1. Nominal exchange Rate

1.1. When individuals or firms in Australia import or export goods or invest in other countries, they need to convert Australian dollars into foreign currencies.
当澳大利亚的个人或公司进口、出口商品或在其他国家投资时，他们需要将澳元转换为外币。

1.2. **A nominal exchange rate** is the price of one currency in terms of another currency.
名义汇率是以另一种货币表示的某种货币的价格。

1.3. Changes in the exchange rate between the dollar and foreign currencies affect the prices that Australian consumers pay for foreign imports.
澳元与外币之间的汇率变化会影响澳大利亚消费者为外国进口商品支付的价格。

1.4. **Appreciation** is an increase in the value of a currency in exchange for another currency.
货币升值是指一种货币相对于另一种货币的价值上升。

1.5. **Depreciation** is a decrease in the value of a currency in exchange for another currency.
货币贬值是指一种货币相对于另一种货币的价值下降。

1.6. **Direct quotations** are exchange rates quoted as units of domestic currency per unit of foreign currency. 1.29 AUD (domestic currency) for 1 USD (foreign currency) as of 18/04/2021.
直接报价是指以本国货币为单位对外币的报价。例如，2021 年 4 月 18 日，1 美元（外币）兑换 1.29 澳元（本国货币）。

1.7. **Indirect quotations** are exchange rates as units of foreign currency per unit of domestic currency. 0.77 USD (foreign currency) for 1 AUD (domestic currency) as of 18/04/2021
间接报价是指以外币为单位对本国货币的报价。例如，2021 年 4 月 18 日，1 澳元（本国货币）兑换 0.77 美元（外币）。

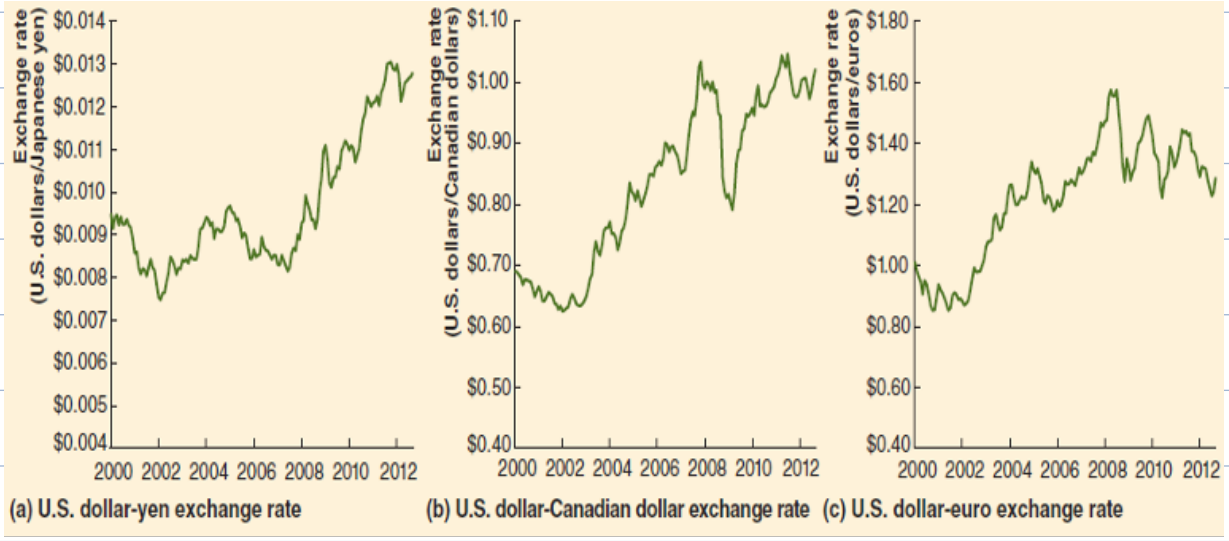
1.8. In financial news, the conventions in reporting exchange rates are a mixture of direct and indirect quotations.
在金融新闻中，报道汇率时通常是直接报价和间接报价的混合使用。

E = nominal exchange rate (indirect quotation)

E = 1 AUD = 0.76 USD

domestic foreign

1.9 Evidences of exchange rate are volatile



(1) US = Yen

(2) US = Canadian ⇒ "Indirect quotation"

(3) US = euro

1.10 Increase in Exchange rate by "Indirect quotation" represent a depreciation of domestic Dollar

2. Real Exchange Rate:

$$\underset{\sim}{C} = \underset{\sim}{E} \cdot \frac{P^D}{P^F}$$

P^D → Domestic price

P^F → foreign price

Real exchange rate ↓ nominal exchange rate

The **real exchange rate** is the rate at which goods and services in one country can be exchanged for goods and services in another country.

