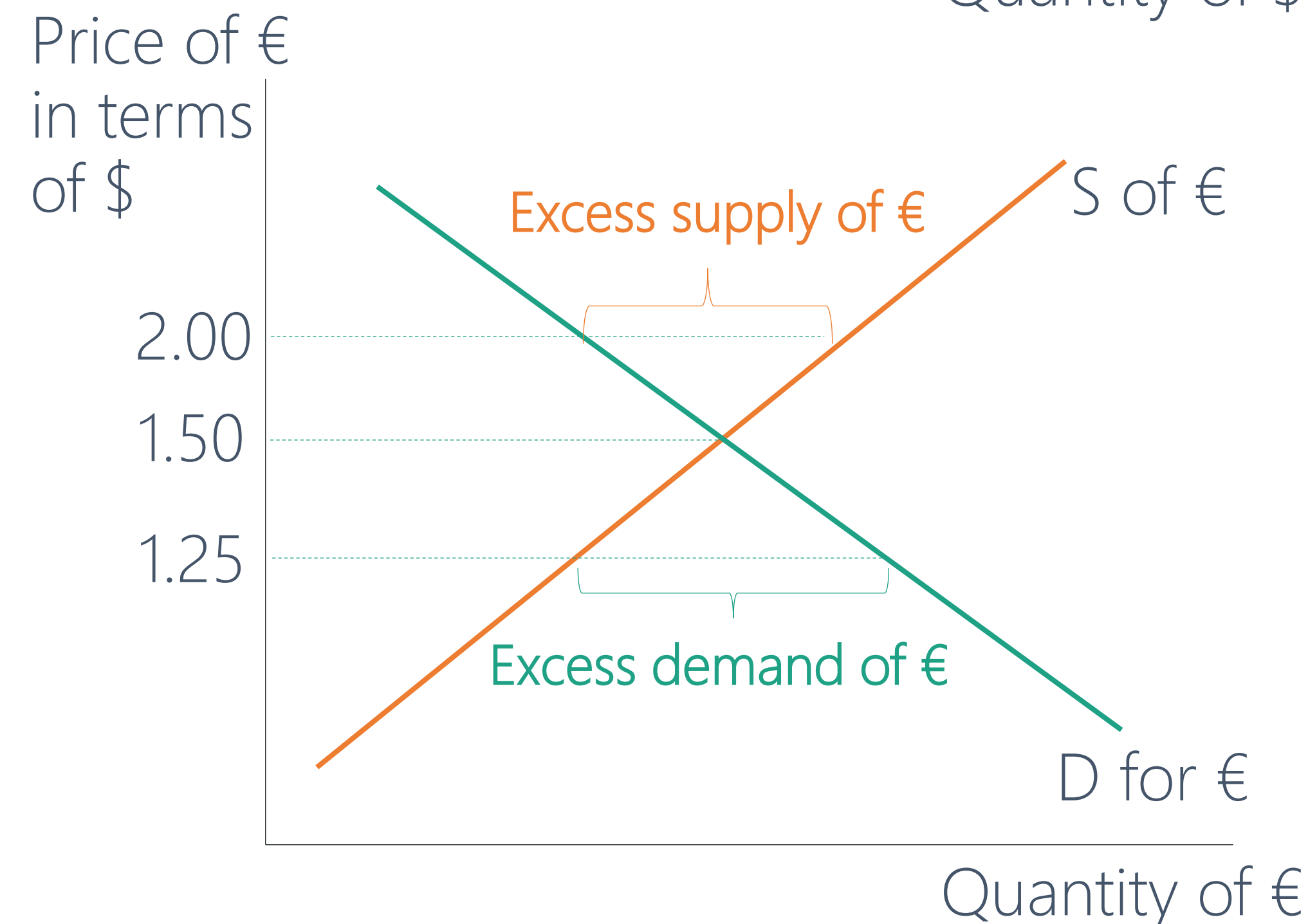
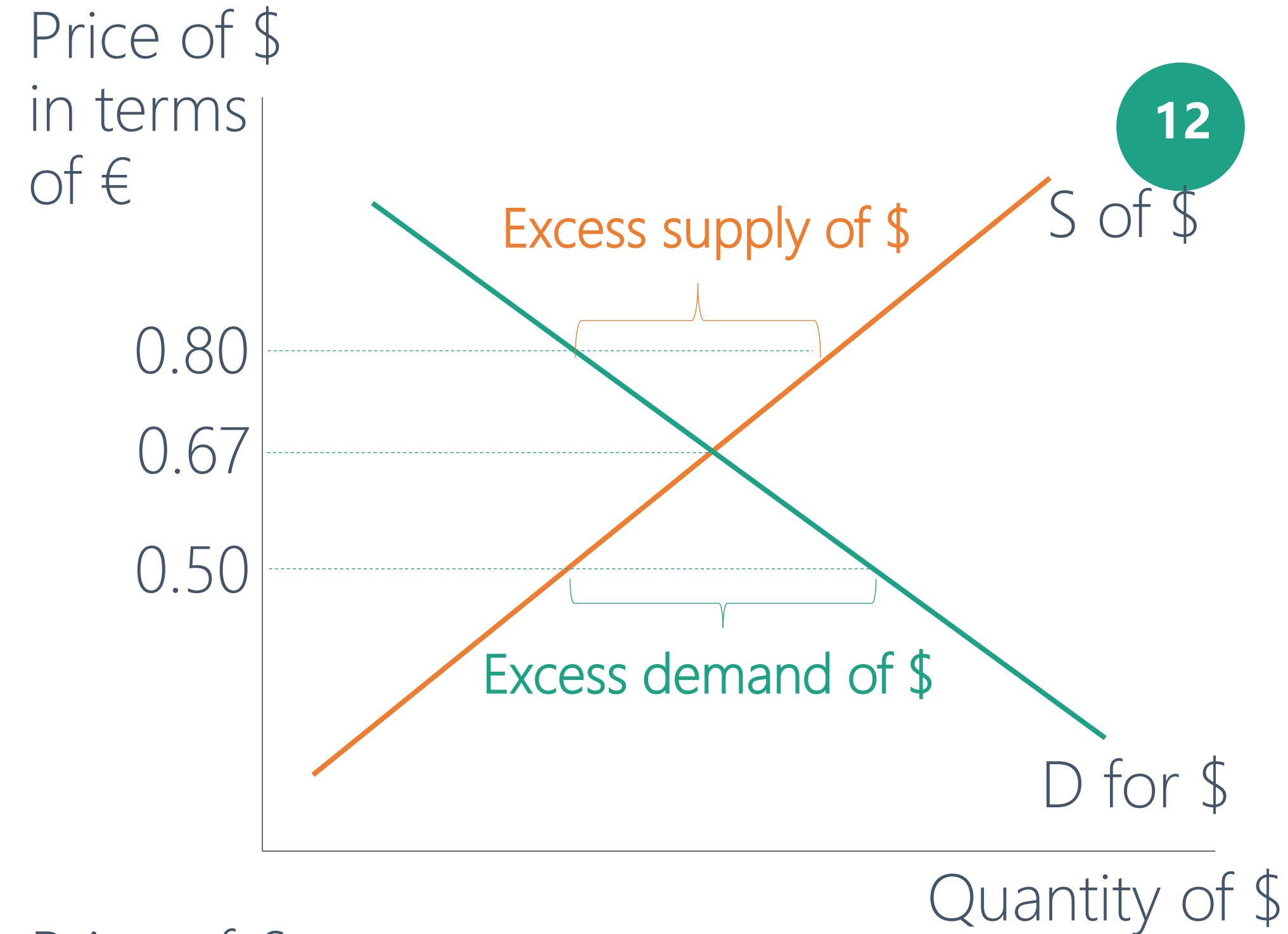
- If the exchange rate were higher than the equilibrium (e.g. 0.80 euro per dollar), there would be an excess supply of dollars.
- If the exchange rate were lower than the equilibrium (e.g. 0.50 euro per dollar), there would be an excess demand of dollars.



