

Convention for quoting of exchange rates

The quoting of currency rates will follow international practice in the Module B examination as follows:

The base currency is the first currency quoted, and the counter currency is the second currency quoted.

So, a quotation £/HK\$11.25 means that one pound is exchanged for 11.25 Hong Kong dollars. Here, £ is the base currency and HK\$ is the counter currency.

Major currencies, such as the euro and US dollar, are more likely to be the base currency in a currency pair.

Chapter 11 of the 2015 Learning Pack has been revised in order to be consistent with this approach, as detailed below.

Paragraph 8.1.1, p 393**Foreign exchange demand**

If an importer has to pay a foreign supplier in a foreign currency, he might ask his bank to sell him the required amount of the currency. For example, suppose that a bank's customer, a Hong Kong trading company, has imported goods from a UK supplier for which it must now pay £100,000.

- The company will ask the bank to sell it £100,000 (if the company is buying currency, the bank is selling it)
- When the bank agrees to sell £100,000 to the company, it will tell the company what the spot rate of exchange will be for the transaction. If the bank's selling rate (called the '**offer**', or '**ask**' price) is, say £/ HK\$10.7935, the bank will charge the company:

$$£100,000 \times \$10.7935 = \$1,079,350$$

Similarly, if an exporter is paid £100,000 by a foreign customer in the UK, he may wish to exchange the sterling to obtain HK dollars. He will therefore ask his bank to buy the sterling from him. Since the exporter is selling currency to the bank, the bank is buying the currency.

If the bank quotes a buying rate (known as the **bid** price) of, say £/HK\$10.6075, for the currency the bank will pay the exporter:

$$£100,000 \times \$10.6075 = \$1,060,750$$

A bank expects to make a profit from selling and buying currency, and it does so by offering a rate for selling a currency that is different from the rate for buying the currency.

The figures used for illustration in the previous paragraphs show a bank selling some sterling for \$1,079,350 and buying the same quantity of sterling for \$1,060,750, at selling and buying rates that might be in use at the same time. The bank would make a profit of \$18,600.

**Paragraph
8.2.2, p 396**

Interest rate parity

Example

The spot exchange rate between two currencies, the Southland dollar (S\$) and the Northland florin (NF), is listed in the financial press as follows:

$$\text{S\$/NF}4.725$$

That is, 1 Southland dollar is worth 4.725 Northland florins (and conversely, 1 Northland florin is worth 0.21164 Southland dollars).

The money market interest rate for 90-day deposits in Northland florins is 7.5% annualised and for the Southland dollar it is 5.3%. Assume a 365-day year. (In practice, foreign currency interest rates are often calculated on an alternative 360-day basis, one month being treated as 30 days.)

What will be the 90-day forward exchange rate between the two currencies?

What is implied about interest rates in Southland?

Today S\$1,000 buys NF4,725.

- (a) If S\$1,000 is placed on deposit for 90 days at 5.3%, the value of the deposit after 90 days would be: $\text{S\$}1,000 + (1,000 \times 0.053 \times 90/365) = \text{\$}1,013.07$.
- (b) If NF4,725 is placed on deposit for 90 days at 7.5%, the value of the deposit after 90 days would be: $\text{NF}4,725 + (4,725 \times 0.075 \times 90/365) = \text{NF}4,725 + \text{NF}87.38 = \text{NF}4,812.38$.

The foreign exchange markets would ensure that these values are equivalent, which means that the 90-day forward exchange rate must be:

- (a) $4,812.38/1,013.07 = \text{S\$}1/\text{NF}4.7503$
- (b) $1,013.07/4,812.38 = \text{NF}1/\text{S\$}0.2105$

Alternative method of calculation:

$$\text{90-day interest rate for the NF} = 7.5\% \times 90/365 = 1.85\% = 0.018493$$

$$\text{90-day interest rate for the S\$} = 5.3\% \times 90/365 = 1.31\% = 0.0130685$$

Forward exchange rate =

$$\frac{1 + 0.018493}{1 + 0.0130685} \times 4.725 = \text{NF}4.7503 \text{ to S\$}1$$

Or:

$$\frac{1 + 0.0130685}{1 + 0.018493} \times 0.21164 = \text{S\$}0.2105 \text{ to NF}1$$

**Paragraph
8.3.5, p 401**

Illustration: Netting

A and B are respectively Hong Kong and US based subsidiaries of a Swiss holding company. At 31 March, A owed B CHF300,000 and B owed A CHF220,000. Netting can reduce the value of the inter-company debts as the two inter-company balances are set against each other, leaving a net debt owed by A to B of CHF 80,000 (i.e. CHF300,000 - CHF 220,000).