3 - Long-Run determination of Exchange Rate

3. Exchange Rates in the Long Run

- The law of one price is the idea that identical products should sell for the same price everywhere.
  一价定律是指相同的产品在任何地方都应该以相同的价格出售。
- The law of one price is the basis for the theory of purchasing power parity (PPP).
  一价定律是购买力平价（PPP）理论的基础。
- Theory of purchasing power parity (PPP) states that exchange rates move to equalize the purchasing power of different currencies.
  购买力平价（PPP）理论指出，汇率会随着不同货币购买力的变化而调整。
- In the long run, an exchange rate should be at a level that the equivalent amount of any country's currency can buy the same amount of goods and services.
  从长远来看，汇率应该处于这样一个水平：任何一个国家的等值货币可以购买相同数量的商品和服务。
- In the long run, arbitrage activity in the foreign exchange market causes PPP to hold.
  从长远来看，外汇市场的套利活动会使购买力平价成立。
- PPP makes an important prediction: If one country has a higher inflation rate than another country, its currency will depreciate relative to the currency of the other country.
  购买力平价做出了一个重要的预测：如果一个国家的通货膨胀率高于另一个国家的通货膨胀率，那么该国的货币相对于另一个国家的货币会贬值。

Ex: A cup of coffee in Canberra = $1.50

A cup of coffee in London = £1

3.1 Based on Law of one price =

Identical product should be sold for the same price

↓

3.2 So what accounts for the difference?

"The purchasing power Theorem"

购买力平价（PPP）理论指出，汇率会随着不同货币购买力的变化而调整。

↓

Exchange Rate accounts for the difference

(1) Exchange rate in "direct quotation" = £1 = 1.55 AUD

(2) Exchange rate in "indirect quotation" = 1 AUD = $0.66

3.3 How does PPP works?

Suppose $E = 1$ $\Rightarrow$ (1 AUD = £ 1)

E: nominal exchange rate (indirect)

↓

Arbitrage opportunity exists

Coffee in London is cheaper

we can buy coeffee in London and sell in Canberra

making Arbitrage profits of $1.50 - $1 = $0.50

↓

Result: people exchange AUD → pounds

(1) Demand for pounds increases

↳ Pounds (£) appreciates

(2) Demand for AUD decreases

↳ AUD depreciates

↓

The process will continue until $E = 0.66$ (1 AUD = £ 0.66)

All Arbitrage opportunities are used

3.4 prediction by PPP :

(1) If domestic inflation level > foreign inflation level

$\pi^D > \pi^F$ $\Rightarrow$ then domestic currency depreciates

As real exchange rate is defined as:

$$e = E \cdot \frac{P^D}{P^F}$$

P^D → Domestic price level

P^F → foreign price level

e: real exchange rate

E: nominal exchange rate

percentage change in real exchange rate:

$\%\Delta e = \%\Delta E + (\pi^D - \pi^F)$

3.5 If PPP holds, the real exchange rate $(e = 1)$

this implies that % Δ in real exchange rate $= 0$

$\Downarrow$

$\%\Delta e = 0$

$\%\Delta E + (\pi^D - \pi^F) = 0$

$\%\Delta E = \pi^F - \pi^D$

percentage change of nominal exchange rate — difference in inflation rate

Conclusion:

(1) Difference in inflation rates explain nominal exchange rate

Difference in the long-run

(2) If $\pi^D > \pi^F$,

$\%\Delta E = \pi^F - \pi^D$

$\%\Delta E \downarrow$ $\quad \pi^D \uparrow$

Suppose before inflation " 1 AUD = ¥ 1 "

after inflation: " 1 AUD = ¥ 0.66 "

Domestic currency depreciates

3.6 PPP cannot being a complete explanation of exchange rate

1) Not all products can be traded internationally.
   并非所有产品都可以进行国际贸易
2) Products are differentiated.
   产品存在差异化
3) Governments impose barriers to trade, e.g., tariffs and quotas.
   政府对贸易设置了障碍，例如关税和配额