The equilibrium 'price' of euro

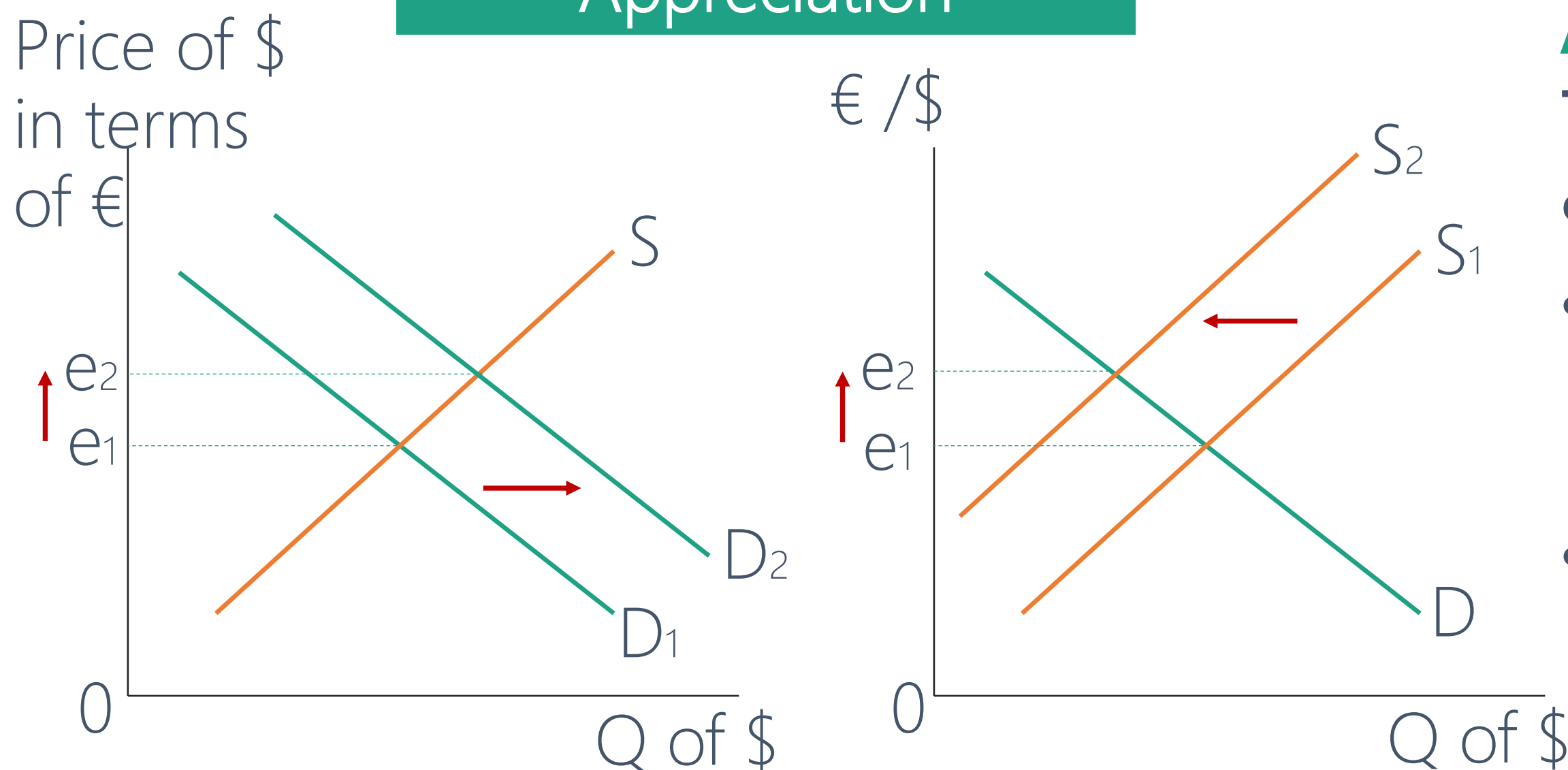
- Demand for dollars = supply of euros
 - Demand for euros = supply of dollars
- When we determine the 'price' of dollars, we also determine the 'price' of euros.

→ The two equilibrium exchange rates are equivalent to each other.



Exchange rate changes: appreciation & depreciation

Appreciation



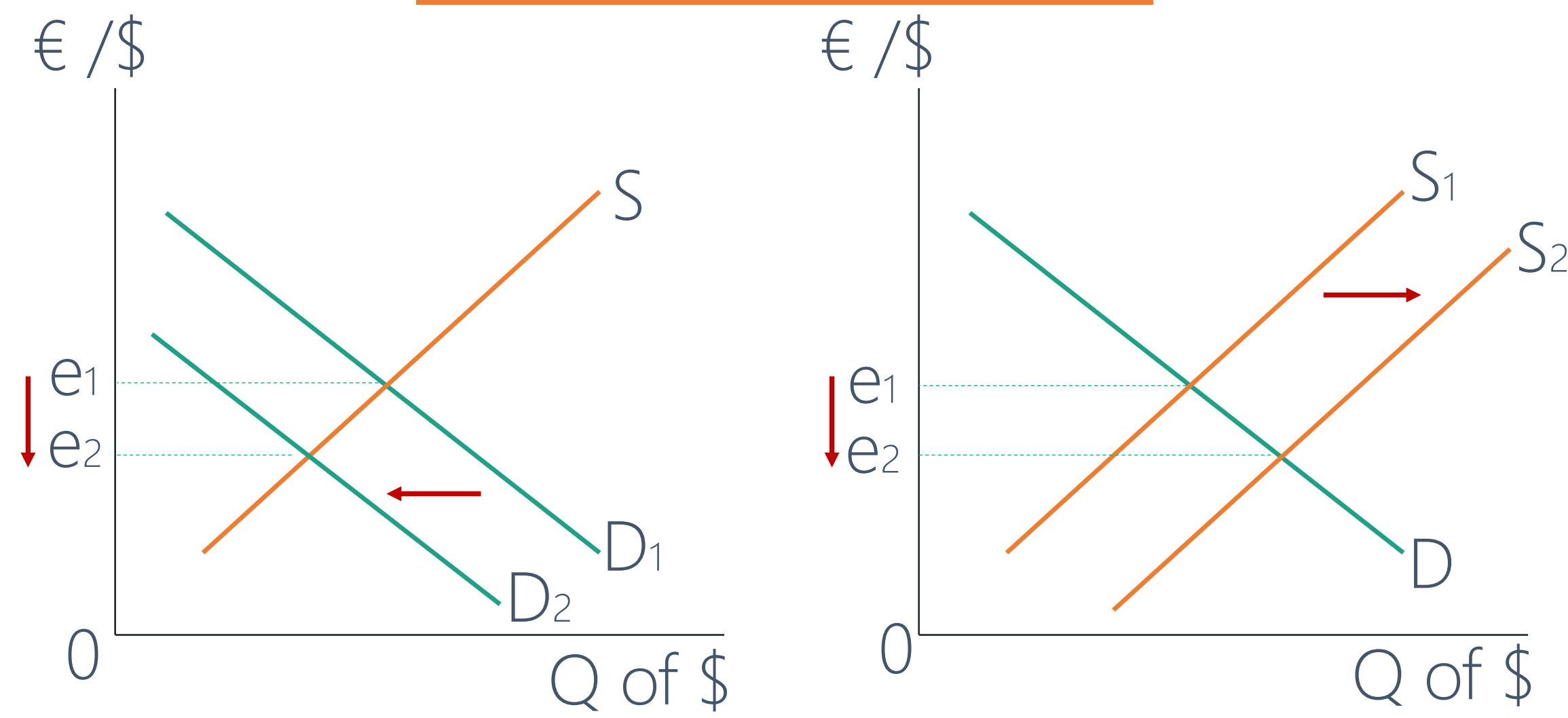
An increase in the value of a currency in a floating exchange rate system is called an appreciation. It may have two causes:

- An increase in the demand for dollars → the demand-for-dollars curve to shift to the right (D_1 to D_2) → higher exchange rate from e_1 to e_2 .
- An decrease the supply of dollars → the supply-of-dollars curve to shift to the left → higher exchange rate from e_1 to e_2 .

An fall in the value of a currency in a floating exchange rate system is called a depreciation. It may have two causes:

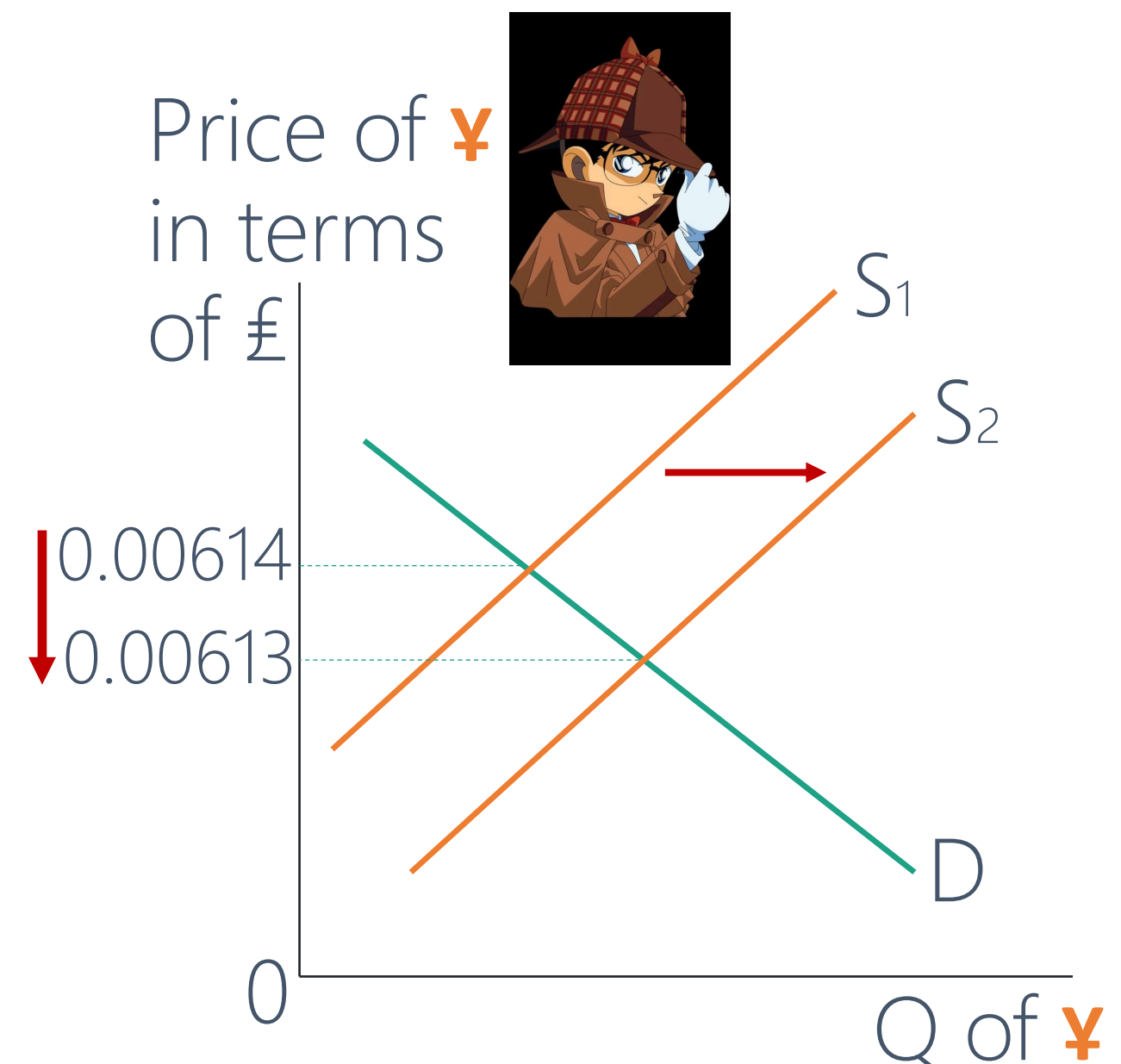
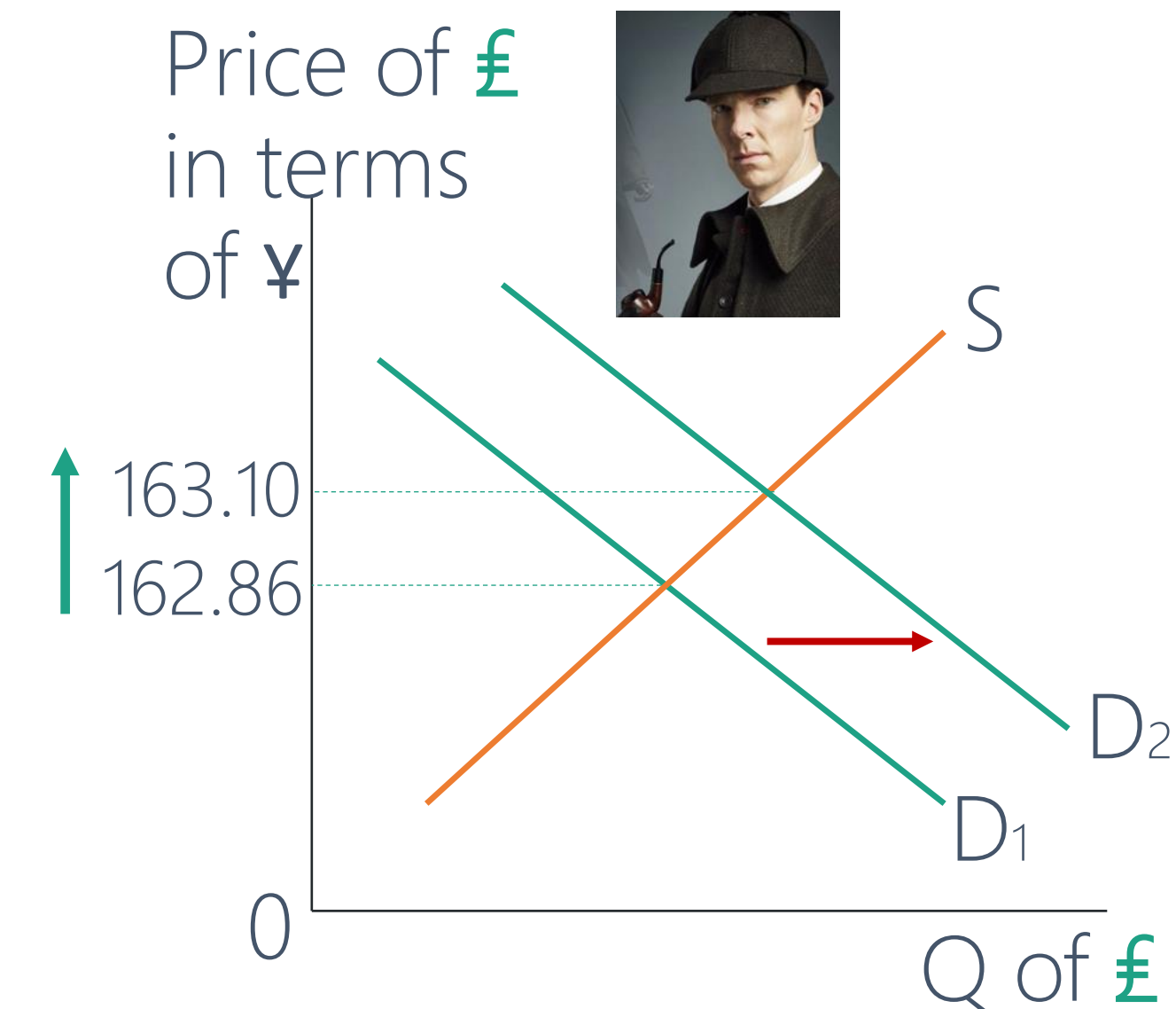
- A fall in the demand for dollars → demand-for-dollar D_1 shift to the left. → lower value for dollar to e_2 .
- An increase in the supply of dollars → supply-of-dollar curve S_1 shift to the right → lower dollar value to e_2 .

Depreciation



Floating exchange rate affecting two currencies 14

- What happens to the exchange rate when Conan in Japan decides to buy 126 million British made trench coats from Sherlock Holmes?
 - If Conan buys 126 million British made trench coats, there will be an **increase in the demand for British goods** → an increase in demand curve for GBP(British pounds) from D_1 to D_2 .
 - The **GBP** is now worth more (from 162.86 to 163.10), it has **appreciated**.
 - In order to buy these GBP, the **supply of JPY(Japanese Yen)** will **have to increase**. The supply curve in the second diagram shifts to the right from S_1 to S_2 . The **JPY has depreciated** against GBP – it is worth less in terms of the GBP.
- An appreciation of the GBP against the JPY must result in the JPY depreciating in value against the GBP.
- If the value of exports into Japan (from UK) > exports into UK(from Japan), the value of GBP in terms of JPY will rise; the value of JPY in terms of GBP will fall.



In the real world



In the real world, there are many national currencies in the international system.

- When one currency appreciates it does so against all others in a floating exchange rate system, meaning that all others depreciate relative to it.
- When a currency depreciates, all other currencies appreciate relative to it.
- There are numerous ongoing changes in demand and supply of currencies, causing exchange rates of most currencies around the world to fluctuate on a daily or even hourly basis.

Causes of changes in exchange rates

Changes in currency demand

1. Exports and factors affecting exports
2. Investment and factors affecting investment
3. Other factors affecting currency demand

Changes in currency supply

1. Imports and factors affecting imports
2. Investment and factors affecting investment
3. Other factors affecting currency supply



Causes of changes in exchange rates

Changes in currency demand

20

1. Exports and factors affecting exports

- **Foreign demand for exports of goods**
 - An increase in foreigner's demand for Germany cars → demand for Euros increases → the demand-for-euros curve shifts to the right → the euro appreciates. Vice versa.
- **Foreign demand for exports of services**, such as tourism services.
- **The rate of inflation relative to other countries** (both affect demand and supply)
 - If China have lower inflation rate than other countries → higher demand for exports (relatively less expensive) → higher demand for RMB → demand curve for RMB shifts to the right → RMB appreciates. Vice versa
- **Relative growth rates**
 - If Kenya's trading partners experience high economic growth → their income increase and they will demand more exports from Kenya → higher demand for Kenya Shilling → demand curve for Kenya shilling shifts to the right → Kenya Shilling appreciates. Vice versa



Causes of changes in exchange rates

Changes in currency demand

2. Investment and factors affecting investment

- **Inward (coming into the country) foreign direct investment (FDI) and portfolio investment.**
 - ✓ Foreign direct investment - investment by multinational corporations in productive facilities
 - ✓ Portfolio investment – financial investment, such as purchase of stocks and bonds
 - If foreigners want to increase their investments in China → higher demand for Chinese yuan → the demand-for-yuan curve shifts to the right → Chinese yuan appreciates. Vice versa
- **Relative interest rates (both affect demand and supply)**
 - * Financial capital refers to funds that are used to make financial investment, or investments that receive a return based partly on the rate of interest.
 - If interest rates in Canada increase relative to interest rates in other countries (or expectations of financial investors that interest rates will rise) → the financial investment in Canada become more attractive → more financial capital will flow in → Demand for Canadian dollar(CAD) increases → the demand-for-CAD curve shifts to the right → CAD appreciates. Vice versa.



Causes of changes in exchange rates

Changes in currency demand

3. Other factors affecting currency demand

- **Inward flow of remittances**

- Remittances involve a transfer of money from one country to another, in most cases by foreign workers who send money from their earnings in the country of residence to their family in their home country.
- An increase in remittances into India sent from abroad → an increase in the demand for the Indian Rupee → Indian Rupee appreciation. Vice versa

- **Speculation that a currency will appreciate**

- Currency speculation involves buying and selling currencies to make a profit from changes in exchange rates.
- If currency speculators expect a country's currency to appreciate, they buy it in the hoping of selling it later after its appreciation to make a profit → higher demand and appreciation of the currency.
→ self-fulfilling prophecy

- **Central bank intervention to increase the value of a currency**

- Every central bank holds reserves of foreign currencies that it can buy or sell to influence the value of the domestic currency.
 - To increase the value of domestic currency, it demands (buys) the domestic currency (by selling foreign currencies). Vice versa.



Causes of changes in exchange rates

Changes in currency supply

1. Imports and factors affecting imports

- **Domestic demand for imports of goods**

- If consumers in the U.S import more foreign made cars → US importers must buy more foreign currencies, so they supply (sell) more US dollars in the foreign exchange market. → supply of dollars increases → the supply-of-dollar curve shifts to the right → the dollar depreciate. Vice versa.

- **Domestic demand for imports of services**, such as tourism.

- Imports of tourism services: tourists travelling abroad to foreign countries.
- More tourist travelling abroad in China, they sell domestic currency to buy foreign exchange that they can use abroad → the supply of RMB increase → RMB will depreciate. Vice versa.

- **The rate of inflation relative to other countries. (both affect demand and supply)**

- If Sweden's rate of inflation is lower than that of other countries → imports become more expensive compare to domestically produced goods → lower demand for imports → supply for the Swedish Kronor decreases → Swedish Kronor appreciate.
- Vice versa

- **Relative growth rates**

- If Kenya experience higher economic growth rate with growth in income → higher demand for imports → the supply of Kenyan shilling increases → shilling depreciates. Vice versa.



