

Macro-Economics



Analysing exchange rates

Analysing Exchange rates

Learning outcomes.....

- **Explain** how changes in supply and demand for a currency will affect its value on the foreign exchange markets
- **Explain** an optimal currency area (OCA) and identify the advantages and disadvantages of implementing a single currency in an OCA
- **Describe** the nature and basic operations of the spot and forward exchange markets
- **Explain** the nature of exchange rate risk and how it can be managed

Analysing Exchange rates

Learning outcomes.....

- **Apply** the concept of PPP to forecast expected future spot exchange rates using the differential inflation rates between two countries
- **Distinguish** between covered and uncovered interest rate parity and calculate forward rates using the appropriate method
- **Describe** the nature and basic operations of the spot and forward exchange markets
- **Explain** the nature of exchange rate risk and how it can be managed

Analysing Exchange rates

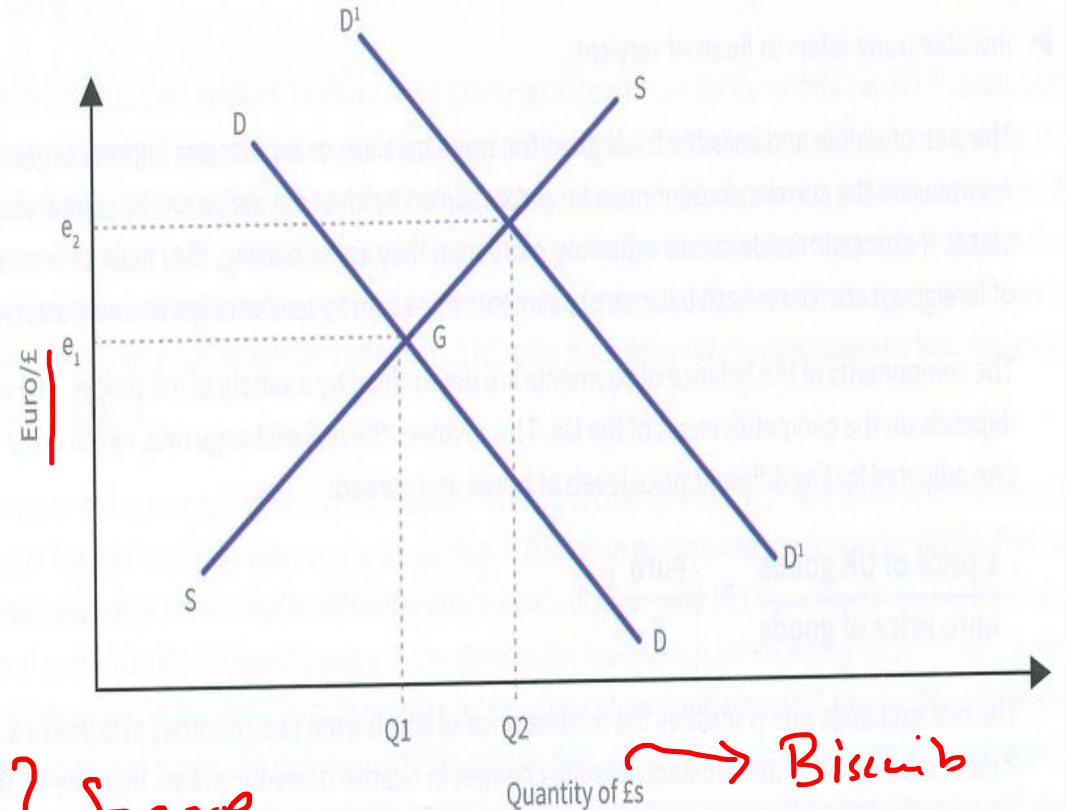
Foreign exchange market

- Foreign exchange rate is a **price of one currency expressed in terms of another**. For example, QAR per dollars.
- It is a huge market with turnover running in trillions of dollars per day.
- Demand and supply curves for a currency are like for any other good.