- A tariff is a tax a government imposes on imports.
  关税是政府对进口商品征收的税。
- A quota is a limit a government imposes on the quantity of a good that can be imported.
  配额是政府对可进口商品数量的限制。

3.7 Application of PPP = Should Big-Macs have the Same price everynhere ?

Country	Big Mac price in domestic county	Exchange rate (in terms of USD)	Price of Big Mac in terms of USD
US	$4.33	-	$4.33
Japan	320 yen	78.22	320/78.22=$4.09
Mexico	37 pesos	13.69	37/13.69=$2.7
Great Britain	2.69 pounds	0.65	2.69/0.65=$4.13
China	15.65 yuan	6.39	15.65/6.39=$2.4
Russia	75 rubles	32.77	75/32.77=$2.28
Norway	43 kroner	6.09	43/6.09=$7.06

The table shows the Big Mac's prices in the different countries, along with the exchange rate with the U.S. dollar.

a. Explain whether the statistics in the table are consistent with the theory of purchasing power parity.

- We can convert the price of a Big Mac in a given country to its price in dollars. For example, in the case of Japan: ¥320/(¥78.22/$) = $4.09, which is close to the U.S. price. However, this is not the case for the majority of other countries, so that PPP does not hold in general for Big Macs.

b. Explain whether your results in part (a) mean that arbitrage profits exist in the market for Big Macs.

- It is not possible to make arbitrage profits by buying low-price Big Macs in one country and selling them in another since it is a perishable good. (易腐物品)

4.1 Short Run Explanation (Interest Rate Parity condition)

Suppose 2 countries

① Domestic ② foreign

i^D i^F

E_t = current exchange rate

E_{t+1} = future expected exchange rate

Expected rate of appreciation / depreciation =

$\frac{E^e_{t+1} - E_t}{E_t}$ > 0 Appreciate

< 0 depreciate

Example:

$E_t = 1$ (1 AUD = 1 USD)

$E^e_{t+1} = 2$ (1 AUD = 2 USD)

Expected app/dep = $\frac{2-1}{1} = 100\%$

Calculate returns in terms of foreign currency:

(1) Expected Returns on domestic assets

In terms of foreign currency

$$R^D = i^D + \left(\frac{E^e_{t+1} - E_t}{E_t}\right)$$

i^D: return from domestic Bonds

$\frac{E^e_{t+1} - E_t}{E_t}$: gain / loss made by foreigners from converting foreign currency to domestic currency

(2) Expected Returns on foreign assets

In terms of foreign currency

$$R^F = i^F$$

i^F: return from foreign bonds

If $R^D > R^F \Rightarrow$ Demand for domestic assets ↑

Hence, In equilibrium $R^D = R^F$

then:

$$i^D + \left(\frac{E^e_{t+1} - E_t}{E_t}\right) = i^F$$

$$\boxed{i^D = i^F - \left(\frac{E^e_{t+1} - E_t}{E_t}\right)}$$

$$i^D = i^F - \left(\frac{E^e_{t+1}}{E_t} - 1\right)$$

$$\frac{E^e_{t+1}}{E_t} = i^F - i^D + 1$$

$$\boxed{E_t = \frac{E^e_{t+1}}{i^F - i^D + 1}}$$

Therefore:

we obtain the "Interest Rate Parity condition":

$$\boxed{E_t = \frac{E_{t+1}}{i^F - i^D + 1}}$$

and we are able to see How expected rate is affected in the Short-Run.

(1) If E_{t+1} ↑ = E_t ↑

(2) If i^F ↑ = E_t ↓

(3) If i^D ↑ = E_t ↑

Facts regarding "Interest Rate Parity Condition"