Causes of changes in exchange rates

Changes in currency supply

2. Investment and factors affecting investment

- **Outward foreign direct investment (FDI) and portfolio investment.**
 - If domestic investors increase their investment abroad → increase in the supply of domestic currency → domestic currency will depreciate. Vice versa.
- **Relative interest rates (both affect demand and supply)**
 - The interest rates influence the flow of funds in search of higher rates of return from country to country. → interest rates and exchange rates tend to move together, ceteris paribus.
 - If interest rate in UK fall relative to interest rates in other countries → more financial capital will flow out of the country → higher supply of pounds → pounds depreciates. Vice versa.



Causes of changes in exchange rates

Changes in currency supply

3. Other factors affecting currency supply

- **Outward flow of remittances.**
 - An increase in remittances send home by workers living in US → increase in the supply of dollar → US dollar depreciates. Vice versa.
- **Speculation that a currency will depreciate.**
 - If currency speculators expect a country's currency to depreciate, they sell it in the hope of buying it later after its depreciation to making a profit → the selling of currency will increase the supply → currency depreciation. (self-fulfilling prophecy at work)
- **Central bank intervention to decrease the value of a currency.**
 - To lower the value of the domestic currency, central bank supplies(sells) more of the domestic currency (by buying foreign currencies) → supply increases → currency depreciates.



Rate of inflation
If country A has a lower rate of inflation relative to other countries, demand for its exports increases and demand for imports decreases; both factors lead to currency appreciation

Factors that affect currency demand Inflows of funds		Factors that affect currency supply Outflows of funds	
Increase in currency demand leads to appreciation Figure 16.2(a) D curve shifts right	Decrease in currency demand leads to depreciation Figure 16.2(c) D curve shifts left	Decrease in currency supply leads to appreciation Figure 16.2(b) S curve shifts left	Increase in currency supply leads to depreciation Figure 16.2(d) S curve shifts right
Increase in foreign demand for exports of goods and services	Decrease in foreign demand for exports of goods and services	Decrease in domestic demand for imports of goods and services	Increase in domestic demand for imports of goods and services
Lower inflation leading to increase in foreign demand for exports	Higher inflation leading to decrease in foreign demand for exports	Lower inflation leading to decrease in domestic demand for imports	Higher inflation leading to increase in domestic demand for imports
High growth rates of trading partners leading to increase in foreign demand for exports	Low growth rates of trading partners leading to decrease in foreign demand for exports	Low domestic growth rate leading to decrease in domestic demand for imports	High domestic growth rate leading to increase in domestic demand for imports
Increase in inward investment	Decrease in inward investment	Decrease in outward investment	Increase in outward investment
Higher interest rates leading to more inward financial investment	Lower interest rates leading to less inward financial investment	Higher interest rates leading to less financial investment by domestic residents in foreign countries	Lower interest rates leading to more financial investment by domestic residents in foreign countries
Increase in inflow of remittances	Decrease in inflow of remittances	Decrease in outflow of remittances	Increase in outflow of remittances
Speculators expect currency X will rise so they buy currency X	-	-	Speculators expect currency X will fall so they sell currency X
Central bank buys the domestic currency	-	-	Central bank sells the domestic currency

Interest rates
An increase in interest rates in country B attracts financial capital, causing the demand for local currency to increase and supply decrease, both factors lead to currency appreciation.

Calculations

- Given a hypothetical exchange rate of 5.24 RMB = 1 Canadian dollar. Calculating the value of RMB in terms of Canadian dollar.
 $1 \text{ RMB} = 1/5.24 = 0.19 \text{ Canadian dollar}$
- Calculating prices in different currencies
 - An importer in UK imports wine from France. Exchange rate: £0.84 = €1, the importer wants to import 1000 bottles at the price of €5 per bottle. What is the cost in pound?
 $\text{Cost in euro} = 1000 * €5 = €5000$
 $\text{Cost in pound} = 0.84 * 5000 = £4200$

Calculations

- **Calculating changes in the value of a currency from a set of exchange rate data**

An imaginary country Bopland whose national currency is the bople. The table shows the value of 1 bople in terms of US dollar. It appreciated in 2020 relative to the dollar. But it depreciated in June, July and August compared to the previous month.

January 2020	1.22	July 2020	1.40
February 2020	1.25	August 2020	1.37
March 2020	1.33	September 2020	1.45
April 2020	1.39	October 2020	1.58
May 2020	1.47	November 2020	1.63
June 2020	1.43	December 2020	1.69

- Calculate the percentage change in the value of the bople between Jan and Dec 2020.

$$(1.69 - 1.22) / 1.22 * 100 = 38.52\%$$

- Calculate the percentage change in the value of the \$ between Jan and Dec 2020.

$$\text{In Jan: } \$1 = 1 / 1.22 \text{ bople} = 0.82 \text{ bople}$$

$$\text{In Dec } \$1 = 1 / 1.69 \text{ bople} = 0.59 \text{ bople}$$

$$\% \text{ change in } \$ = (0.59 - 0.82) / 0.82 * 100 = -28.05\%$$

→ The bople appreciated by 38.52% while the \$ depreciated by 28.05%

Practice

- a) 1 Canadian dollar = 0.99 US dollar, find the price of 1 dollar in terms of Canadian dollar.
 $1 \text{ US dollar} = 1/0.99 = 1.01 \text{ Canadian dollar.}$
- b) 1 Indian rupee = 1.84 Japanese yen. Find the price of 1 JPY in terms of rupee.
 $1 \text{ JPY} = 1/1.84 = 0.54 \text{ Indian rupee}$
- c) 1 Japanese yen = 1.34 Sri Lanka rupee, find the price of 1 SLR in terms of JPY
 $1 \text{ SLR} = 1/1.34 = 0.75 \text{ JPY}$
- d) 1 British pound = 1.62 Canadian dollars. Calculate the value of 1 Canadian dollar in terms of British pounds.
 $1 \text{ Canadian dollar} = 1/1.62 = 0.62 \text{ British pounds}$
- e) The price of item X in India is 50 Indian rupees. Using the exchange rates in question above, find its price in Japanese yen and Sri Lanka rupees.
 $\text{Cost in JPY} = 50 * 1.84 = 92 \text{ JPY}$
 $\text{Cost in SLR} = 92 \text{ JPY} * 1.34 = 123.28 \text{ SLR.}$
- f) Importers in Japan and Sri Lanka want to import 1000 units of item X, calculate their price in yen and rupees, respectively.
 $\text{Total cost in yen} = 1000 * 92 = 92,000 \text{ Yen}$
 $\text{Total cost in rupees} = 123.28 * 1000 = 123,280 \text{ rupees.}$

Practice

3. The price of item Y in Canada is 75 Canadian dollars. Using the exchange rates in question 1, find its price in

a) US dollars

$$1 \text{ Canadian dollar} = 0.99 \text{ US dollar} \rightarrow 75 * 0.99 = 74.25 \text{ dollar}$$

b) British pounds

$$1 \text{ Canadian dollar} = 0.62 \text{ British pounds} \rightarrow 75 * 0.62 = 46.5 \text{ GBP}$$

c) What is the cost of 5000 units of item Y in dollars and pounds.

$$\text{Costs in dollar} = 74.25 * 5000 = 371,250 \text{ dollar}$$

$$\text{Costs in pound} = 46.5 * 5000 = 232,500 \text{ pound}$$

Practice

4. On 1 June 2010, 1 British pound was worth US\$1.46; on 1 November 1 British pound was worth US\$1.60.

a. Identify which currency appreciated and which depreciated

GPB → appreciated; US Dollar → depreciated

b. Calculate the percentage appreciation of the appreciating currency

GPB: $(1.60 - 1.46) / 1.46 * 100\% = 9.59\%$

c. Calculate the percentage depreciation of the depreciating currency

1 June 2010: $\$1 = 1 / 1.46 = 0.68$ GBP

1 November: $\$1 = 1 / 1.60 = 0.63$ bople

% change in \$ = $(0.63 - 0.68) / 0.68 * 100\% = -7.35\%$

Practice

5. Euros to 1 US\$ (value of 1 US dollar per euro)

1 Sept. 2010	1.2800
8 Sept. 2010	1.2697
16 Sept. 2010	1.2989
23 Sept. 2010	1.3364
30 Sept. 2010	1.3611

- a) Using the table above, determine which currency appreciated, and which depreciated from the 1st to the 30th of September.

US Dollar → appreciated, Euro → depreciated

- b) Calculate the percentage appreciation of the appreciating currency.

$$(1.3611 - 1.2800) / 1.2800 * 100\% = 6.34\%$$

- c) Calculate the percentage depreciation of the depreciating currency

$$1 \text{ sep: } 1 / 1.2800 = 0.7813$$

$$30 \text{ sep: } 1 / 1.3611 = 0.7347$$

$$\% \text{ change} = (0.7347 - 0.7813) / 0.7813 * 100\% = - 5.96\%$$

Consequences of changes in exchange rates (AO3) 33

1. **Impacts on net exports**
2. **Effects on the rate of inflation**
3. **Effects on economic growth**
4. **Effects on unemployment**
5. **Effects on the current account balance**
6. **Effects on the foreign debt**
7. **Effects on living standards**

1 Impacts on net exports

- When country A' s currency **appreciates**,
 - a unit of it can buy more of other currencies → imports become cheaper; it can buy more foreign goods → **import increase**
 - foreigners need to give up more of their currencies to buy country A' s currency → foreigners can buy fewer of country A' s more expensive goods → **export decrease**.→ Net export (X-M) will decrease.



- When country A' s currency **depreciates**,
 - a unit of it can buy less of other currencies → imports become more expensive; it can buy less foreign goods → **import decrease**
 - foreigners need to give up less of their currencies to buy country A' s currency → foreigners can buy more of country A' s cheaper goods → **export increase**.→ Net export (X-M) will increase.



2 Effects on the rate of inflation

• Demand-pull inflation

- A currency depreciation, by making exports cheaper and imports more expensive, net export (X-M) will increase. → rightward shift of AD curve
 - If the country is producing at or close to potential output, excess aggregate demand will lead to inflationary pressure → demand-pull inflation
 - If the country is in recession, an increase in AD will not cause demand-pull inflation.
- A currency appreciation will work to reduce demand-pull inflationary pressures.