Base Price
 $1 \$ = 3.64 \text{ QAR}$
 Buying

Suppose $1 \$ = 1.10 \text{ £}$
 Suppose $1 \text{ £} = 1.05 \text{ £}$

THE DEMAND AND SUPPLY OF A CURRENCY



$1 \text{ £} \rightarrow 1.15 \text{ Eur}$
 $1 \text{ £} \rightarrow 1.20 \text{ Eur}$
 } £ are costlier or Eur are cheaper
 Biscuit

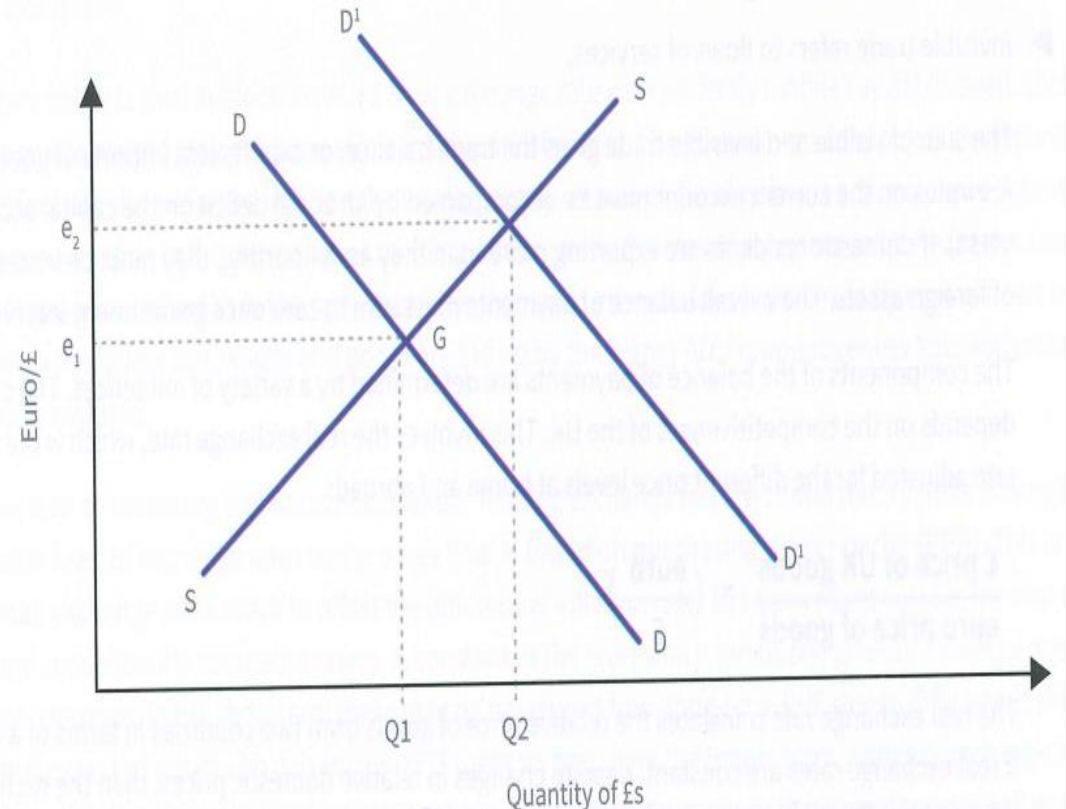
Analysing Exchange rates

Foreign exchange market

- Suppose the central bank has target exchange rate of e_2 , then it will add to demand for pounds from DD to D^1D^1 .
- This is called **intervention** in foreign currency market by the central bank.

$$\text{\$ } 1 = \underline{\underline{3.64 \text{ QAR}}}$$

THE DEMAND AND SUPPLY OF A CURRENCY



Analysing Exchange rates

Foreign exchange market: Exchange rate systems

$$= C + I + G + \boxed{\begin{matrix} X - M \\ \downarrow \quad \uparrow \end{matrix}}$$

➤ In a fixed rate system, a currency is convertible into another currency at a fixed rate. Hence market intervention is needed to keep the exchange rate fixed.

➤ Fiscal policy could be less effective under floating rate system compared to fixed rate.

➤ This is because if fiscal expansion is sought, increased AD and increased interest rates may attract funds from abroad, increasing the domestic currency price (domestic currency appreciates).

