

AcF305 International Financial and Risk Management

Additional Explanations on Hedging FX Exposure

Self test questions

- Q1: What is translation/transaction/economic FX exposure?
- Q2: How to measure/manage economic FX exposure?
- Q3: Why manage FX exposure?
- Q4: How to hedge FX exposure using forward?
- Q5: How to hedge FX exposure using the money market?
- Q6: How to hedge FX exposure using options?
- Q7: How to hedge contingent claims?
- Q8: How to hedge recurrent exposure using swaps?

FX Exposure: Laker Airlines

- Late 1970s, US\$ was weak and demand for US holidays was increasing
- Laker Airlines purchased five more DC-10s, financed by issuing US\$ debt
- More than half of the revenues was in UK£
- In 1981, US\$ strengthened and Laker Airlines had to pay more UK£ to service its US\$ debt

Foreign Exchange Exposures

- Translation Exposure
- Transaction Exposure
- Economic Exposure

Translation Exposure

- **Arises from the need for (financial reporting) consolidation involving translation (conversion) of foreign subsidiaries' assets from local (i.e. foreign) currency to the home currency**
- **Translation exposure is really a function of accounting system for foreign assets and liabilities on consolidation, which the company uses.**

- Translation exposure clearly impacts both the consolidated P/L account and the consolidated balance sheet.
⇒ Effect on financial ratios, e.g. leverage
- But translation exposure does not affect the real cash flows, and in turn the true value of the firm in an economic sense.
- **For pure translation exposure**, ‘it is uncommercial to hedge a non-cash item with a cash one!’

Example of FX Translation Exposure

An UK company has an Australian subsidiary

A year ago the subsidiary had a net worth of A\$60m and was in the parent company's accounts at £40m as the exchange rate was A\$1.5/£ at the time.

The exchange rate has become 2.0A\$/£ and the subsidiary still has a net worth of A\$60m. However, it will be valued in the accounts of the parent company at £30m.

The subsidiary has lost 25% of its value in Sterling!!

Transaction Exposure

- Transaction exposure arises when, and as soon as, a contractual obligation of a future payment or receipt arises in a currency other than the home currency. It is sometimes referred as Contractual Exposure.
- Transaction exposure is concerned with how changes in exchange rates affect the value, in home currency terms, of anticipated cash flows denominated in foreign currencies relating to transactions already entered into
- Short-term economic exposure

Example of Transaction Exposure

An UK exporter just sold some goods to a Swiss company at an invoice price of SFr10m, and payable in 90 days. The current exchange rate is SFr1.80/£, so the company records the value of sale in Sterling at 5.5556m.

After 90 days, the amount of SFr the UK firm will receive is sure SFr10m.

However the value in Sterling is uncertain.

Hedging Transaction Exposure

Hedging instruments

- FX Forward
- Money Market
- Currency Swaps
- FX Options

Economic Exposures

- Economic (operating) exposure can be defined as the extent to which the firm's future cash flows (and its present value) are affected by unexpected changes in exchange rates
- It depends on the effect of exchange rate changes on the firm's competitive position; the significance of changes in the value of competitors' currencies, which appear unrelated to your operations, should not be underestimated
- **Long-term!**

Examples of Economic Exposure

Case 1: A UK car manufacturer sells half of its cars to continental Europe

Case 2: A pure domestic UK shoe manufacturer

Measures of Economic Exposure

- Market-based measure: sensitivity of equity return to exchange rate changes
- Internal measure of exposure: Sensitivity of historical cash flows to exchange rate changes
- Simulation

Managing Economic Exposure

- Selecting low-cost production site
- Flexible sourcing and production policy
- Diversification of the markets
- Product differentiation and R&D
- Financial hedging

However, changing operations

- Are much more expensive than financial hedging
- Are irreversible, i.e. it is very difficult to undo investment decisions

Why Managing FX Exposure?

- Risk management can reduce the volatility of the firm's real cash flows
- Risk management can increase the value of the firm only if
 - The firm's net cash flows increase, and/or
 - The firm's costs of capital are reduced
- Main arguments in favour of risk management are:
 - Reduce the costs of financial distress
 - Reduce corporate taxes
 - Reduce agency costs

Reducing Costs of Financial Distress

This depends on:

- The probability of encountering financial distress if the firm does not hedge
- The costs if such financial distress occurs

The probability of financial distress is determined by

- Fixed-claim coverage
- Volatility of income

The costs of financial distress:

- If the financial distress leads to bankruptcy, the firm would face substantial legal and accounting costs
- With high probability of financial distress, the following costs can be incurred:
 - Increased costs of capital
 - Higher salaries demanded by employees
 - Loss of customers who value a long-term commitment from the company

Reducing Corporate Taxes

Reducing volatility of earnings through risk management can reduce corporate taxes if the company's effective tax schedule is convex, i.e. average tax rate is rising as pre-tax income rises

Is the corporate tax schedule convex?

