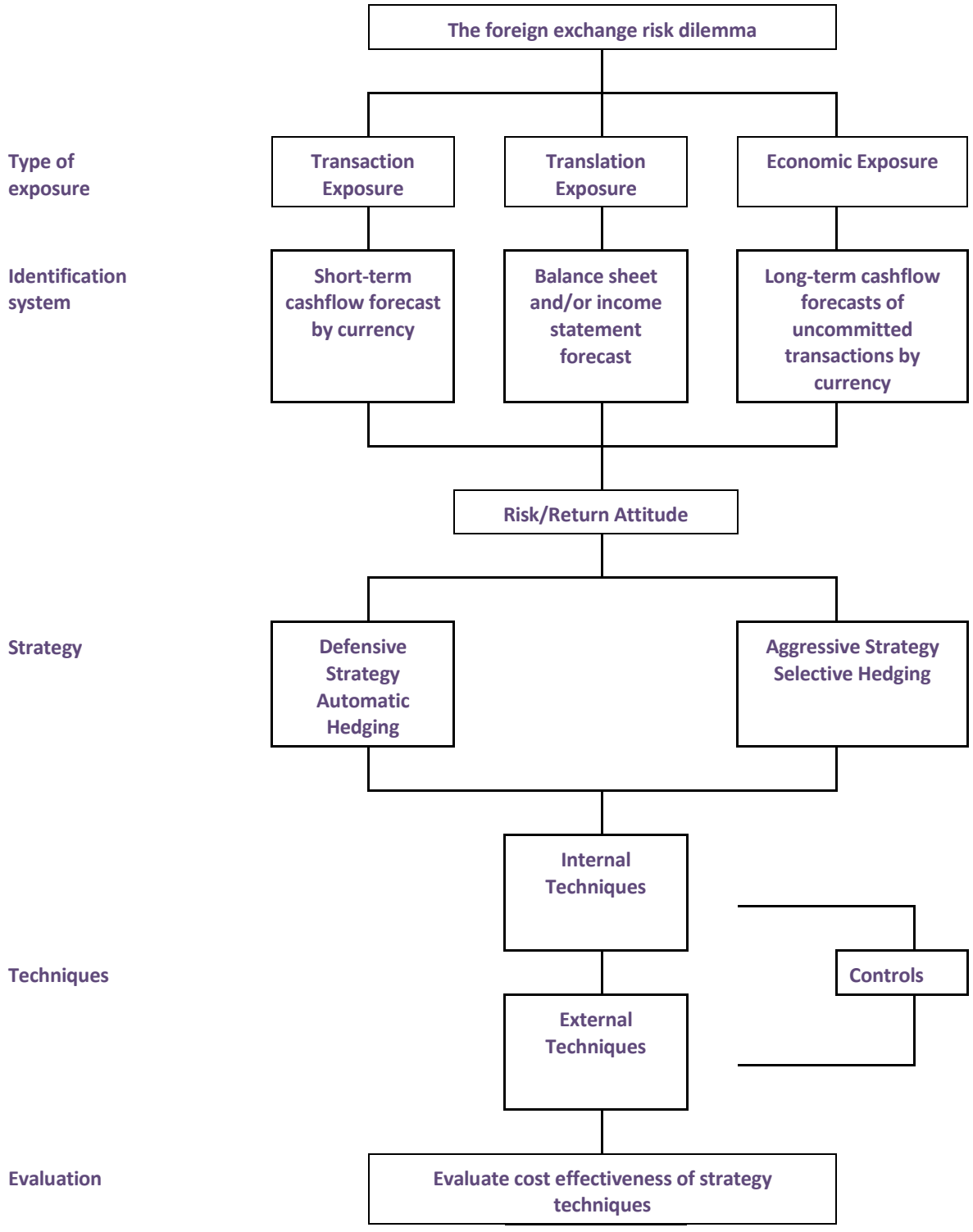
Foreign Exchange (FX) Strategies and Techniques

In simple terms, Foreign Exchange Exposure occurs when business takes place in a currency other than your base currency. But not necessarily only then: any company selling products overseas or importing goods from abroad has a foreign exchange exposure. Indeed, even a company manufacturing and selling only in one country can have a significant degree of economic exposure to changing foreign exchange rates. It must be noted that a sterling based company doing business in the domestic marketplace will suffer foreign exchange exposure if any of its competitors are based in a foreign country even though prices are in sterling. For example, a UK video manufacturer making equipment sourced entirely from UK parts and sold entirely to the UK market has a Japanese Yen exposure if the company has Japanese competitors, because a weak Japanese Yen gives Japanese competitors in the UK market an advantage. For a group such as ICI, with manufacturing plants in 40 countries, selling organisations in another 60 and sales in at least 150 of the 160 or so sovereign states, the management of foreign exchange risk has long been a task of the treasury function.
The following table illustrates the foreign exchange problem.