US eco-
If $G \uparrow$, $AD \uparrow$, int rates \uparrow , $\$$ demand \uparrow , $\$$ value \uparrow

➤ This is likely to dampen exports and offset fiscal expansion.

↓ adverse effect: bad

If domestic currency ↑, Exports ↓, imports ↑
Hence domestic GDP ↓

Analysing Exchange rates

Exports & Imports.

$$1 \text{ Eur} = 1.05 \$$$

$$1 \text{ Eur} = 1.10 \$$$

↓
Base

↓
Price

→ Euro
Base

\$ becomes cheaper

\$ depreciates against Eur

↑

Eur appreciates against \$

↓

i) Eur becomes costlier,

European Exports costlier & hence ↓

ii) Imports from US become cheaper, imports ~~from~~ from US ↑

Impacts on GDP: GDP ↓

Analysing Exchange rates

Foreign exchange market: Exchange rate systems

- In recent years, many countries face imbalances in external capital and trade.
- Countries like US for example face persistent trade deficit, which increases indebtedness of US. $M > X$ → borrowing
- If countries run persistent trade surplus, they end up accumulating overseas assets.
China → trade surplus → acquire foreign assets
- Since many countries run trade surplus against US, these countries invest in USD denominated assets which keeps US interests low. This may lead to excessing borrowing in US which can backfire in worsening economic situations.
↑
rates

Analysing Exchange rates

Foreign exchange market: Exchange rate systems: Fixed Vs Floating

- Merits and demerits of both the systems is often debated extensively.
- Merits of fixed rate include relative certainty in international transactions and hence encouragement to trade and investment. \$
- Floating rates on the other hand allow economies to adjust relative costs and wages through exchange rates.

Analysing Exchange rates

Optimal Currency Areas (OCA) or Currency Union

- Using common currency in a geographic regions such as Euro.
- Benefits:
 - reduced transaction costs for trades between the countries in the OCA
 - increased production due to economies of scale since the entire area acts like a domestic market

Disadvantage: Countries lose monetary policy freedom
Entire Euro area → 1 central bank

Analysing Exchange rates

Essential conditions for successful Currency Union

- Labor and capital should have free mobility with no barriers.
- If no free mobility for labor and capital, then mechanism to redistribute income to less well-off regions.
- Similar business cycles for countries
- Experience of Eurozone has brought forward some of these issues, especially different business cycles within the Eurozone countries.

2010 Germany very well

Italy, Portugal, Greece struggling

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Spot, Forward Markets

Malaysia → freezing all foreign accounts
1997: South East Asia

- Investing in foreign markets needs to be carefully evaluated with following considerations:
 - Restricted access to financial markets or specific investments → restrictions on intl investments.
 - Different regulations
 - Different taxation rules, may make it more expensive to transaction in foreign markets
 - Political risk

Analysing Exchange rates

$$1 \$ = 3.64 \text{ QAR}$$

$$1 \text{ QAR} = \frac{1}{3.64} \$$$

Spot, Forward Markets: Exchange rate risk

- Exchange rates can be expressed as price of one currency per unit of another currency

$\begin{array}{c} \text{Base} \\ \downarrow \\ \frac{\text{QAR}}{\text{GBP}} \\ 4.08 \\ \hline 1 \end{array}$	$\begin{array}{c} \text{Base} \\ \downarrow \\ \frac{\text{GBP}}{\text{QAR}} \\ 0.25 \\ \hline 1 \end{array}$
1 GBP = 4.08 QAR	1 QAR = 0.25 GBP

- For international investors

$$\text{Returns in QAR} = \text{Return in JPY} + \text{JPY QAR Exch. rate}$$

$$\text{Returns in domestic currency} = \text{Return in Foreign currency asset} + \text{Changes in exchange rates}$$