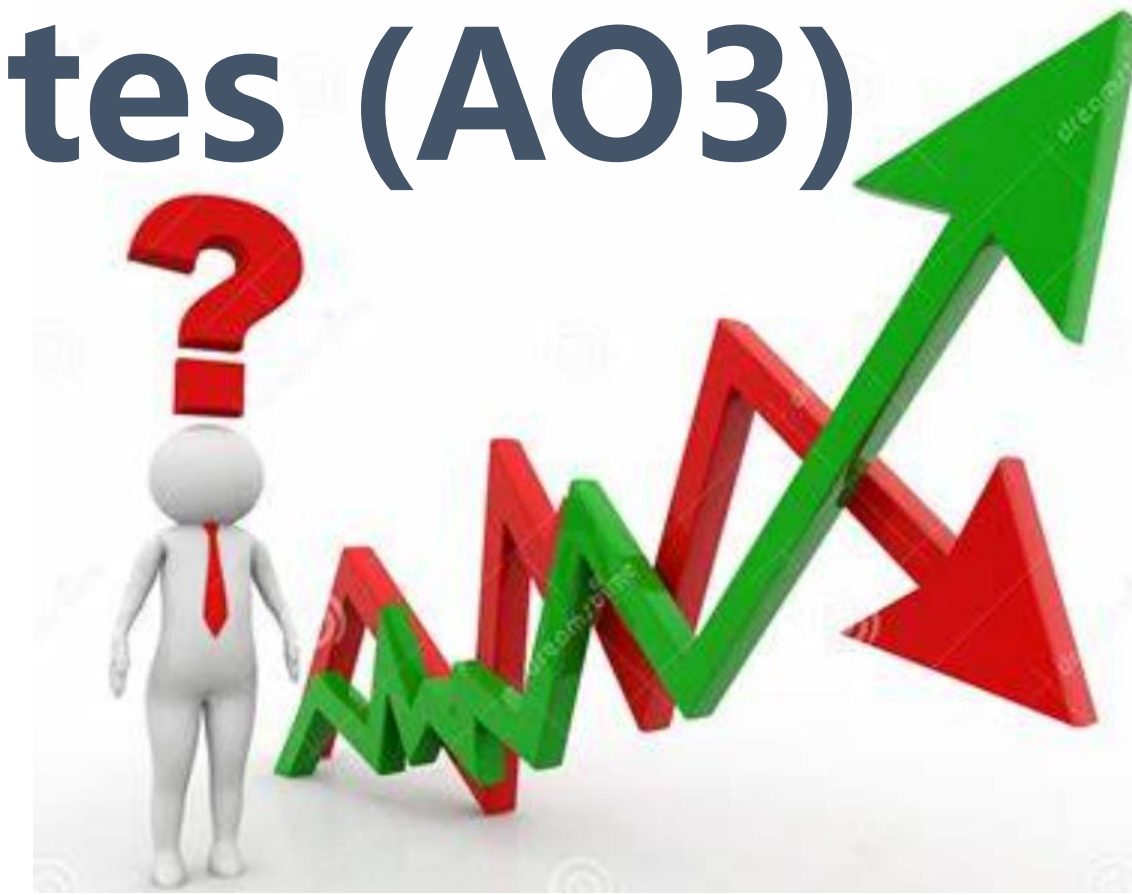
• Cost-push inflation

- A currency depreciation makes imports more expensive. If domestic producers are heavily dependent on imported factors of production → cost of production increase → leftward shift of SRAS curve → cost-push inflation
- A currency appreciation makes imports less expensive → rightward shift of SRAS curve → lower inflationary pressures in the economy



Consequences of changes in exchange rates (A03)

3 Effects on economic growth



• Currency depreciation:

✓ Positive effect on economic growth

➤ Effect on **aggregate demand**:

- Currency depreciation → net export increase → Aggregate demand and real GDP increase (short-term, rightward shift of AD curve)

➤ Effects on **aggregate supply**

- The growth of export industries leads to increased investment spending in the domestic economy (production of capital goods) → effects on aggregate supply, causing increases in potential GDP (rightward shifts in the LRAS or Keynesian AS curves)

x Negative effect on economic growth

➤ If there is cost-push inflation caused by exchange rate change → possible downward pressure on real GDP due to the fall in short-run aggregate supply (leftward shift in the SRAS curve)

→ What will happen to real GDP depends on which of the two effects is stronger:

- ✓ the upward effect due to the increase in aggregate demand
- ✓ the downward effect due to the decrease in short run aggregate supply.

• Currency appreciation:

- Currency appreciation → net export decrease → aggregate demand decrease → reduce growth of real GDP.

4 Effects on unemployment

• Currency depreciation:

✓ Positive effects

1. Increase in export → Increased employment in export industries
 2. Decrease in imports → Increased employment in industries producing goods that compete with imports
- If the economy is in recessionary gap → fall in cyclical unemployment
 - If the economy is at or close to potential GDP → temporary decrease in natural unemployment and strong demand-pull inflationary pressures.

x Negative effects

3. If depreciation leads to cost-push inflation → decrease in short run aggregate supply → unemployment increase.

➤ What will happen to real GDP depends on which of the two effects is stronger:

- ✓ the upward effect due to the increase in aggregate demand
- ✓ the downward effect due to the decrease in short run aggregate supply.

• Currency appreciation:

- Reduced net exports and aggregate demand → recessionary gap → cyclical unemployment
 - Decreased employment in export industries
 - Decreased employment in industries producing goods that compete with imports.



5 Effects on the current account balance

- Current account balance: The balance of exports and imports of goods and services ($X-M$)
- Depreciation \rightarrow lower imports, higher exports \rightarrow larger trade surplus, or smaller trade deficit
- Appreciation \rightarrow higher imports, lower exports \rightarrow larger trade deficit, or smaller trade surplus
- It is undesirable especially if they persist over long period.
- Will be studied later



6 Effects on the foreign debt

- Depreciation (lower value of domestic currency) → increasing value of foreign debt, larger debt burden
- Appreciation (higher value of domestic currency) → decreasing value of foreign debt



- Examples:
- Pakistan owns \$10,000 to US. Exchange rate: 239.23 PKRUSD = 1 dollar,
→ it's foreign debt is $10000 \times 239.23 = 2,392,300,000$ PKRUSD
- If Pakistan Rupee depreciates, new exchange rate 260,00 euro = 1 dollar
→ its foreign debt is $10000 \times 260.00 = 2,600,000,000$ PKRUSD

7 Effects on living standards

➤ Currency depreciation:

→ imported goods become more expensive → residents worse off

➤ Cost-push inflation

→ higher price of gasoline and heating oil for residents.

→ Higher general price level → higher cost of living and therefore reducing the real income of residents.

➤ Demand-pull inflation

→ inflationary pressure

E.g.: for tourists, they find their holidays become more expensive.

➤ Currency appreciation:

→ imported goods become cheaper → residents better off

→ downward pressure on the rate of inflation → higher real income



2. Fixed exchange rates

Fixed exchange rate system: an exchange rate system where exchange rates are fixed by the central bank of each country.

Fixed exchange rate – refer to an exchange rate that is fixed by the central bank of a country, and is not permitted to change in response to changes in currency supply and demand; It requires constant intervention by the central bank or government.



* The exchange rate is still determined by currency demand and supply, but these are manipulated by the central bank or government to the desired exchange rate.

- **Forms:** buying and selling reserve currencies by the central bank, or making other adjustments in the domestic economy.

2. Fixed exchange rates

Intervention to maintain fixed exchange rates

- a. Using official reserves to maintain the exchange rate
- b. Increases in interest rates
- c. Borrowing from abroad
- d. Efforts to limit imports