From the table the following questions are highlighted:

1. What types of exposure are to be managed? There are three main types of risk which we will consider in a later section. We must analyse these different forms of exposure and the company should have a clear policy and direction from the Board on how to

deal with its exposure. Companies may differ in the way they conceptualise foreign exchange risk (especially economic exposure). The industry type will sometimes shape the way the treasurer views the exposure. Exposure can give rise to cash flow effects, but can also simply affect the accounting or financial statements of the company. Since these positions are subject to rapid change. The possibility of changes in foreign currencies needs to be anticipated.

2. What sources of financial information should your company make use of identifying their exposure? What currency/interest rate expertise input should be used when marketing/purchasing decision are made? How effective are the company and its advisors at forecasting future currency rates? The time horizon of the information sources is important. The extent to which a company believes it can forecast exchange rate movements will be a basic determinant of its risk management positions.
3. What is the company's attitude to risk? The company may choose to hedge everything or nothing. This will be discussed in the next section.
4. Which exposure reducing techniques should it employ? What knowledge of instruments and what they achieve does the treasurer have? Should we use internal or external instruments? What controls should be placed on these procedures?
5. Judgement of risk and reward and feedback of the results of the strategy adopted.

Answers to these questions will build up a picture of what is required and will highlight the conflict which will need to be resolved in order to settle on a sensible and efficient approach to exposure management.

Measuring Foreign Exchange Exposure

Accounting and Economic Exposure

Foreign exchange exposure may be defined as the degree to which a company is affected by changes in exchange rates. But there are different types of exposure which we must consider. To begin with consider accounting and economic exposure. Accounting exposure arises from the need for reporting and consolidation to convert the financial statements of foreign operations from local currencies to home currency. Economic exposure relates to the economic consequences of currency changes on a company's value.

To develop an effective strategy for managing currency risk, management must determine what is at risk. This determination requires an appropriate definition of FX risk. But there is a major discrepancy between accounting practice and economic reality in terms of measuring exposure. Accounting measures of exposure focus on the effect of currency changes on previous decisions of the firm as reflected in book values of assets and liabilities incurred. However, book values and market values which reflect future cash flows typically differ.

Retrospective accounting techniques cannot account for the economic effects of a devaluation/revaluation on the value of a company because these effects are prospective in nature. Economic exposure is the extent to which the value of the company (as measured by the present value of its expected cash flows) will change when exchange rates change. Financial theory suggests that managers should be concerned with economic reality since managers are assumed to be maximising the value of the firm.

In practice many managers are preoccupied with potential accounting based currency gains or losses. This makes sense if their earnings are tied to earnings and not market value or if they believe the stock market cannot properly appraise the value of the firm. However, there is a

large body of evidence that suggests that the stock market can `see through' accounting manipulations.

We can further consider exposure under the three main headings which companies would analysis their FX problem - `**transaction**' exposure, `**economic**' exposure and `**translation**' exposure - although different types of `economic' exposure such as `Competitive' exposure are sometimes considered separately.

Transaction Exposure

Transaction exposure materialises when, and as soon as, a contractual obligation arises in a currency other than your reporting currency, i.e. the booking of a transaction at one rate of exchange whereas the eventual receipt or payment of cash comes in at a different rate of exchange. The exposure may well not appear immediately, or indeed ever, in the accounting records. Transaction exposure can be considered a short term economic exposure. For example, consider goods sold by a UK manufacturer at an invoice price of DKR 500,000 at a time when the FX rate is DKR 1.90 to £1.00; payment is due in 90 days. After 90 days the rate is DKR 2.00 to £1.00 (i.e. sterling has strengthened). The value of the sale initially recorded in the books of the manufacturer was £263,157.89 but they receive only £250,000. This is called a closed exchange as it has been completed. An open exchange is a transaction across two currencies which has not yet been completed.