- For international investors, changes in exchange rates can

<ul style="list-style-type: none"> increase the returns or 	$\begin{array}{c} \text{Return in QAR} \\ 3\% \\ \hline 7\% \end{array} = \begin{array}{c} \text{JPY Return} \\ 5\% \\ \hline 5\% \end{array}$	$\begin{array}{c} \Delta \text{Exch. rate} \\ - 2\% \\ \hline + 2\% \end{array}$
<ul style="list-style-type: none"> reduce or eliminate returns 	$\begin{array}{c} \text{Return in QAR} \\ 3\% \\ \hline 7\% \end{array} = \begin{array}{c} \text{JPY Return} \\ 5\% \\ \hline 5\% \end{array}$	$\begin{array}{c} \Delta \text{Exch. rate} \\ - 2\% \\ \hline + 2\% \end{array}$

Analysing Exchange rates

% Return:

$$\frac{425 - 408}{408}$$

$$\frac{425}{408} - \frac{408}{408}$$

$$1 \text{ £} = 4.08 \text{ QAR}$$

$$100 \text{ £} = 100 \times 4.08 \text{ QAR}$$

Spot, Forward Markets: Exchange rate risk: Example

- Suppose an investor in Qatar, buys GBP denominated bond in UK for GBP 100. Assuming at present the exchange rate is 1 GBP = 4.08 QAR, how many QAR are needed?

Qatari investor invests 100 £. QAR: $4.08 \times 100 = \underline{408} \text{ QAR}$

- Suppose soon after the bond purchase, the exchange rate changes to 1 GBP = 4.25 QAR, and the investor sells the bond at same price of GBP 100. What is the rate of return for the investor in QAR?

GBP appreciated or became costlier

Investor will get back: $100 \times 4.25 = 425 \text{ QAR}$

Gain: $425 - 408 = 17 \text{ QAR}$ Rate of Return: $\frac{17}{408}$

- Suppose soon after the bond purchase, the exchange rate changes to 1 GBP = 3.88 QAR, and the investor sells the bond at same price of GBP 100. What is the rate of return for the investor in QAR?

↳ GBP depreciates, QAR appreciates

New Value = 388

% rate of Ret $\frac{388}{408} - 1$

Analysing Exchange rates

Spot, Forward Markets: Forex market features

- Market with no physical presence where currencies are traded, London being a major center
- Major international banks and brokers trade currencies through computer networks
- International banks are **market makers**, they trade on their own account as well as for clients
- Brokers trade for clients → Ready to buy & sell currencies any time
- Customers in forex market are
 - ✓ ➤ Corporates, mainly exporters and importers
 - ✓ ➤ Financial institutions to buy foreign currency assets or to borrow or lend
 - ✓ ➤ Individuals for a variety of purposes

Analysing Exchange rates

Spot, Forward Markets: Spot market

→ Banks / Fin institutions perspective

- Spot market is market for immediate delivery of foreign exchange.
- Due to timing differences across the regions, delivery of foreign exchange takes place within two business days (T+2).

Citi Bank 14th Nov $\xrightarrow{\$}$ Spot $\xrightarrow{\text{Jpy}}$ Mizuho Corp Japan 16th Nov
- Following prices are quotes by market makers such as banks.
 - Bid price: Price at which the market maker is willing to buy foreign currency or base currency
 - Ask price: Price at which the market maker is willing to sell foreign currency or base currency
 - Bid price is lower than the ask price and the difference is the spread (profit) for the market maker
- See example on page 160.

Eur / \$
↳ base

	Bid	Ask
	\$ 1.0525	\$ 1.0535

Analysing Exchange rates

or sells Eur

Bank Buys Eur against \$ from Company

Eur/\$

Bid

Ask

\$ 1.0525

\$ 1.0535

When Bank buys Eur, it will pay \$ 1.0525 to (bid) Company

When Bank sells Eur, it will demand \$ 1.0535 from (ask) Company

Analysing Exchange rates market makers

Client $\$$ 1.5244 Bid Ask per £ $\$1.5284$ \rightarrow base

Fund mgr wants to sell £ 500,000.

Bank will buy £, at bid rate.

\rightarrow pay $\$ \rightarrow 1.5244 \times 500,000 =$

Analysing Exchange rates

Spot, Forward Markets: Forward market

- Forward market is market for future delivery of foreign exchange though the price is decided now.