**Paragraph
8.4.1, p 402**

Forward exchange rates

A forward exchange rate might be higher or lower than the spot rate. If it is higher, the quoted currency will be cheaper forward than spot. For example, if in the case of £ sterling/Swiss francs (GBP/CHF):

- The spot rate is: 2.1560 – 2.1660
- The three months forward rate is: 2.2070 – 2.2220
- A bank would sell CHF2,000 at the spot rate, now, for CHF2,000/2.1560 = GBP927.64 or in three months' time, under a forward contract, for CHF2,000/2.070 = GBP906.21
- A bank would buy CHF2,000 at the spot rate, now, for CHF2,000/2.1660 = GBP923.36 or in three months' time, under a forward contract, for CHF2,000/2.2220 = GBP900.09

In both cases, the quoted currency (Swiss franc) would be worth less against £ sterling in a forward contract than at the current spot rate. This is because it is quoted forward 'at a discount', against £ sterling. Therefore, if the forward rate is higher than the spot rate, then it is trading 'at a discount' to the spot rate.

**Paragraph
8.4.2, p 402**

Forward exchange contracts

Illustration

A Hong Kong importer knows on 1 April that he must pay a foreign seller 2.65 million dinars in one month's time, on 1 May. He can arrange a forward exchange contract with his bank on 1 April, whereby the bank undertakes to sell 2.65 million dinars to the importer on 1 May, at a fixed rate of (say) HK\$1/dinars 2.64.

The Hong Kong importer can be certain that whatever the spot rate is between HK\$ and dinars on 1 May, he will have to pay on that date, at this forward rate:

$$\frac{\text{Dinars } 2.65\text{m}}{2.64} = \text{HK\$}1,003,788$$

- If the spot rate is lower than HK\$1/dinars 2.64, the importer would have successfully protected himself against a weakening of the dollar, and would have avoided paying more \$ to obtain the dinars.
- If the spot rate is higher than HK\$1/dinars 2.64, the value of the dollar against the dinar would mean that the importer would pay more under the forward exchange contract than he would have had to pay if he had obtained the dinars at the spot rate on 1 May. He cannot avoid this extra cost, because a forward contract is a binding contract.

**Paragraph
8.5.1, p 404**

Illustration: Money market hedge (Hong Kong importer)

A Hong Kong company owes a French supplier (i.e. creditor) €1 million in three months' time. Relevant data are:

Spot rate: € / HK\$ 11.60– 11.80

Interest rates	<i>Deposit</i>	<i>Borrow</i>
	%	%
Hong Kong	2	3
France (euro)	4	5

The process will be:

- Today: borrow dollars, exchange into euros and deposit euros
- For period until settlement of transaction: pay interest on dollars borrowing, receive interest on euros deposit
- On settlement date: use deposit of euros to pay supplier
- Effective exchange rate is the dollars borrowing/euros deposit

The interest rates for three months are 0.75% to borrow in dollars (i.e. 3%/4) and 1% to deposit in euros (i.e. 4%/4). The company needs to deposit enough euros now so that the total including interest will be €1 million in three months' time. This means depositing $€1m / (1 + 0.01) = €990,099$.

These euros will cost \$11,683,168 (spot rate 11.80). The company must borrow this amount and, with three months' interest of 0.75%, will have to repay $\$11,683,168 \times (1 + 0.0075) = \$11,770,792$.