How central bank intervene

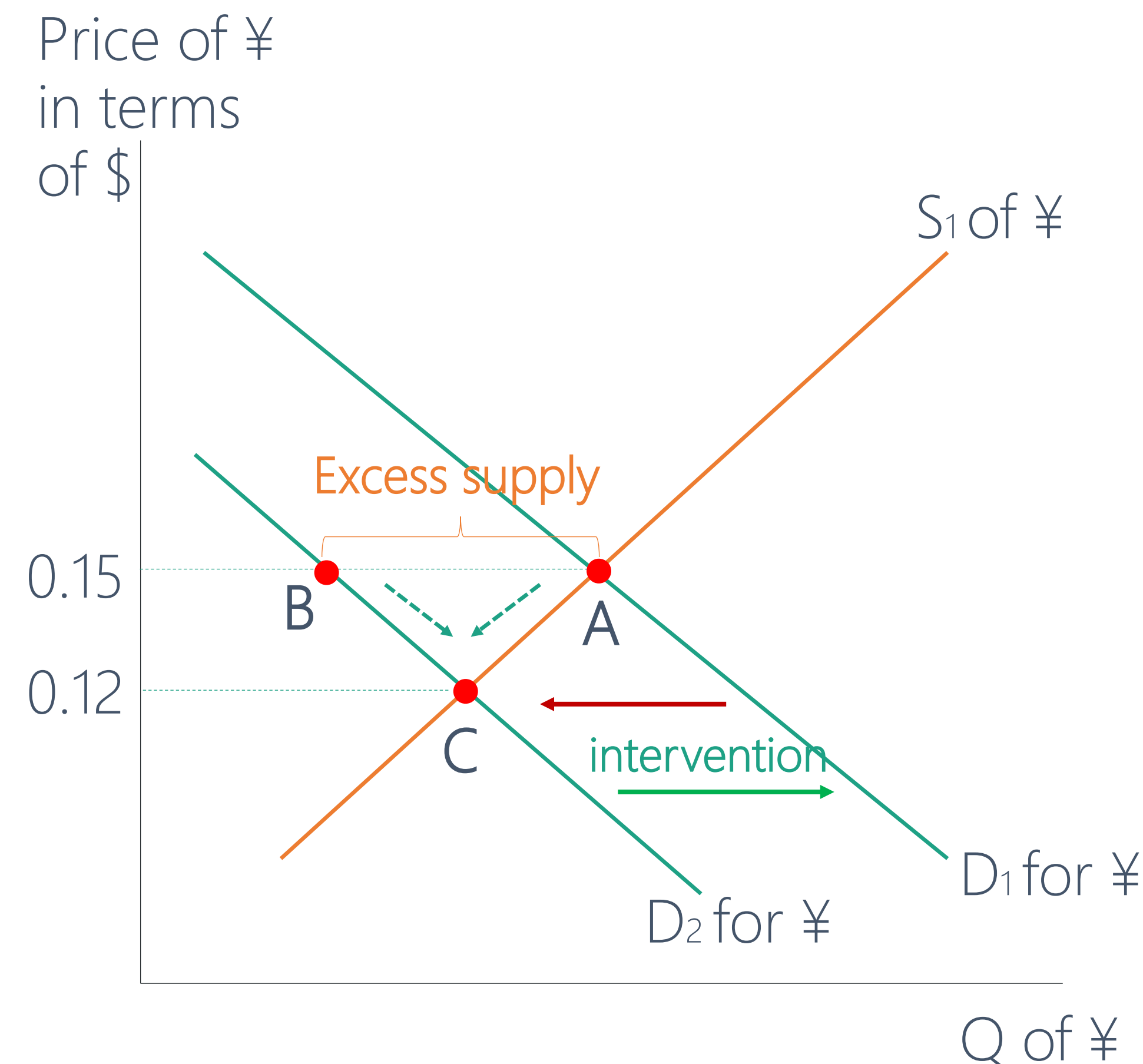
- a. using official reserves

- The diagram shows the market for RMB, the central bank of China has fixed the RMB-US dollar exchange rate at 0.15 US dollars = 1 RMB.
- Initial equilibrium at point **A**
- There occurs a leftward shift in the demand for ¥ from D1 to D2. **(the red arrow)**
- At the fixed exchange rate of 0.15 US dollars = 1 RMB, there is an **excess supply** of RMB (A to B)
- Under floating exchange rates, the exchange rate would fall to point C of 0.12 dollars per RMB, eliminating the excess supply.

To maintain the fixed exchange rate
Action of central bank → Shifting the currency demand curve

→ The central bank of China buy the excess RMB by selling some of its foreign currency reserves.

- The demand curve for RMB shift back from D2 to D1. **(the green arrow) – demand ¥, supply \$**
- The fixed exchange rate of 0.15 US dollars = 1 RMB is maintained.



How central bank intervene

- a. using official reserves

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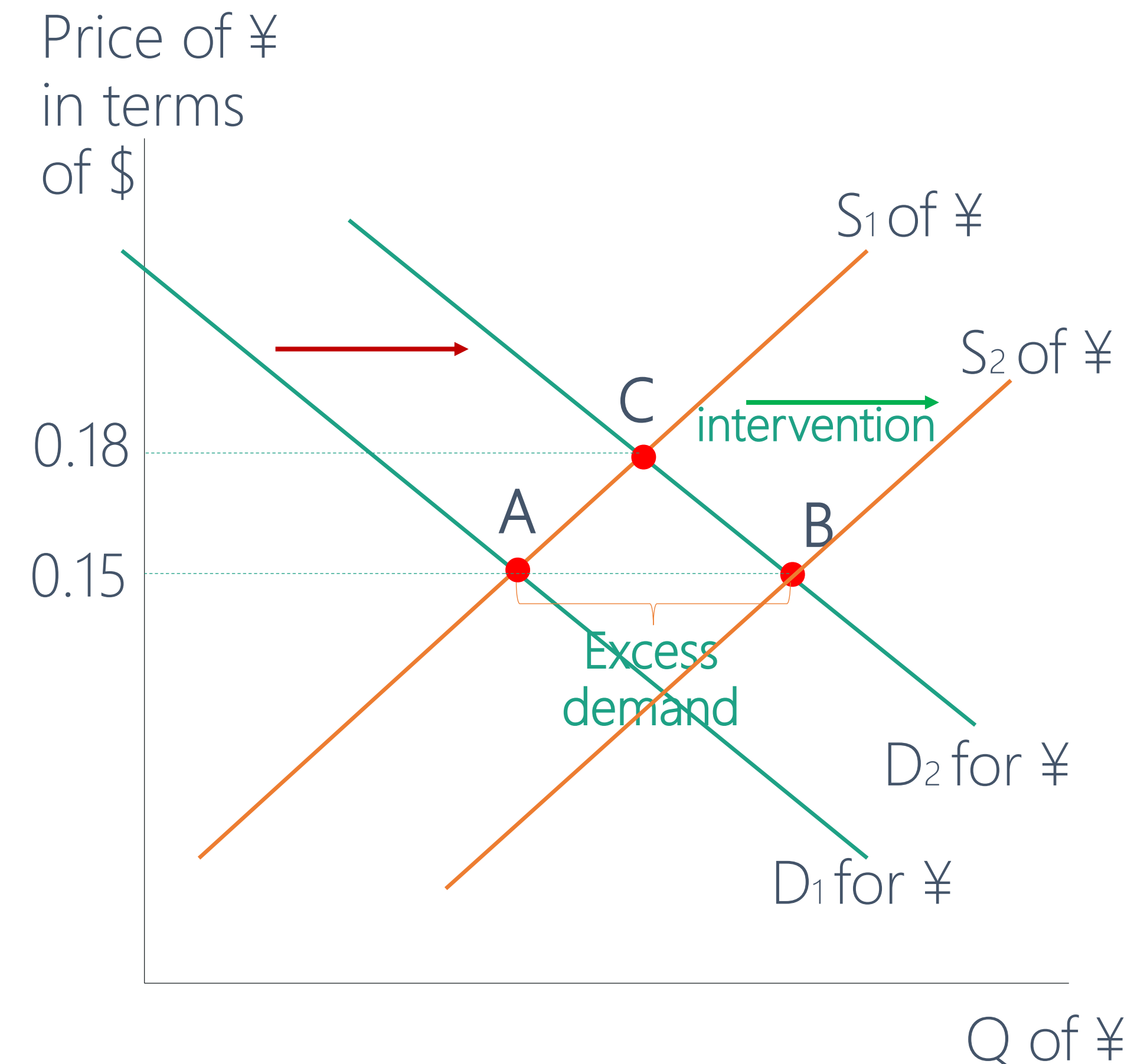
- Initial equilibrium at point **A**
- There occurs a rightward shift in the demand for ¥ from D_1 to D_2 . (the red arrow)
- At the fixed exchange rate of 0.15 US dollars = 1 RMB, there is an **excess demand** of RMB (A to B)
- Under floating exchange rates, the exchange rate would increase to point C of 0.18 dollars per RMB, eliminating the excess demand.

To maintain the fixed exchange rate

Action of central bank → Shifting the currency supply curve

→ The central bank of China sell some RMB by buying dollars

- The supply curve for RMB shift rightwards from S_1 to S_2 . (the green arrow) – demand \$, supply ¥
- The fixed exchange rate of 0.15 US dollars = 1 RMB is maintained.



How central bank intervene

- b. other measures

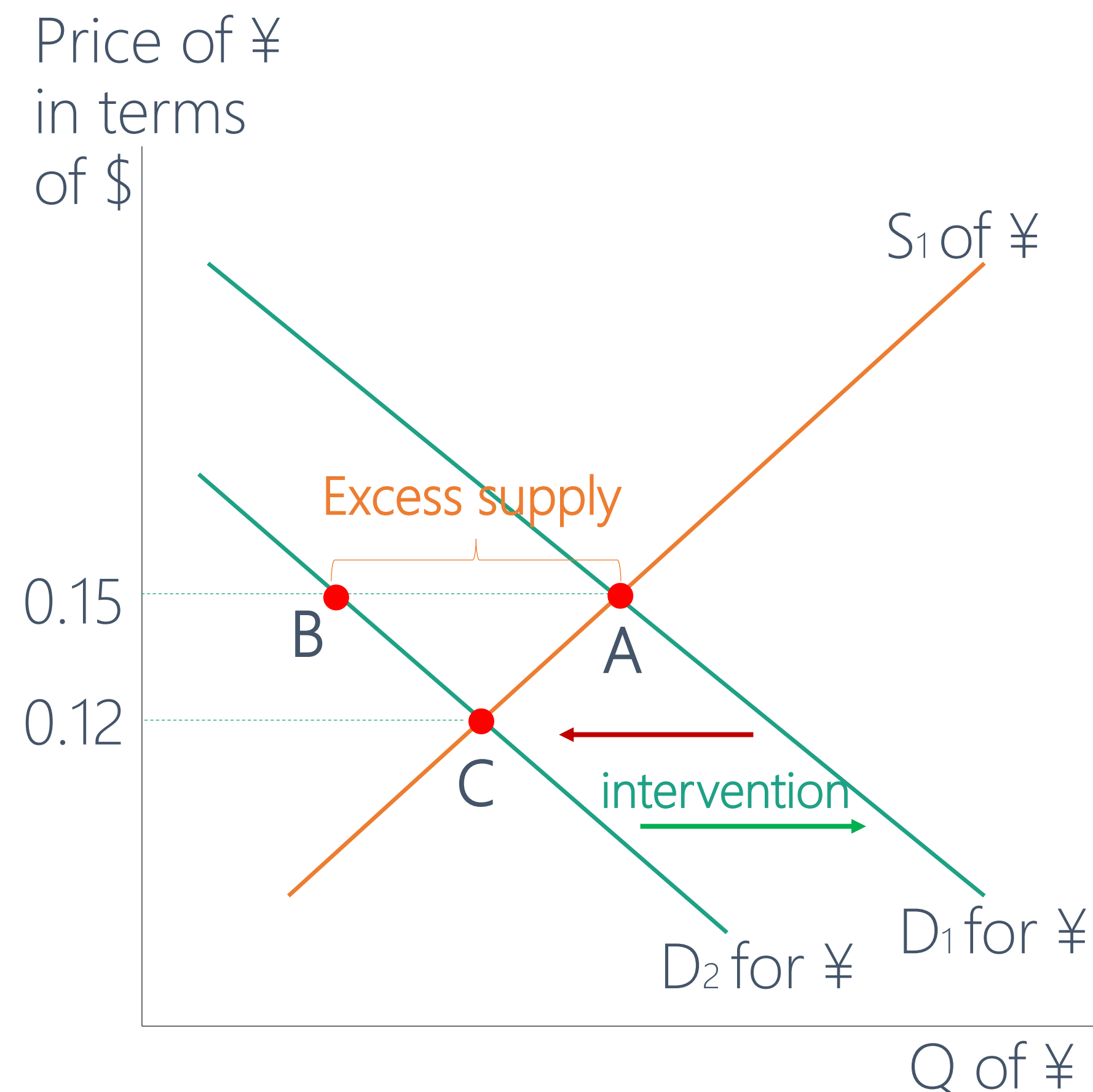
- In the case of **excess supply**: If the country faces excess supply of domestic currency and a downward pressure on the currency value over a long time, the country might eventually run out of foreign currency reserves and unable to keep the fixed exchange rate.
- In the case of **excess demand**: the central bank can keep on selling the domestic currency and buying foreign exchange, thus maintaining the exchange rate.
- Other additional measures could be used:**