The increase in the volatility of all currencies has made transaction exposure very dangerous, but it is comparatively easy to identify because it is specific and discrete, being linked with individual items of business. It may also be used to describe transactions which are confidently expected to be booked soon, and transactions which are forecast, as long as the forecast is a reasonably close one. There is a point in time - not clearly definable - when 'transaction' exposures merge into 'economic' exposures. In general, transaction exposures are relatively easy to identify. For example, a US company exporting to a German customer in Euros has a transaction exposure to the US dollar/Euro exchange rate on the money they are due to receive for sales they have already made. Similarly, a French importer is at risk if sterling rises and they have invoices to pay in sterling. Transaction exposures arise on cash movements, including dividends and interest as well as sales and purchases, and affect the profit and loss account in a very direct way.

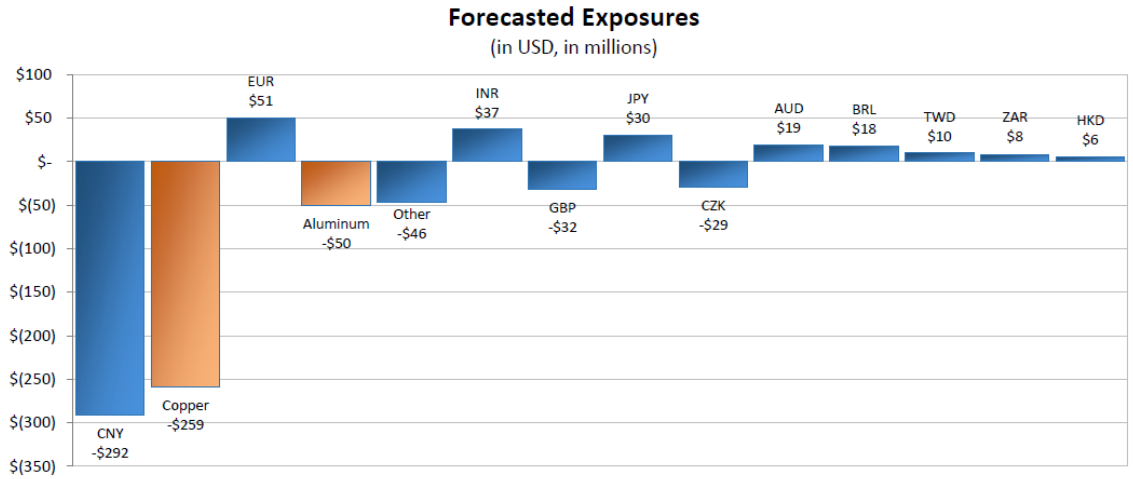
Transaction exposure is by its nature of uncertain timing, and its cover should not be considered in a static or item by item manner. The exposure in an on-going business is ever evolving - changing day by day or even hour by hour - as business is won, orders are placed, payables paid, receivables received, or cover taken. It is not often that treasurers can say at any particular time that they have covered all their foreign exchange exposure. It is more efficiently covered by taking a broader, overall and forward looking view. Companies usually try to determine the net amount of inflows and outflows in each currency and determine the overall exposure to those currencies. For example, if a UK company has two subsidiaries X and Y and subsidiary X has a net cash inflow of €1,000,000 and subsidiary Y has a net cash outflow of €1,250,000, the consolidated net cash outflow is €250,000 for the chosen period. Therefore, any currency movement between the € and the £ will be offset in the two subsidiaries apart from the outstanding consolidated flow. This information will of course usually be uncertain and companies have sometimes to deal with possible ranges of cash inflows and outflows. Therefore, for most companies they will try and estimate their FX transaction exposure. This

does mean that in addition to the FX risk there is the possibility the forecast can be wrong. After the net cash inflow or outflow is established the company may try to predict possible ranges for each currency against the home currency to try and get some estimate of the level of exposure. The following table is an example of a firm forecasting their transaction exposures over a 12-month period.

Table

Forecasted Exposures

The forecasted revenue and expenses are based on the forward curve for each currency / commodity over the next 12 months.



Another important consideration for a treasurer is currency correlations. If a UK company has costs in US $ but its income is mainly in Canadian $s. It would appear that the company has two currency exposures to deal with the US$/£ and the C$/£. But assume the Canadian $ and US$ values to the £ are highly positively correlated. This means that when the US$ appreciates against the £ the Canadian $ will also appreciate by about the same degree and similarly for any depreciation. Two highly correlated currencies can act as the same currency even if they are not 100 per cent correlated. Table shows some currency correlations based on historic data.