Therefore, in three months, the French creditor will be paid out of the French bank account and the company will effectively be paying \$11,770,792 to satisfy this debt. The effective forward rate which the company has 'manufactured' is $\$11,770,792 / €1m = € / HK\$ 11.7708$. This effective forward rate shows the euros at a discount to the dollar because the euro interest rate is higher than the dollar rate. The foreign currency asset hedges the foreign currency liability.

Diagrammatically this could be shown as:

Exchanged @ 11.80			
	\$	€	
Today	11,683,168	990,099	Today
Borrowed at 3% for 3 months (i.e. $3\% \times \frac{3}{12}$)	↓ ↓	↓ ↓	Deposited at 4% for 3 months (i.e. $4\% \times \frac{3}{12}$)
3 months	11,770,792	1,000,000	3 months
Effective rate = 11.7708			Paid to supplier

**Paragraph
8.5.2, p 405**

Illustration: Money market hedge (Hong Kong exporter)

A Hong Kong company is due to receive €1 million from a French customer (i.e. debtor) in three months' time. Relevant data are the same as the previous example:

Spot rate: € / HK\$ 11.60 – 11.80

Interest rates	<i>Deposit</i>	<i>Borrow</i>
	%	%
Hong Kong	2	3
France (euro)	4	5

The process will be:

- Today: borrow euros, exchange into dollars and deposit dollars
- For period until settlement of transaction: pay interest on euros borrowing, receive interest on dollars deposit
- On settlement date: payment from customer used to pay off euros borrowing
- Effective exchange rate is the dollars deposit / euros borrowing

The interest rates for three months are 0.5% to deposit in dollars (i.e. 2%/4) and 1.25% to borrow in euros (i.e. 5%/4). The company needs to borrow €1m/1.0125 = €987,654 today. These euros will be converted to \$11,456,790 (i.e. €987,654 × \$11.60). The company must deposit this amount and, with three months' interest of 2.00%, will have earned \$11,456,790 × (1 + 0.005) = \$11,514,074.

Therefore, in three months, the loan will be paid out of the proceeds from the French debtor and the company will receive \$11,514,074. The effective forward rate which the company has 'manufactured' is \$11,514,074 / €1m = € / HK\$ 11.5141. This effective forward rate shows the euro at a discount to the dollar because the euro interest rate is higher than the dollar rate.

Diagrammatically this could be shown as:

		Exchanged @ 11.60				
		\$		€		
Today		11,456,790		987,654	Today	
Deposited at 2% for 3 months (i.e. $2\% \times \frac{3}{12}$)		↓ ↓		↓ ↓	Borrowed at 5% for 3 months (i.e. $5\% \times \frac{3}{12}$)	
3 months		11,514,074		1,000,000	3 months	
		Effective rate = 11.5141		Received from customer		

Paragraph 8.6
p 407

Example: Currency futures contract

A US company buys goods worth €720,000 from a German company payable in 30 days. The US company wants to hedge against the euro strengthening against the US dollar. Relevant data are:

- The current spot rate is €1/ US\$ 1.3215 – 1.3221. The € futures price is €1/US\$ 1.3245.
- The standard size of a 3-month € futures contract is €125,000 (in exchange for US dollars)
- In 30 days' time the spot is €1/US\$ 1.3345 – 1.3351
- Assume that the futures price after 30 days is €1/US\$ 1.3367.

Required

Evaluate the hedge.

Approach

- (1) Importing or exporting?

Importing

- (2) What is the exposure to currency risk?

The US company has an exposure of €0.72 million

- (3) What is the risk?

If the euro appreciates in value (spot rate) against US\$ in the next 30 days, the payment in euros will cost more in US dollars, unless the exposure to currency risk is hedged.

- (4) Buy or sell futures?

If the euro appreciates in value against the US dollar, the US company will make a loss on the exchange rate movement. The hedge with futures should therefore ensure that if the euro appreciates in value against the US dollar the company will make a profit on its futures position. The profit made on the futures should offset the loss on the underlying trading position and the risk is hedged. As an importer in this example, the contract currency is euros, so the company will buy euros futures at a price of €1/US\$ 1.3245

Note. Another way of looking at this is that in order to pay for the goods the US company will need to **buy** euros, hence it needs to **buy** euros futures.