Reducing Agency Costs

- Conflict between shareholders and bondholders
 - ⇒ Shareholders have the incentive to undertake risky projects with possibly negative NPV OR not to undertake risk-reducing projects with positive NPV
 - ⇒ Bondholders recognise and anticipate these potential conflicts of interest and, adjust terms of their loans appropriately
 - ⇒ Risk management reduces the volatility of the firm's cash flows, one can reduce the potential for conflicts of interest, and one can thereby reduce the cost of borrowing

- Conflict between management and shareholders

Through their wages and bonus plans, the wealth of managers depends on to a large extent on the performance of the firm

Risk management reduces the managers' exposure, and thus reduces wage bill and lead to the optimal investment policy

Forward Market Hedge

- Hedging using forward contract can fix the HC value of the firm's FC cash flows
- It removes the potential for losses but it also removes the opportunities for profits.
- When the opportunities to profit have been lost, even if the treasurer had engineered a perfect hedge using forward (i.e. all FX exposure has been removed) it would appear that the treasurer made a wrong decision

Hedging a FC Cash Inflow

- The company that is expecting to receive FC payment in the future sells FC forward (short).

- Example 1

Boeing has just sold 2 Boeing-747s to British Airways for £100m payable in one year's time

Boeing can hedge this cash flow in £ by selling £ forward (short). The one-year forward rate is \$1.60/£, so Boeing will receive \$320m no matter how exchange rate \$/£ moves

Hedging a FC Cash Outflow

- The company that is going to make a FC payment in the future should buy FC forward (long).
- Example 2

A UK company imported some goods from Switzerland is due to pay SFr100m in six months

The company can hedge its exposure to SFr by buying SFr forward. The six-month forward rate is SFr1.54/£, so the company is required to pay £64.94m

Money Market Hedge

- Forward rates (markets) do not exist in many currencies; even for major trading currencies (e.g. \$, Euro, £, Yen, etc.), the markets for maturity beyond one year are thin with large bid-ask transaction spread.
- A money market hedge involves simultaneous borrowing and lending in two different currencies to lock in the HC value of a future FX cash flow.

Example 1, Cont'd Short a synthetic £ forward contract for \$

The current spot \$/£ rate is 1.61 and the one-year interest rates are 12% and 10% in the UK and in the US respectively

Boeing can use the money market to hedge its £ exposure. The transactions and cash flows are as follows:

At time 0

- Borrow £178.57m $\left(= \frac{200}{1+0.12}\right)$
- Convert borrowed £ into \$: \$287.50m (178.57×1.61)
- Deposit \$ in a US bank

At time one year

- Receive £200m from British Airways
 - Repay £ loan back with interest (£200m)
 - Receive \$316.25m from the US bank
-
- Boeing will receive \$316.25m no matter what the \$/£ exchange rate in one year's time is.
 - A money market hedge effectively enables Boeing to create a “home made” forward contract, and the effective forward rate is \$1.58125/£

Example 2, Cont'd

The UK firm is required to pay SFr100m, it can create a six-month deposit in SFr

If the SFr six-month interest rate is 6%, the amount of deposit necessary in SFr is:

$$\frac{100\text{m}}{1.06} = 94.34\text{m}$$

With the spot rate of SFr1.50/£, the firm needs to borrow £62.89m to purchase the required SFr.

Long a synthetic SFr forward contract for £

The money market hedge can be summarised as:

At time 0

- Borrow £62.89m
- Convert into SFr: 94.34m
- Deposit SFr94.34m

At time $t = \text{six month}$

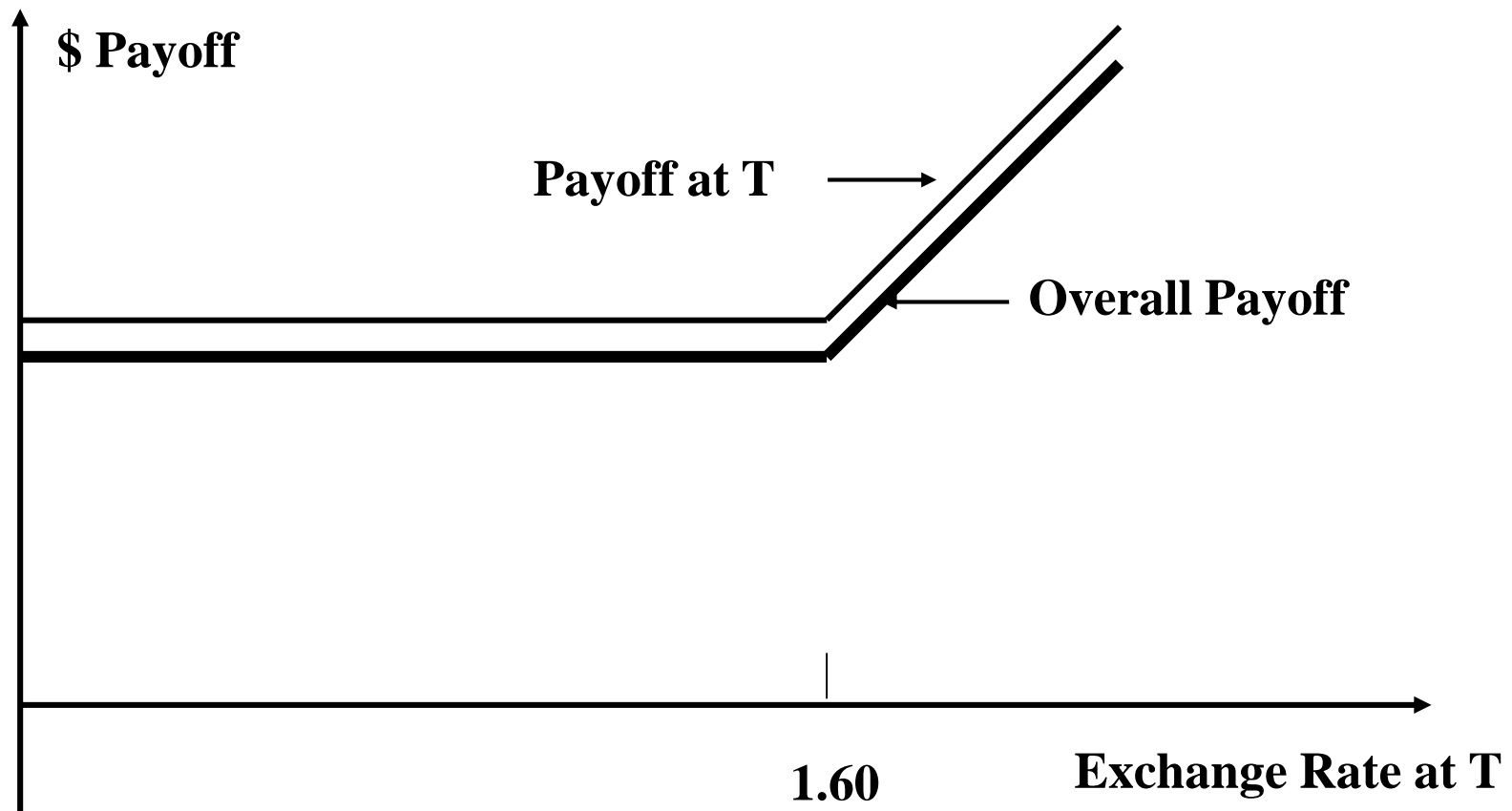
- Close SFr deposit account: SFr100m
- Pay the Swiss supplier: SFr100m
- Pay back the £ loan with interest: £65.09m

FX Option Market Hedge

- Using forward (or futures) and money market can result in a situation where it would have better to remain unhedged if the currency moves in a favourable direction
- Currency options can eliminate the risk of exchange losses but unlike forward contracts they allow the company to make gains from favourable exchange rate movements
- OTC versus Exchange-traded FX options