1. Increases in interest rates (increasing demand for local currency)

- Central bank increase interest rates → more financial investments from other countries → higher demand for domestic currency → shifting the demand for domestic currency back to D1.
- Drawbacks: it is an contractionary monetary policy and may lead to a recession.

2. Borrowing from abroad (increasing demand for local currency)

- Country borrow from abroad → the loans will come in the form of foreign exchange, it need to convert into domestic currency → higher demand for domestic currency → shifting the demand for domestic currency back to D1.
- Drawbacks: cost of government debts

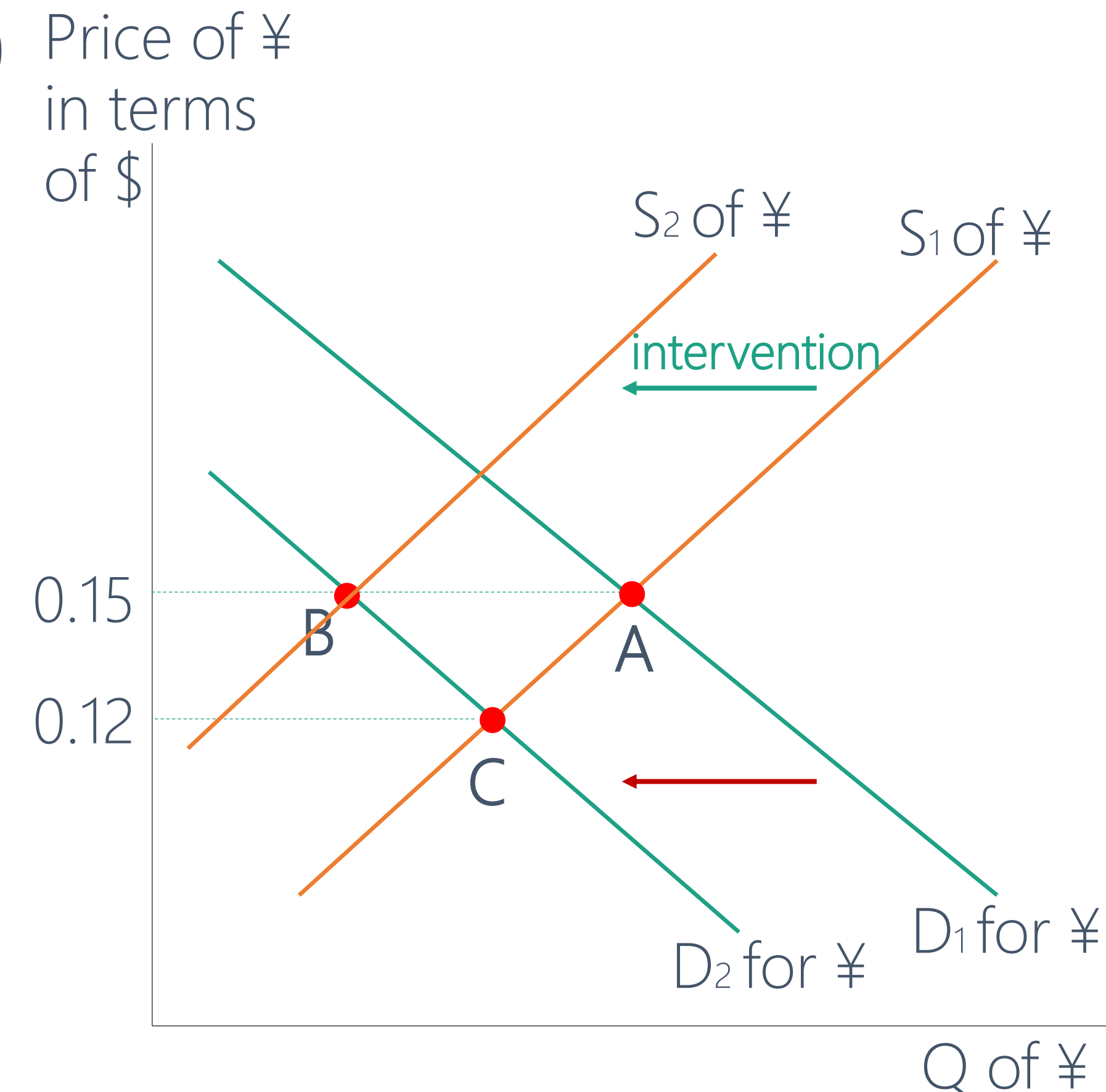


How central bank intervene

- b. other measures

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- **Other additional measures could be used:**
 3. **Efforts to limit imports** (reducing supply of local currency)
 - Government use policies to limit imports → it reduces the supply of the domestic currency (lower demand for foreign exchange needed to buy imports) → leftward shift in the currency supply curve from S_1 to S_2 .
 - Exchange rate back to predetermined 'price'.
 - **Policies to limit imports:**
 - a) Contractionary fiscal and monetary policies → lower aggregate demand, lower income → fewer imports
 - Drawbacks: possibility of recession
 - b) Trade protection policies
 - Drawbacks: possibility of retaliation by trading partners, which would result in lower exports.



Changing the fixed exchanging rate: devaluation and revaluation

- **Devaluation of a currency** refers to a decrease in the value of a currency in the context of a fixed or pegged exchange rate system.
 - When the currency value is higher than what can be maintained through intervention, the government change it to a new lower value.
 - Compared with depreciation, which is a decrease in currency value in the context of a floating or managed exchange rate system.
- **Revaluation of a currency** refers to an increase in the value of a currency in the context of a fixed or pegged exchange rate system
 - When the currency has a lower value than can be maintained by intervention, the government set a new higher value.
 - *Compared with appreciation, which is an increase in currency value in the contest of a floating or managed exchange rate system.

* E.g. Originally, 2 US dollars = 1 British pound

If the dollar devalues at the new fixed rate 3 dollars = 1 pound

→ Dollar lost some of its value, it needs 3 instead of 2 dollars to buy 1 pound.

→ The devaluation of US dollar = the revaluation of British pound



The Bretton Woods System



- Before the Bretton Woods agreement, most countries used gold as the standard of money, with each country guaranteeing their money with gold.
- **The Bretton Woods System** was established after World War II and was in existence during the period 1945-1973.
- Under this system, each country established a par value in relation to the US dollar, which was pegged to gold at \$35 per ounce. The central banks of the countries (except US) promised to keep the value of the currency fixed against the USD.
- It permitted periodic devaluations or revaluations. When any country revalued/devalued its currency, it did so not against just one other currency but against all other currencies simultaneously, since all currencies were fixed against each other.
- The two major financial institutions of the world were created by the Bretton Woods system agreement, the IMF (International Monetary Funds) and the World Bank
- In 1971, the US was worried that their gold supply would no longer be sufficient to cover the number of dollars in circulation. Eventually, in 1973 the Bretton Woods System collapsed, the United States and other nations agreed to allow exchange rates to float.
- Economists call the resulting system a "managed float regime," meaning that even though exchange rates for most currencies float, central banks still intervene to prevent sharp changes.

3. Managed exchange rates

Managed exchange rates (also known as the managed float): exchange rates that are for the most part free to float to their market levels (i.e. their equilibrium levels) over **long periods of time**; however, central banks periodically intervene in order to stabilize them over the **short term**.

- In use since 1973.
- The objective of central bank intervention is to **prevent large and abrupt exchange rates fluctuation**, which would disrupt the orderly flow of international trade and create uncertainties that undermine investment and economic activity.