- (5) Which futures contract?

The company should buy futures with the first settlement date after the settlement date for the payment of the €0.72 million. (This may be March, June, September or December futures.)

- (6) How many contracts and tick value?

Divide the foreign currency exposure by the contract size. This gives the number of contracts, but remember futures can only be bought or sold as whole numbers of contracts.

$$\frac{€.72\text{m}}{€25,000} = 5.76, \text{ rounded up to 6 contracts}$$

The value of one tick is the change in the value of a futures contract from a movement in the price by one tick (= US\$0.0001). Price in US\$, tick value = US\$12.50 (= US\$0.0001 × €125,000) per contract.

- (7) In 30 days' time when the supplier payment must be made, the company should 'close out' its futures position by selling six futures contracts (for the same settlement date as the futures that were originally bought). When a position is closed there is a net gain or loss on the futures transaction.

Hedge outcome

Outcome in futures market:

Opening futures price	€1/US\$ 1.3245	Buy at lower price
Closing futures price	€1/US\$ 1.3367	Sell at higher price
Movement in ticks	122 ticks	Profit

$$\text{Futures profit} = 122 \times \$12.50 \times 6 \text{ contracts} = \$9,150$$

(8) Calculate the final position.

In 30 days' time, the company buys the required € at the spot rate in order to pay the supplier.

If the euro has appreciated against US dollar, as feared, the euros payment will be more expensive, however this will be offset by any profit on the futures contracts. (Conversely, if the euro has depreciated against the US dollar, the cheaper cost of buying the currency would be offset by a loss on the futures contracts.)

Net outcome

	US\$
Spot market payment (€720,000 at €1/US\$ 1.3351)	961,272
Futures market profit	<u>(9,150)</u>
	<u>952,122</u>

This is close to the target exchange rate that was the spot rate on the day the original transaction took place (i.e. €1/US\$ 1.3221) and which would have cost US\$951,912.

**Paragraph
8.7.2, p 410**

Illustration: Currency option

Caldwell Ltd is a Hong Kong based company that exports goods to the Middle East. The company is tendering for a contract to supply specialist electronic equipment to the Government of Saudi Arabia. The tender is to be submitted in the near future, with the tender price quoted in Saudi Arabian riyals. The Government's decision will be made after two months and the time period for delivery of the equipment will be a further two months after the contract is signed. The contract price will be paid on delivery.

Caldwell's management would like to put in a competitive tender price, giving the company a 25% mark-up on incremental costs of \$14.75 million. All Caldwell's costs will be incurred in \$. The company wishes to minimise its exposure to short-term exchange rate movements. The order for the Saudi Arabian Government has been priced using a comparatively low profit mark-up because of the extremely competitive nature of the business. As a result the management is particularly concerned that unexpected movements in the exchange rate could eliminate the company's profit on the order.

The current spot exchange rate is riyal / HK\$ 2.1246, but the company is concerned that the riyal may weaken. The company's bankers are prepared to sell Caldwell an option to sell riyal at riyal / HK\$ 2.0798 to be exercised at any time over a 14-day period starting in four months' time. The cost of this option is 4.92 Hong Kong cents per riyal covered and payable in advance.

How could Caldwell use the currency option to hedge its exposure, and illustrate by considering the financial outcome if the riyal/ HK\$ exchange rate moves in four months' time to HK\$ 1.93 or HK\$ 2.22. (Consider both that Caldwell is awarded the contract and that Caldwell is not awarded the contract.)

Note. Since the Hong Kong dollar is pegged against the US dollar, Caldwell could have hedged its exposure by dealing in US dollar options.

As an exporter due to receive a large sum in a foreign currency in four months' time Caldwell does not want the riyal to weaken (i.e. does not want the dollar to strengthen) so the company can take up a position such that if the dollar does strengthen it will make a profit on the options deal. To do this Caldwell should buy a dollar call option. (An alternative strategy would be to buy a riyal put option. Buying a dollar call and selling a riyal put are effectively the same thing.)

Since an option is the right but not the obligation to buy or sell Caldwell does not have to exercise its option if it is not awarded the contract. Given the company's contingent exposure an option may be the preferred hedging strategy.