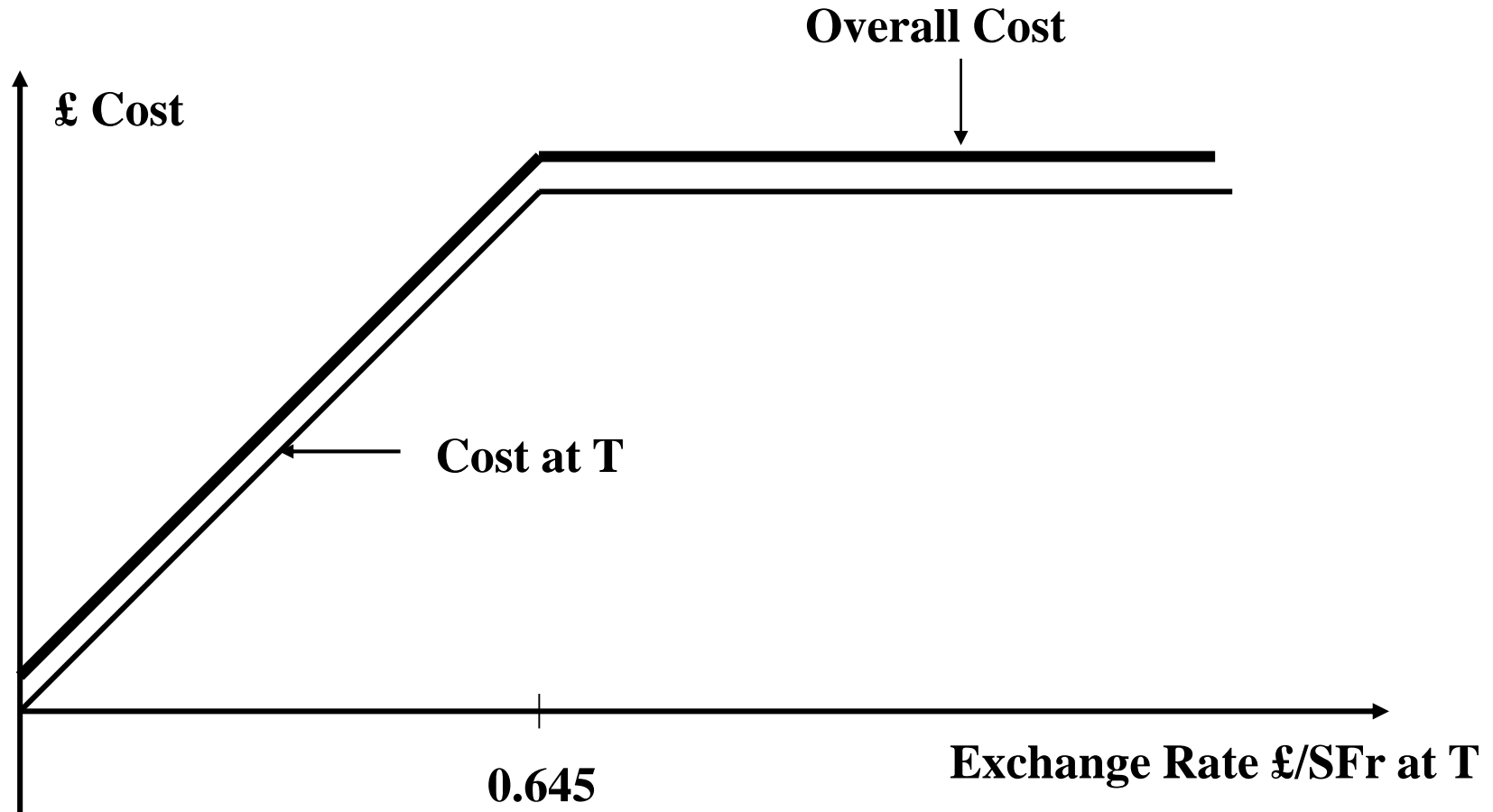
Example 1 Cont'd

Boeing can buy the put option to sell £2000 millions with strike price of \$1.60/£. The premium is 3 millions.



Example 1 Cont'd

The UK firm can buy the SFr call option with strike price of £0.645/SFr; the premium is £1 million



Hedging Contingent Claim

- Contingent Exposure refers to a situation in which the firm may or may not be subject to FX exposure.
- **Example 3**
Suppose General Electric (GE) is bidding on a hydroelectric project in Canada. If the bid is accepted, which will be known in three months, GE is going to receive C\$100m to initiate the project

GE may or may not face FX exposure depending on whether its bid will be accepted

- GE can sell C\$100m forward short to hedge the exposure
 - If its bid is accepted, no problem
 - If its bid is rejected, GE has an unhedged short forward position in C\$100m
- GE can buy three-month put options on C\$100m.
 - The bid is accepted
GE is protected against the depreciation of C\$, but makes potential gain if C\$ appreciates
 - The bid is rejected
GE has a long naked put position

Hedging Recurrent Exposure

- Companies often have to deal with a sequence of accounts receivable or payable in terms of a foreign currency
- Such recurrent FC cash flows can be hedged using a currency swap contract or a portfolio of FX forwards

Example 4

Boeing is scheduled to deliver an aircraft to British Airways at the beginning of each year for the next five years, starting in 2001. British Airways, in turn, is scheduled to pay £10m to Boeing on 1 December of each year for five years, starting in 2001.

Boeing is exposed to the \$/£ exchange rate risk. Boeing can hedge its £ exposure by entering a currency swap

Under a swap contract, Boeing delivers £10m to FI and takes delivery of \$16m on December 1 of each year for five years

Example 5

- Laker Airlines bought five DC-10s, financing them by issuing 10-year US\$ debenture
- Laker Airlines can enter into a currency swap
- Currency swap transforms a \$ bond into a £ bond