Pegging exchange rates

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- Some countries peg (i.e. fix) their currencies to the US dollar or euro, and float together with it.
- The pegged currency is allowed to fluctuate only within a narrow range above and below a target exchange rate relative to the dollar or the euro, so that if the actual exchange rate hits the upper or lower limit of the range, the central bank intervenes to keep it within the limits.
- It combines fixed and floating exchange rates, the pegged currencies are fixed within the specified range of the US dollar (or the euro), and they float in relation to all other currencies, together with the dollar (or the euro)

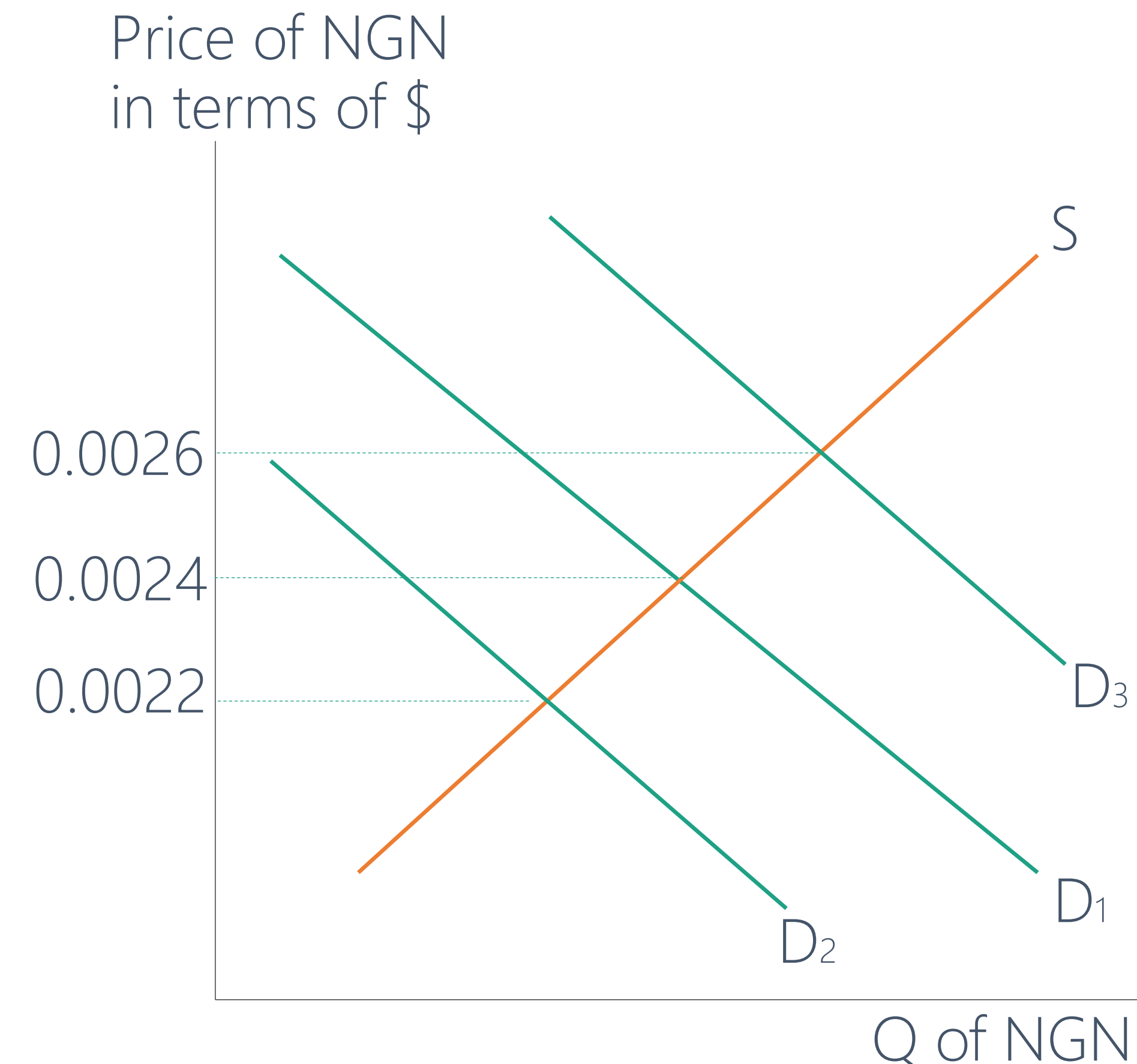


- Exchange rate stability relative to the dollar as well as relative to each other
- Facilitate trade flows with US as well as between the countries with pegged currencies

Illustration of pegging exchange rates

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- Nigeria pegged the Nigerian naira to the US dollar, the target exchange rate chose is 0.0024 dollar = 1 NGN
 - Fluctuation maximum: 0.0026 dollar = 1 NGN
 - Fluctuation minimum: 0.0022 dollar = 1 NGN
- ✓ If the demand for naira falls, the demand curve shift from D_1 towards D_2 , market force cause the exchange rate fall to 0.0022 dollar = 1 NGN. The central bank of Nigeria will intervene by buying naira (and selling dollars), the demand-for-naira curve will stop shifting leftward and the naira stops falling.
- ✓ If naira increases in value and hits the maximum of 0.0026 dollar = 1 NGN, The central bank of Nigeria will intervene by selling naira (and buying dollars) to prevent a further rise in the value of the naira.



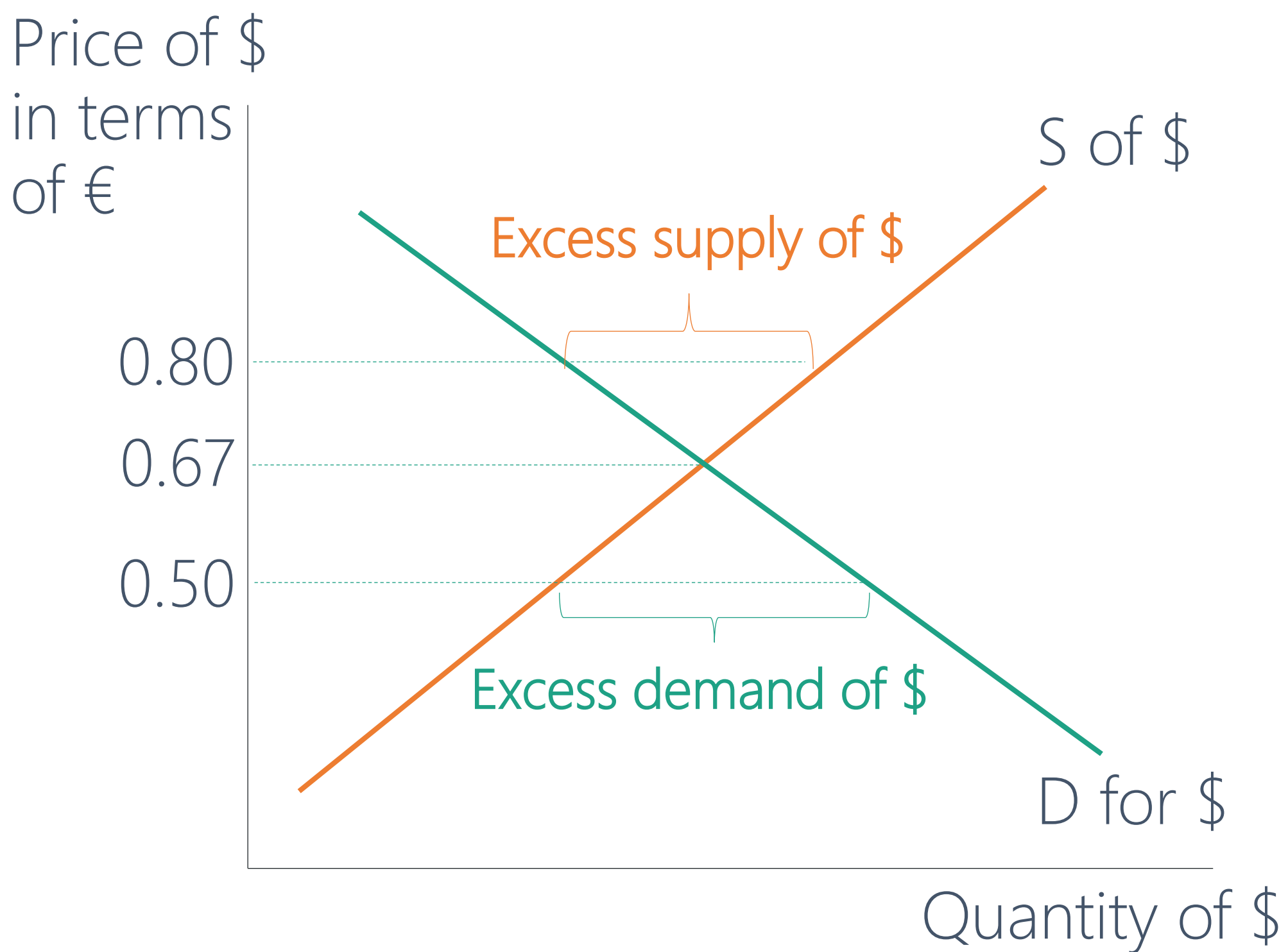
Consequences of overvalued and undervalued currencies

An Overvalued currency has a value that is too high relative to its equilibrium free market value. Its exchange rate has been set at a higher level than the equilibrium market exchange rate.

An **Undervalued currency** has a value too low relative to its equilibrium free market value; its exchange rate is low relative to the one the market would have determined.

- Both overvalued and undervalued currency may occur if the exchange rate is fixed (or pegged), or in a managed exchange rate system, but not in a freely floating exchange rate system.

Illustration of overvalued and undervalued currencies



- The market determines a price of US dollars at 0.67 euro = 1 dollar
- If The Federal Reserve wants to overvalue the US dollar, it could try to maintain a price in terms of the euro above the equilibrium, such as at 0.80 euro = 1 dollar.
- If the Federal Reserve wants to undervalue the US dollar, it would select a price below the equilibrium price, such as 0.50 euro = 1 dollar.
- Both can be achieved by central bank and government interventions that maintain the exchange rate at the selected level (or range of levels, as when a currency is pegged)

Benefits and costs

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Overvalued currencies

Benefits:

- Cheaper imports. (beneficial especially for developing countries to import capital goods, raw materials and other inputs for use in manufacturing industries, to speed up industrialization)

Costs:

- Exports become more expensive, thus hurting domestic exporters.
- Increased imports and reduced exports lead to a worsening current account balance, resulting in payment difficulties.
- Domestic producers have to compete with artificially low-price imports → negative consequences for domestic employment and resource allocation.

Undervalued currencies

Benefits:

- Exports become less expensive to foreign buyers
- Many developing countries use it as a method to expand their export industries, expand their economies and therefore also increase their employment levels.

Costs:

- Imports become more expensive domestically.
- Unfair competitive advantage compared to other countries that do not undervalue their currencies, and which suffer the consequences of increased imports and lower exports. ('dirty float')
- Possibility of cost-push inflation due to the higher price of imports.