Approach

- (1) Importing or exporting?

Exporting

- (2) What is the value of currency that is exposed?

Riyals 8,865,035 (**)

(**) Caldwell's incremental costs are \$14.75 million. A 25% mark-up gives a target sales price of $\$14.75\text{m} \times 1.25 = \18.4375 million . This gives a target profit on the contract of $\$18.4375\text{m} - \$14.75\text{m} = \$3.6875\text{ million}$. At the option price offered (riyal / HK\$ 2.0798) the tender price should be $\$18.4375\text{m}/2.0798 = \text{riyals } 8,865,035$

- (3) What is the risk?

Caldwell will receive income from this contract in riyals, but its costs are in \$. If the riyal depreciates against the dollar, the profit margin (which is not very large) could be eroded or lost.

- (4) Buy a call or a put option?

The risk is that the riyal will fall in value against the dollar. The company will be selling its receipts in riyals in exchange for dollars. It should therefore buy a put option on riyals (or buy a call option on dollars) at a price of riyal / HK\$ 2.0798.

- (5) Expiry date for the option?

The option is an over-the-counter option, so the company should select as the exercise date a date by which time it will know whether or not it has won the contract. This will be in about four months' time.

Caldwell should therefore purchase an option to sell 8,865,035 riyals at riyal / HK\$ 2.0798 for \$18.4375 million. (If the contract is won, then in four months' time Caldwell will receive 8,865,035 riyals from the customer which it will want to exchange into dollars.)

- (6) What premium is payable?

Premium = $4.92 \text{ cents} \times 8,865,035 = \$436,160$

Outcome

If the company wins the contract and receives 8,865,035 riyals, it has a choice between:

- (a) letting the option lapse at expiry and selling the riyals at the current spot exchange rate, and
 (b) exercising the option to sell 8,865,035 riyals at the option exercise price of HK\$2.0798.

	Scenario 1	Scenario 2
Exchange rate – date of receipt	1.93	2.22
Exercise HK\$2.0798 option?	Yes	No
	\$	\$
Cash receipt (\$ million)	18,437,500	19,680,378
Contract costs	(14,750,000)	(14,750,000)
Option premium cost	(436,160)	(436,160)
Profit	<u>3,251,340</u>	<u>4,494,218</u>

If the option is exercised, the contract net profit (after payment of the option premium) is fixed at a minimum of HK\$3,251,340.

Without the option or any other form of cover if the exchange rate moved to HK\$ 1.93, the net contract profit would have been only $\$(17.109518\text{m} - 14.75\text{m} - 0.43616\text{m}) = \$1,923,358$.

If the contract is not won, it would still be worthwhile exercising the option if the spot rate is HK\$1.93. The option would enable the company to make 'windfall' exchange gains of $\$18.4375\text{m} - (8.865.035 \times 1.93) = \$1,327,982$. From this the cost of the option, the option premium of \$436,160 must be deducted to give a net exchange gain of \$891,823. However, a loss equal to the premium of \$436,160 is payable if the exchange rate is HK\$2.22. This would have been avoided if no cover had been taken out.

**Paragraph 8.8,
p 412**

Consider a UK company 'X' with a subsidiary 'Y' in France that owns vineyards. Assume a spot rate of £1/€1.6. Suppose the parent company 'X' wishes to raise a loan of €1.6 million for the purpose of buying another French wine company. At the same time, the French subsidiary 'Y' wishes to raise £1 million to pay for new up-to-date capital equipment imported from the UK. The UK parent company 'X' could borrow the £1 million and the French subsidiary 'Y' could borrow the €1.6 million, each effectively borrowing on the other's behalf. They would then swap currencies.