- Investors account for more than 95% of demand for foreign exchange, reflecting the importance of international capital mobility.
  投资者占外汇需求的 95%以上，反映了国际资本流动的重要性。
- To purchase Japanese bonds, you assume some exchange-rate risk: While your funds are invested in Japanese bonds, the value of the yen might decline relative to the dollar.
  当你购买日本债券时，你需要承担一定的汇率风险：当你的资金投资于日本债券时，日元相对于美元的价值可能会下跌。
- To eliminate any arbitrage profits, the difference between the interest rates on a Japanese bond and a U.S. bond must equal the expected change in the exchange rate between the yen and the dollar.
  为了消除任何套利利润，日美债券利率的差异必须等于日元与美元之间预期的汇率变化。

$$i_F - i_D = \frac{E_{t+1}}{E_t} - 1$$

- The interest-rate parity condition holds that differences in interest rates on similar bonds in different countries reflect expectations of future changes in exchange rates.
  利率平价条件认为，不同国家相似债券的利率差异反映了对未来汇率变化的预期。
- This condition also means:
  Interest rate on domestic bond = Interest rate on foreign bond – Expected appreciation of the domestic currency.
  这一条件还意味着：国内债券利率 = 国外债券利率 – 国内货币的预期升值。
- If the expected returns (including expected changes in the exchange rate) from the domestic and foreign bonds are not the same, then investors can make arbitrage profits.
  如果国内和国外债券的预期回报（包括预期汇率变化）不相同，那么投资者可以获得套利利润。

$$i^D = i^F - \left(\frac{E^e_{t+1} - E_t}{E_t}\right)$$

- If the expected returns (including expected changes in the exchange rate) from the domestic and foreign bonds are not the same, then investors can make arbitrage profits.
如果国内和国外债券的预期回报（包括预期汇率变化）不相同，那么投资者可以获得套利利润。
- Differences in interest rates in different countries do not always reflect expectations of future changes in exchange rates for several reasons:
  1) Differences in default risk and liquidity.
  2) Transactions costs.
  3) Exchange-rate risk.

不同国家之间的利率差异并不总是反映未来汇率变化的预期，原因包括
  1) 违约风险和流动性差异。
  2) 交易成本。
  3) 汇率风险。

$$i^D = i^F - \left(\frac{E^e_{t+1} - E_t}{E_t}\right) - \text{currency premium}$$

- To account for the additional risk of investing in a foreign asset we can include a currency premium in the interest-rate parity equation:
Interest rate on the domestic bond = Interest rate on the foreign bond– Expected appreciation of the domestic currency – Currency premium
为了考虑投资外资资产的额外风险，我们可以在利率平价方程中加入货币溢价：**国内债券利率 = 国外债券利率 – 国内货币的预期升值 – 货币溢价。**

4.2 What explains the Short-run / Long Run fluctuations in exchange rates?

In long-Run: focus on Purchasing power parity
⇒ (Inflation Rate) explains the exchange rate differences

$$\%\Delta E = \pi^F - \pi^D$$

In the Short-Run: focus on interest rate difference
⇒ Interest Rate differences explain the Short-term fluctuations in the exchange rates

$$E_t = \frac{E_{t+1}}{i^F - i^D + 1}$$

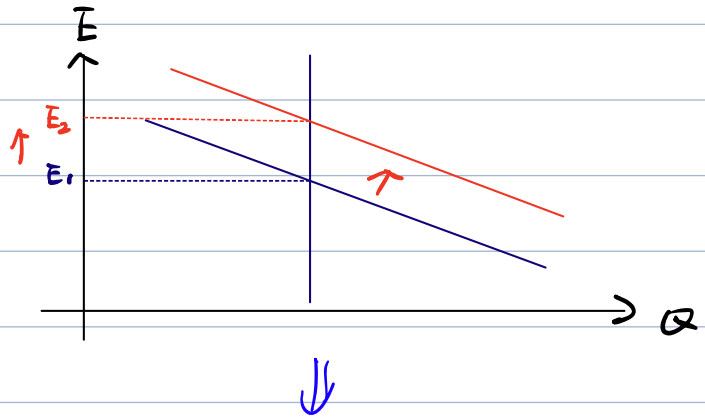
Exchange Rates

Long-Run

PPP: $\%\Delta E = \pi^F - \pi^D$

Short-Run

Interest Rate parity condition



4.3 Demand and Supply of Short-Run Movement in Exchange rate

A Demand and Supply Model of Short-Run Movements in Exchange Rates

- The model determines both the equilibrium nominal exchange rate and the equilibrium real exchange rate, holding price levels constant.
  该模型确定了名义汇率和实际汇率的均衡水平，同时保持价格水平不变。
- **The demand for Australian dollars** represents the demand by foreign households and firms for Australian goods and Australian financial assets.
  对澳大利亚元的需求代表了外国家庭和企业对澳大利亚商品和澳大利亚金融资产的需求。
- **The supply of dollars in exchange for a foreign currency** is determined by the willingness of households and firms that own dollars to exchange them for the foreign currency.
  以外币兑换美元的供应由拥有美元的家庭和企业愿意将其兑换为外币的意愿决定。