Buy Eur against \$ after 1 month
but we decide price today.

- A currency trades at forward **premium** if forward rate is **greater** than spot rate.

$$\text{Spot : } 1 \text{ £} = \underline{1.10 \$} \quad \text{Forw } 1 \text{ £} = \underline{1.12 \$}$$

Premium

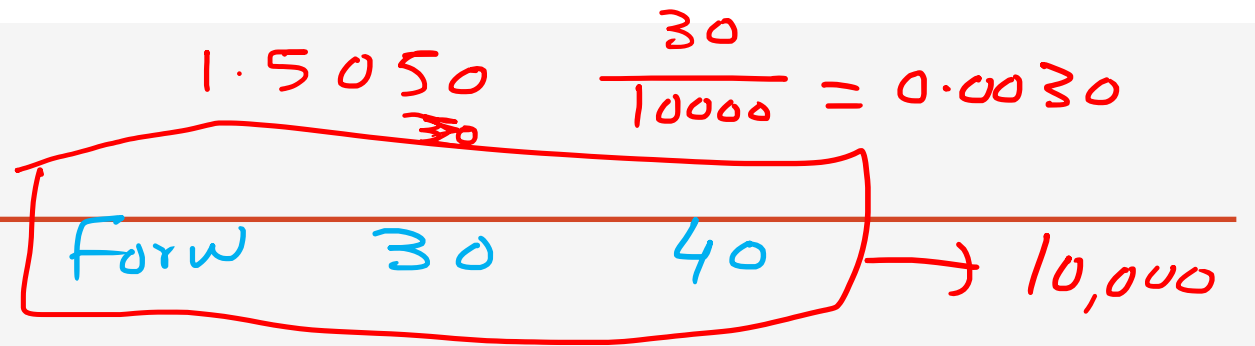
- A currency trades at forward **discount** if forward rate is **lesser** than spot rate.

$$1 \text{ £} = \underline{1.10 \$} \quad 1 \text{ £} = \underline{1.08 \$}$$

Analysing Exchange rates

Spot, Forward Markets: Forward market

➤ Forward market is market for future delivery of foreign exchange though the price is decided now.



Suppose spot is given & forw prem or dis. is given we may be asked to calculate forward rate.

Divide by 10000

Forw Prem:	Forw pt
1 f =	Ascending order
Spot f/\$	Bid Ask
Forw pts	1.5050 1.5060
Forw Rate (Add)	.0030 .0040
	1.5080 1.5100

Forw Disc:	Forw pts descending
Spot	1.5050 1.5060
Forw pts	-0.0040 -0.0030
Forw Rate	1.5010 1.5030

Analysing Exchange rates

$$1 \$ = 100 ¥$$

Inflation and Exchange Rates : Purchasing Power Parity (PPP)

Burger
1 \$ ← 100 ¥

- A country that has a higher inflation rate compared to another country, will find on average, its currency has depreciated compared to the another country.
- For example, if US has higher inflation than Japan, then on average USD will depreciate compared to JPY.
- This is based on the principle of **PPP** which states that the exchange rate on average will change at a rate equal to the inflation differential between the two countries.
- This is also known as **Law of one Price**.
- A currency trades at forward **discount** if forward rate is **lesser** than spot rate.
- See examples on page 161, 162.

Analysing Exchange rates

If US inf > Japan inf,
\$ ↓ & ¥ ↑

Inflation and Exchange Rates : Purchasing Power Parity (PPP)

➤ We can use the following formula to calculate new exchange rate:

$$\text{New Rate}_{P/B} = \text{Old Rate}_{P/B} * (1 + \text{inf}_P) / (1 + \text{inf}_B)$$

➤ Or the Exchange rate adjustment can be calculated as:

$$\text{New Rate}_{P/B} / \text{Old Rate}_{P/B} = (1 + \text{inf}_P) / (1 + \text{inf}_B)$$

$$\frac{\text{New}}{\text{Old}} = \frac{1 + \text{inf}_P}{1 + \text{inf}_B} = 100 \times \frac{(1 + 2\%)}{(1 + 5\%)} = \underline{\underline{¥97.14}} \text{ per } \$$$

$$= \frac{1.02}{1.05} = 0.9714 \quad \neq \quad \uparrow \text{ ¥ } \& \quad \$ \downarrow$$

Spot: 1 \$ = 100 ¥

↙ base ↘ price

US inf → 5%

Japan inf → 2%

New rate → ?
exch.