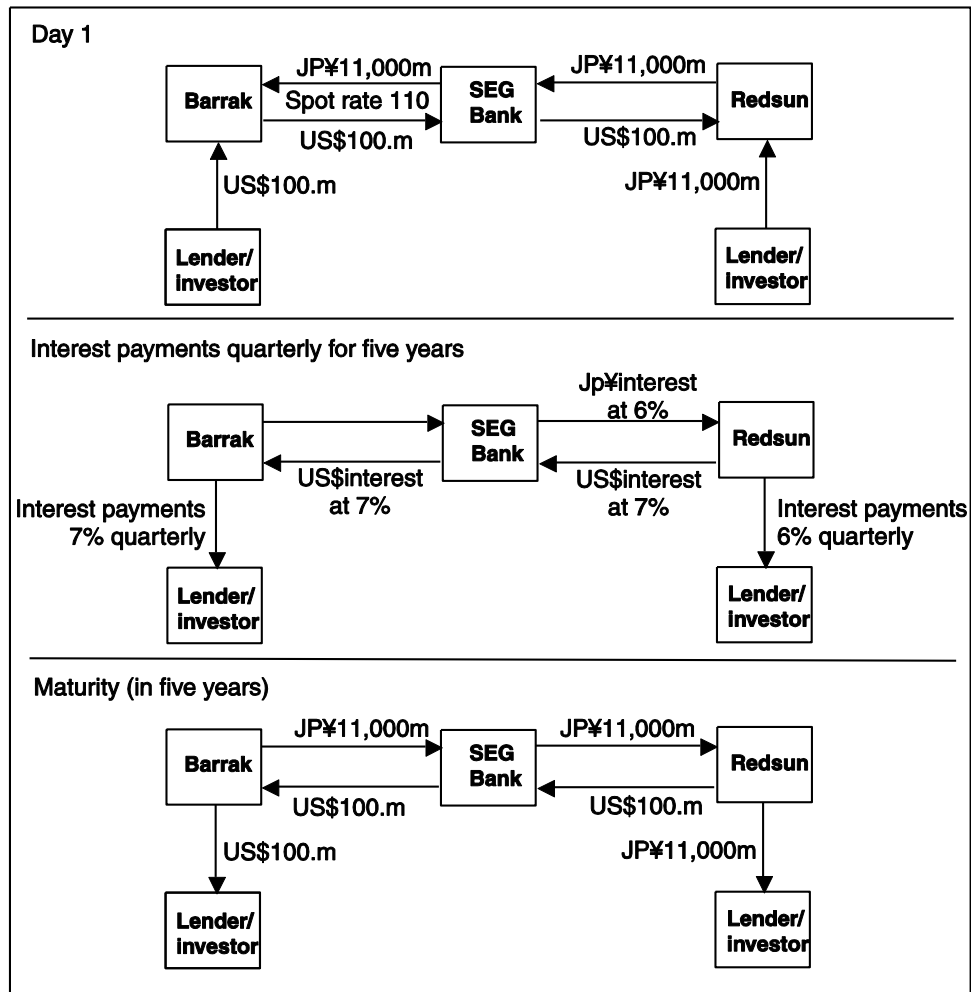
**Paragraph
8.8.1,
illustration
p 413**

A Japanese company Redsun Ltd wants to borrow US\$100 million for five years and a US company Barrak Corp. wants to borrow JP¥ 11,000 million, also for five years. SEG Bank is aware of the borrowing requirements of the two companies, and is also aware that Redsun could borrow in yen at a lower interest rate than Barrak, and Barrak could borrow at a lower interest rate than Redsun in US dollars. The current exchange rate is US\$1/JP¥110.

SEG Bank therefore sees an opportunity for a currency swap. Under the swap agreement, the bank would match the needs of the two companies, acting as an intermediary. There would be an agreement on:

- the amount of the principal to swap and the exchange rate. Barrak Corp. will borrow US\$100 million and Redsun will borrow JP¥ 11,000 million, and they will exchange these amounts on day 1 of the swap. It is assumed that Barrak will pay interest at 7% on the dollar loan and Redsun will pay interest at 6% on the yen loan.
- the period of the agreement. The swap will be for five years.
- the swap interest rates payable. Here it is assumed for simplicity that Barrak will pay 6% on the JP¥ 11,000 million received and Redsun will pay 7% interest on the dollars received in the swap.
- the frequency of the exchange of interest. Here it is assumed that interest payments will be exchanged under the swap agreement every three months.