4.4 Shift in demand for domestic assets

1> Domestic interest rate

2> Foreign Interese rate

3> Expected Future Exchange Rate

(1) Shift Demand curve up

1> Domestic interese rate $(i^d) \uparrow$

2> Expected trade barries

Increases demand for domestic assets

3> Expected export demand ↑

foreigners getting the goods need to convert their money into our currency

so demand for domestic assets ↑

4> Expected prodnctivity ↑

Increase people's revenne hence increase domestic demand.

Resnlt : $E_t \uparrow$

(2) Shift Demand curve left

1> foreign interest rate $(i^f) \uparrow$

2> Expected domestic price level ↑

a high inflation will cause net return from domestic assets ↓

3> Expected import demand ↑

we need to convert our currency into foreign currency

Resnlt : $E_t \downarrow$

4.5 Effect of Changes in Interest Rate on the Equilibrium Exchange Rate

Effects of Changes in Interest Rates on the Equilibrium Exchange Rate

1) Changes in Interest Rates

- When domestic real interest rates raise, the domestic currency appreciates.
  当国内实际利率上升时，国内货币升值。
- When domestic interest rates rise due to an expected increase in inflation, the domestic currency depreciates. $\%\Delta E = \pi_F - \pi_D$ (from PPP)
  当国内利率因预期通胀上升而上升时，国内货币贬值。

$D = F$

2) Changes in the Money Supply

- A higher domestic money supply causes the domestic currency to depreciate.
  国内货币供应量的增加会导致国内货币贬值。

4.6 The Dollar and Interest Rate

- The value of the dollar and the measure of real interest rates tend to rise and fall together.
  美元的价值和实际利率的变化往往一起波动。
- Our model of exchange rate determination helps explain the rise in the dollar in the early 1980s and fall thereafter.
  我们的汇率决定模型可以解释美元在 20 世纪 80 年代初上涨以及之后下跌的原因。
- a rise in the U.S. real interest rate raises the relative expected return on dollar assets, which leads to purchases of dollar assets that raise the exchange rate
  美国实际利率的上升提高了美元资产的相对预期回报，这促使投资者购买美元资产，从而推高汇率。

4.7 The Global Financial Crisis and the Dollar

The Global Financial Crisis and the Dollar

- During the financial crisis of 2007–2009, many foreign investors sought a safe haven in U.S. Treasury securities.
  在 2007–2009 年的金融危机期间，许多外国投资者寻求购买美国国债作为避险手段。
- As a result, the demand for dollars and thus the dollar exchange rate increased.
  结果，美元的需求增加，美元汇率也上升。

5. Exchange Rate Intervention

1) Unsterilised Intervention

Monetary Base (B) is allowed to fluctuate

2) Sterilised Intervention

Monetary Base (B) will not change

(1) Unsterilised Intervention

Example 1 = CB buys foreign assets (sell domestic currency) with a check of 1 billion

"open market purchase"

Asset	Liability
Foreign Assets +$1 Billion	Bank Reserves of CB +$1 Billion

According to $B = \underset{\text{Reserves}}{R} + C$ currency

Buying foreign currency =

$\uparrow R \Rightarrow \uparrow B \Rightarrow \uparrow M$ ($M = mB$)

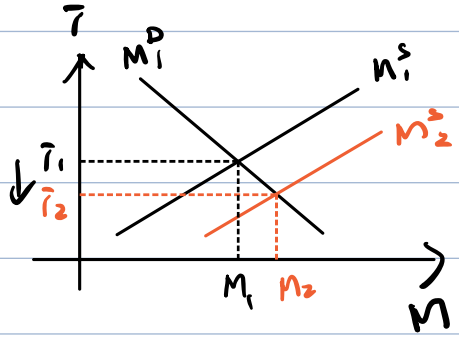
买外汇计入外汇储备

$\uparrow M \Rightarrow \pi^e \uparrow \Rightarrow \downarrow$

By Liquidity preference Framework:

↑ Money supply will decrease interest rate

then expected inflation rate will increase



$\pi^e \uparrow$ = suggests that expected real return on domestic assets decreases

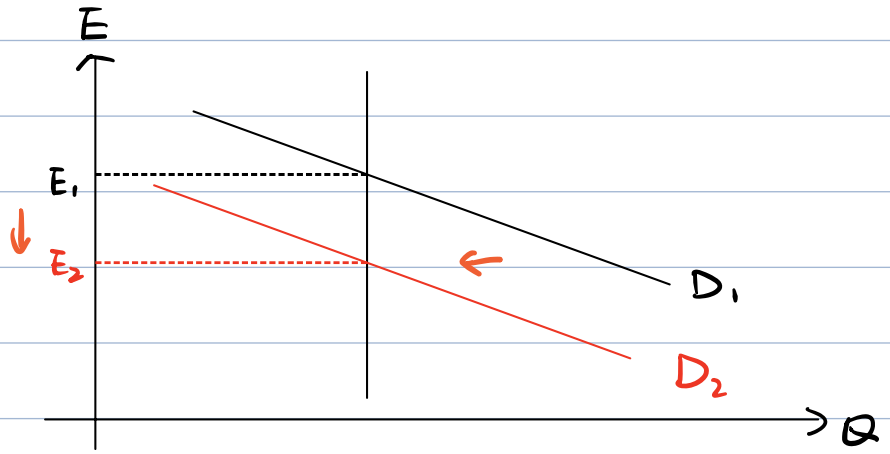
$(i^D - \pi^e) \downarrow$

demand for domestic assets decreases

(Demand curve shifts to the left)

Result: Domestic currency will depreciate

CB thinks that the exchange rate is over-valued,
so they intervene by buying foreign currency to lower the exchange rate



(2) Sterilised Foreign Exchange Rate

Ex: Selling $1 billion of foreign assets (buying domestic currency)

- **卖出外国资产**：在这个阶段，中央银行为了干预汇率，会通过公开市场操作（卖出外国资产）来影响市场。比如，中央银行卖出 10 亿美元的外国资产（如美国国债），从市场上回收本国货币。
- **效果**：因为中央银行在卖出外国资产的过程中，实际上是在回收市场上的本国货币（用外币换回本国货币），这导致了本国的货币供应量减少。
- **为什么要这么做**：目的是为了防止本国货币贬值或减少市场上本国货币的供应量。这是一个“紧缩的货币政策”，因为它减少了市场上流通的本国货币，从而增加了本币的价值或者防止通胀。

"Open-market Sale"

⇓

Monetary Base (B) ↓ = "Contractionary Monetary Policy"

CB want to keep Monetary Base constant
Therefore, CB conducts OMP of $1 billion of Treasury Bonds

⇓

Monetary Base (B) ↑

⇓

As a result, Net ΔB = 0

Since $\Delta B = 0 \Rightarrow$ $\bar{B}$ (Monetary Base)

$\bar{M}$ (Money Supply)

$\bar{\pi}^e$ (expected inflation)

Do not change

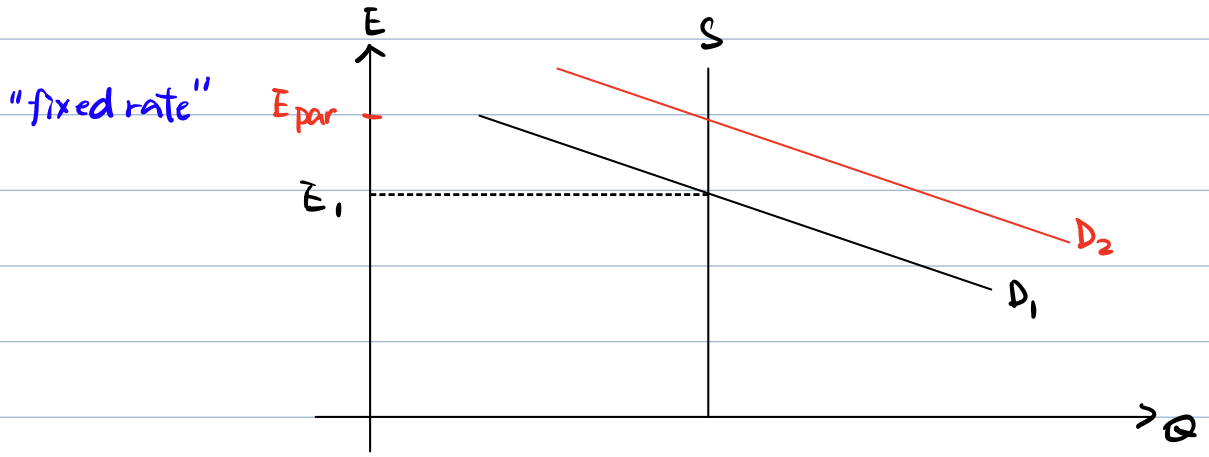
expected real return on domestic assets $(i^D - \bar{\pi}^e)$ will not change