Analysing Exchange rates

Inflation and Exchange Rates : Purchasing Power Parity (PPP)

- We can use the following formula to calculate new exchange rate:

$$\text{New Rate}_{P/B} = \text{Old Rate}_{P/B} * (1 + \text{inf}_P) / (1 + \text{inf}_B)$$

- Or the Exchange rate adjustment can be calculated as:

$$\text{New Rate}_{P/B} / \text{Old Rate}_{P/B} = (1 + \text{inf}_P) / (1 + \text{inf}_B)$$

$$1.60 \times \frac{(1 + 2\%)}{(1 + 5\%)} = 1.55$$

$$1 \text{ £} = \$ 1.60$$
$$\text{UK} = 5\%$$
$$\text{US} = 2\%$$

Analysing Exchange rates

Bank deposit rate \rightarrow 5%

International Fisher Effect

int rate \rightarrow 5%
Inflation \rightarrow 3%
 \rightarrow that is stated Real rate \rightarrow 2%

- Following relationship between nominal interest rate and inflation holds as per the Fisher effect.

$$\text{Real rate} = \text{Nominal Rate} - \text{Inflation}$$

- $(1+R) = (1+r) * (1 + \text{Exp}(\text{Inf}))$, where R = nominal interest rate and r = real interest rate

- In International context, the Fisher effect states that the real interest rates in any economy are same, provided investors are free to invest in any currency.

\$ / £ / ¥

- If this does not hold true then market participants called arbitrageurs will take advantage of real rate differential and exploit it.

- Eventually, the difference will be eliminated.

$$1.03 \times 1.02 = 1 + N:R$$

$$1.0506 = 1 + NR \rightarrow 5.06\%$$

$$\text{Real} + \text{infl} = \text{Nominal}$$

$$(1+r) \times (1 + \text{Exp inf}) = (1 + \text{Nom}) \rightarrow \text{Actual} \rightarrow \text{quants}$$

Analysing Exchange rates

International Fisher Effect

➤ International Fisher equation can be stated as:

➤ $(1 + R_{\text{GBP}}) / (1 + \text{Exp}(\text{Inf})_{\text{GBP}}) = (1 + R_{\text{USD}}) / ((1 + \text{Exp}(\text{Inf})_{\text{USD}}))$

➤ See Example on page 163.

Analysing Exchange rates

1 \$ = 100 ¥ → Spot rate

Int Rate: US: 5%

Japan: 2%

Interest rates and Exchange Rates

Covered and Uncovered Interest rate parity

→ No foreign exchange risk

↳ using forw contract

➤ Covered Interest rate parity provides a relationship between forward rate and interest rate differential.

➤ As per this theory, forward rate is a function of interest rate differential between the two countries

➤ A country with a higher rate of interest will trade at forward discount.

$$\begin{array}{l} \text{Spot} \\ \downarrow \\ 100 \times \frac{(1+2\%)}{(1+5\%)} \end{array}$$

➤ A country with a lower rate of interest will trade at forward premium.

$$\text{Forw Rate} = 97.14$$

US investor: Borrow in ¥, invest in \$,
to repay ¥, forw contract.

Analysing Exchange rates

Interest rates and Exchange Rates

Covered and **Uncovered** Interest rate parity → Taking risk
↳ not using forward contract

➤ **Uncovered Interest rate parity** provides a relationship between expected future spot rate and interest rate differential.

➤ As per this theory, expected future spot rate is a function of interest rate differential between the two countries.

➤ A country with a higher rate of interest will have lower expected future spot rate.

➤ A country with a lower rate of interest will have higher expected future spot rate.

➤ See example on page 164.

Borrow ¥, invest \$,
repay ¥ at that spot rate (After 1yr)