Table Currency Correlations

Currency Correlations

	AUD	CAD	CHF	CLP	DKK	EUR	GBP	HUF	IDR	MXN	MYR	NOK	NZD	PLN	RUB	SEK
AUD	1.00	0.62	0.35	0.42	0.38	0.38	0.43	0.43	-0.07	0.57	0.13	0.40	0.83	0.42	0.53	0.41
CAD	0.62	1.00	0.48	0.34	0.51	0.51	0.46	0.44	-0.15	0.48	0.06	0.51	0.56	0.44	0.46	0.53
CHF	0.35	0.48	1.00	0.01	0.81	0.81	0.65	0.48	-0.13	0.18	-0.08	0.53	0.35	0.53	0.30	0.62
CLP	0.42	0.34	0.01	1.00	0.10	0.10	0.09	0.34	0.05	0.47	0.33	0.40	0.44	0.29	0.44	0.28
DKK	0.38	0.51	0.81	0.10	1.00	1.00	0.52	0.64	-0.15	0.35	0.04	0.69	0.39	0.76	0.46	0.74
EUR	0.38	0.51	0.81	0.10	1.00	1.00	0.52	0.64	-0.14	0.35	0.04	0.69	0.38	0.77	0.46	0.74
GBP	0.43	0.46	0.65	0.09	0.52	0.52	1.00	0.36	-0.05	0.22	0.04	0.39	0.37	0.36	0.28	0.30
HUF	0.43	0.44	0.48	0.34	0.64	0.64	0.36	1.00	-0.09	0.46	0.09	0.54	0.39	0.73	0.53	0.53
IDR	-0.07	-0.15	-0.13	0.05	-0.15	-0.14	-0.05	-0.09	1.00	-0.03	0.27	0.01	-0.13	-0.10	-0.04	-0.05
MXN	0.57	0.48	0.18	0.47	0.35	0.35	0.22	0.46	-0.03	1.00	0.20	0.37	0.55	0.52	0.52	0.35
MYR	0.13	0.06	-0.08	0.33	0.04	0.04	0.04	0.09	0.27	0.20	1.00	0.30	0.11	0.15	0.22	0.20
NOK	0.40	0.51	0.53	0.40	0.69	0.69	0.39	0.54	0.01	0.37	0.30	1.00	0.44	0.63	0.47	0.82
NZD	0.83	0.56	0.35	0.44	0.39	0.38	0.37	0.39	-0.13	0.55	0.11	0.44	1.00	0.39	0.53	0.43
PLN	0.42	0.44	0.53	0.29	0.76	0.77	0.36	0.73	-0.10	0.52	0.15	0.63	0.39	1.00	0.59	0.60
RUB	0.53	0.46	0.30	0.44	0.46	0.46	0.28	0.53	-0.04	0.52	0.22	0.47	0.53	0.59	1.00	0.45
SEK	0.41	0.53	0.62	0.28	0.74	0.74	0.30	0.53	-0.05	0.35	0.20	0.82	0.43	0.60	0.45	1.00

Based on the Company's exposure profile (where foreign exposures are in both revenues and expenses), correlation drives the amount of diversification benefit the company expects to see. For example, if CAD weakens against USD, it is likely that the other major net profit currencies will also weaken (NOK, GBP, AUD).

SOURCE: Data based on six month historical period (which is the weighted average time of a hedging program that covers one operating year).

Another related type of exposure is called pre-transactional exposure which occurs before a transaction has taken place. Any time a company produces a price list, or markets a bid or tender in a currency other that their home currency, they are leaving themselves open to the effect of currency movements making the prices in the list or tenders worth less in the home currency. This type of exposure is contingent on the transaction being carried out.

Translational Exposure

Translational exposure is the risk of the net worth of a company changing because of the fluctuating home valuation of assets and liabilities denominated in foreign currencies. It arises from converting a multinational's overseas subsidiaries translated from local currency to home currency prior to consolidation with the parent's financial statements. This may include foreign currency loans and investments. If the subsidiary's balance sheet is unchanged from one year-end to the next, the subsidiary is unaffected. However, the group may not be due to movements on foreign currency. For example, at a particular time, a UK company has an Australian subsidiary which has a net worth of A$6m and is in the parent company's book at £4m because the exchange rate used was A$1.5 = £1. But in the due course of time when the exchange rates change to A$2 = £1 then the Australian subsidiary will be valued in the accounts of its parent at £3 (A£6m @ A$2 = £1). In Australia the unit is still worth A$6. Nothing has changed. It is still generating its normal profit, but looked at in sterling terms it has lost 25% of its worth. If we wish to protect against this risk, we must consider selling Australian dollars.