result: ① Demand will not change

② Exchange Rate will not change

6. Exchang Rate Regime

6-1 Fixed Exchange Rate Regime



$E_1 < E_{par}$ = overvalued currency

⇓

CB has 2 options

1> OMO = purchase domestic currency

2> Devalue Exchange Rate and set it to E_1 instead of E_{par}

Sell foreign assets (buying domestic currency)

"Contractionary Monetary policy"

⇓

Decrease Reserves (↓R)

⇓

↓B (B = c + R)

⇓

↓M (M = mB) Decrease Money supply will increase interest rate

⇓

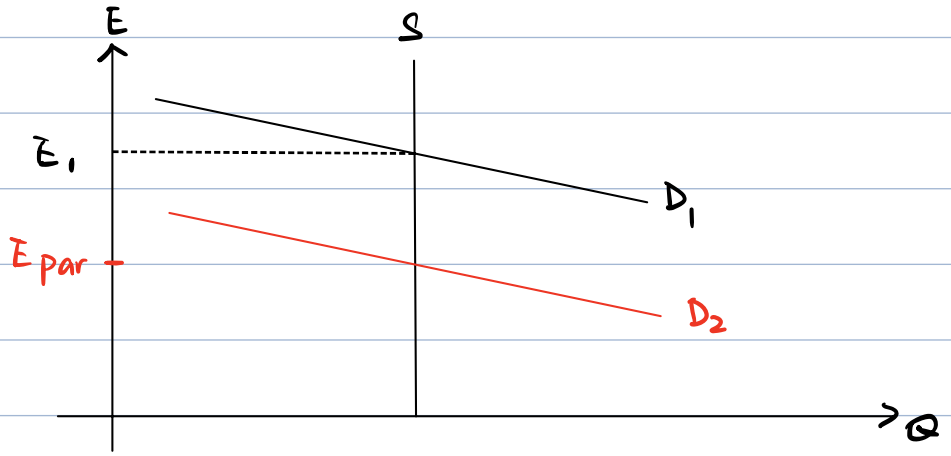
↓ π^e decrease in expected inflation

⇓

↑ $(i^D - \pi^e)$ increase expected real return on domestic goods

Result = ① Demand curve shifts to the right (D↑)

② Exchange rate appreciates (E↑)



CB has 2 options

1> Buy foreign Assets (sell domestic currency)

2> Revalue the currency and set the new value at E1

Buy foreign Assets (sell domestic currency)

⇓

R↑ ⇒ ↑B (B = R+C) ⇒ M↑ (M = mB)

M↑ ⇒ ↑π^e ⇒ ↓ expected real return on domestic asset ($i^D - \pi^e$) ↓

⇓

Result: ① Demand curve shifts to the left

- **横坐标**：在外汇市场的供需图中，横坐标通常表示的是**本国货币的数量**，即本国货币的供给或需求。
- **汇率表示方式**：外汇市场供需分析中的汇率一般使用**直接标价法（Direct Quotation）**，即1单位外国货币等于多少本国货币。汇率上升表示本国货币贬值，汇率下降表示本国货币升值。

- **需求曲线**：如果本国居民对外国商品、服务或资产的需求增加，他们将需要更多的外国货币。这会导致对外国货币的需求曲线右移，推高汇率（本币贬值，外币升值）。
- **供给曲线**：如果外国投资者对本国的商品、服务或资产的需求增加，他们将需要更多的本国货币，从而供给更多的外国货币。这会导致对外国货币的供给曲线右移，降低汇率（本币升值，外币贬值）。