A swap transaction would be completed as shown in the following diagram (ignoring the profit margin for SEG Bank on the transaction):



Ignore bank's profit

Day 1: Barrak borrows US\$100 million and Redsun borrows JP¥ 11,000 million and they swap these amounts.

Every quarter. Redsun pays interest to Barrak at 7% on US\$100 million, and Barrak uses this payment to make the interest payments on its US dollar loan. Barrak pays Redsun interest at 6% on JP¥ 11,000 million and Redsun uses this income to make the interest payments on its yen loan.

At the end of year 5 (end of the swap): The two companies re-exchange the capital amounts. Barrak pays JP¥ 11,000 million to Redsun and Redsun uses this to pay back the yen loan. Redsun pays US\$100 million to Barrak, and Barrak uses this to pay back its dollar loan.

The effect of the swap has been that in effect, Barrak has borrowed for five years in yen, and Redsun has borrowed for five years in US dollars, although the actual loans were in dollars for Barrak and yen for Redsun.

Exam practice question – DEF, p 430

DEF is a UK company that regularly trades with companies in the United States. It has a number of transactions listed below the cash settlement of which will be due in six months:

Receipts from US	US\$6 million
Payment to US	US\$10 million

The CEO of the company would like to hedge its US\$ exposure by either a forward contract or money market hedge. Relevant information is provided below:

- (i) Spot: £/US\$ 1.558
- (ii) 6 month forward rate: £/US\$1.500
- (iii) 6 month interest rates to DEF:

	<i>Borrow (%)</i>	<i>Investing (%)</i>
£	6.5	5
US\$	6.0	4

Required

Assume you are the CFO of DEF:

- (a) Advise the CEO which alternative should be used. Show all relevant calculations.
- (b) The company is also considering using options to hedge its exposure going forward. Discuss the advantages and disadvantages of currency options as a hedging tool compared with forward contracts.

Exam practice question – Tin Tin Trading, p 430

Tin Tin Trading (TTT) Limited is expecting to receive 20 million Foreign Currency (FC\$) in three months' time. The current spot rate is HK\$/FC\$ 23.2060 – 23.2298 (bank sell / bank buy).

Required

Estimate the net benefit / costs if the receipts are hedged by using an over-the-counter option from the bank, exercise price HK\$/FC\$ 23.16, premium cost 14.4 HK cents per 100 FC\$ and the spot rate in the three months moves to:

- (a) HK\$/FC\$25.20
- (b) HK\$/FC\$21.12
- (c) In addition to over-the-counter options, certain currency options are traded in the market. What are the advantages and disadvantages of hedging using a 'traded' currency option over a forward contract?

Answer to exam practice question – DEF, p 725

Money market hedge

Borrow £ now at 6.5%: $US\$4,000,000/1.04/1.558 = £2,468,648$
Convert to US\$ at spot = $£2,468,648 \times 1.558 = US\$3,846,154$
At the end of 6 months, US\$ available = $US\$ 3,846,154 \times 1.04 = US\$4,000,000$
At the end of 6 months, total £ cost = $£2,468,648 \times 1.065 = £2,629,110$
The cost of a money market hedge is lower by $(2,666,667 - 2,629,110) = £ 37,557$.

Answer to exam practice question – Tin Tin Trading, p 726		(a)	(b)
	HK\$/FC\$ spot rate	25.20	21.12
	Foreign currency receipts	FC\$20m	FC\$20m
	Premium (HK\$ per 100 FC\$)	0.144	0.144
	Option exercise price (HK\$/FC\$)	23.16	23.16
	When there is no hedging		
	Actual receipts	HK\$793,651	HK\$946,970
	When option is purchased as hedge:		
	Premium paid (FC\$20m/100 x 14.4c)	HK\$28,800	HK\$28,800
	Actual receipts * / +	HK\$863,558	HK\$946,970
	Net receipts	HK\$834,758	HK\$918,170
	Net benefit / (cost) over no hedging	HK\$41,107	(HK\$28,800)

* Since the option is in the money, it is exercised

+ Since the option is out of the money, it is not exercised