Translation exposure does not represent real movements of cash between different currency systems, but can clearly impact both the consolidated profit and loss account and the consolidated balance sheet. The balance sheet effects are often dismissed as illusory since they have no cash impact. However, the level of assets and liabilities can affect financial ratios

calculated using balance sheet figures which causes practical problems where the company has restrictions on its level of borrowings placed by covenants. Translational exposure can be managed by fully matching assets and liabilities in the overseas currency, whenever possible. But this may result in fluctuations in the levels of consolidated gearing. There is also the problem of trying to match assets to liabilities in countries where there are no sophisticated capital markets or in other cases a perfect match is not necessarily desirable. Companies have attempted to get round this problem by either using grouping currencies together and a proxy currency or a basket currency.

If currency values change foreign exchange translation gains or losses may result. Assets and liabilities that are translated at the current (post change) exchange rate are considered to be exposed; these translated at a historic (pre change) exchange rate will maintain their home currency values and hence are not exposed. Translation exposure is the difference between exposed assets and exposed liabilities. A greater amount of exposed assets than liabilities will give rise to a positive exposure while a greater amount of liabilities than assets will give rise to a negative exposure. The amount of translation exposure depends on the degree of foreign involvement of a multinational's overseas subsidiaries, the location of these foreign subsidiaries and the correlation between that currency and the home currency and the methods for accounting for the translation.

Companies have at least three available methods for managing their translation exposure:

- adjusting fund flows;
- entering into forward contracts; and
- exposure netting.

The basic hedging strategy for reducing translation exposure is to increase hard currency (likely to appreciate) assets and decrease soft currency (likely to depreciate) assets, whilst simultaneously decreasing hard currency liabilities and increasing soft currency liabilities.

Economic Exposure

The definition of 'economic' and 'competitive' exposures varies, and is less important than the underlying concepts. A 'transaction' exposure is one which is readily identifiable in the currency in which it arises. Once the exposure is uncertain, or not genuinely in the currency in which the transaction is settled, it is usually called an 'economic' exposure rather than a transaction exposure.

The longer term change in the value relationship between two currencies gives rise to economic exposure. It is the subtlest and insidious of all the types of exposure, and has the potential to ruin a company, but to do it in a very surreptitious manner. It arises when it is thought that future cash flows will be affected by changing exchange rates. Economic exposure can thus be thought of as the extent to which the present value of future cash flows is affected by exchange rate movements. Transaction exposure is a subset of economic exposure. However, economic exposure is taking place on a continuing basis, it has no time limit, nor a defined direction of movement. It is fairly easy to outline the influence of the expected change in exchange rates on forecasted sales columns. But the significance of changes in the value of competitors' currencies, which appear unrelated to your operations, should not be underestimated. It is important to appreciate a competitor's ability to take a greater market share or larger profit because changing exchange rates have moved in their favour.

The term 'economic' exposure may be used to describe any exposure which is forecast to become a transaction exposure in due course - although if the forecast can be made fairly accurately, this would often be regarded rather as a transaction exposure. The simplest example is when a forecast transaction does not occur. Next year's sales budget for example (as opposed to next week's) can only be an estimate. If we forecast sales in Euros of 500 million but only achieve 300 million, the difference of 200 million is an exposure which we expected but which never occurred. It would therefore have been disadvantageous to have hedged the whole exposure. Another example is where the currency underlying the economics of the goods or service is not the same as the currency of payment. Suppose for example that a company is paying for fuel in French Francs but the price of the fuel in the medium term is linked to the US dollar - because that is the currency in which oil is traded internationally. The fuel purchases which have already been invoiced but not paid clearly represent a Euro risk - a transaction exposure. But future purchases represent a US dollar risk - an economic exposure. If the dollar strengthens, the cost will rise, so that the company must buy dollars if it wishes to hedge against this risk.

Economic exposures relate directly to the competitive position of a firm within the ever more global trading community. For example, both Jaguar and Porcshe sell cars to the US market where they compete at the luxury end. Both clearly have an economic exposure to the level of the US dollar against their home currencies. They also have, because of the cost base in their manufacturing territories. As mentioned at the outset, an economic exposure to FX rates can exist for an indigenous industry.

If economic exposures are often more significant than transaction and translation risk, and if failure to identify them can lead to incorrect treasury decisions, why are they often not managed? There are probably three main reasons.

1. Economic exposures are not reported.

Economic effects are not reported and there is often no clear management responsibility for them, because they fall between the finance and marketing functions. They can therefore easily be unreported by default. Well-managed companies do report these risks, thereby ensuring that they are controlled.

2. Economic exposures are not quantified

It is certainly true that economic risks cannot be accurately measured in the same way was most financial information. This does not mean, however, that they cannot be estimated. Even if the economic risks are not quantified in detail, a simple schedule can be prepared showing the currencies to which the business is economically exposed. To look at the extent of economic exposure, it will be necessary to draw up a cash flow forecast built up by currency - netting receivables and payables - over a time frame which is consistent with planning and budgeting horizons. We can then subjectively predict how these statements will change with forecast exchange rates. Economic exposure must be explicitly recognized in planning decisions.

3. Economic exposures `cannot be hedged'

In general, the question to be asked is: at each point in the future given various changes in exchange rates internationally, what are the net effects in terms of my base currency? Corporate exposure encompasses of exposure, mentioned above, but in some cases is ignored because of the time, cost or complexity of trying to eliminate every currency risk from a business.

To the extent that exchange rate changes bring about relative price changes the firm's competitive situation will be altered. As a result, management may wish to adjust its production process or its marketing mix to accommodate the new set at relative prices.

Hedging Currency Exposure

In the previous section we identified three different types of risk. This section considers techniques which are used to manage this type of risk. Some of the hedging methods we will describe are internal, i.e. actions taken within the company to reduce currency risk without resorting to outside financial institutions. These methods are usually in the way that the company organises its international transactions. Such techniques have little direct cost but may have implications for the operating efficiency of the company itself. Most of the internal techniques are applicable to only international trading organisations. External techniques involve the use of outside contracts purchased from banks or exchanges and are aimed at insuring against the possibility of losses that internal hedges were not able to eliminate. We have covered these hedging instruments in previous chapters and we now look at the application of these instruments to FX risk.

Internal Hedging Methods

- Matching and Netting

The most obvious approach to the FX problem would be to develop a system that allows the company to track all cash flows in different currencies so that outflows in one currency can be matched against inflows of the same currency, reducing the FX exposure to the net amount. Matching involves offsetting all receivables and payables by currency so that only the net exposure to each foreign currency needs to be hedged. It can happen within a group or with outside companies. For example, assume a UK company has continual payments in Euros for goods imported. Consequently, the company is exposed to movements between the € and £. Assume the UK company also exports goods to other Belgian companies which are paid for in €. The € cash inflows could be matched with the payments in € and only the net amount would need to be hedged. If the company has no receivables in Euros but has receivables in Marks and the Euro is highly correlated with the Euro, they may still be able to offset receipts against payments. This is called parallel matching but obviously assumes that the Mark and the Belgium Franc will continue to move together.

This policy has clear advantages apart from the obvious one that since only unmatched value are hedged, currency flows are reduced. This can reduce bank charges and eliminate exchange spread. Where matching is centralised, co-ordination of the group's exposure allows greater management control including tax planning. The greater the international trade, the greater the matching possibilities. The problems with this approach are that the amount and timing of the cashflows may be imprecise. Where centralised, intercompany account reconciliation must be accurate and to a previously agreed time. Currency cashflows can be unmatched by both an amount and timing. Matching requires accurate cashflow forecasts of the timing and amount of foreign currency settlements.

Netting of inter-company cash flows occurs within a group of companies. It involves offsetting exposures in one currency with exposures in the same or another currency where exchange rates are expected to move in such a way that losses (gains) on the first exposed position should be offset by gains (losses) on the second currency exposure. The assumption underlying exposure netting is that the net gain or loss on the entire currency exposure portfolio is what matters rather than gain or loss on any individual monetary unit.

It involves offsetting a long position in a currency with a short position in the same currency. If the exchange rate movements of two currencies are positively correlated, then a firm can offset a long position in one with a short position in the other and if the currency movements are negatively correlated then short (or long) positions can be used to offset each other.

For example, a group has subsidiary companies in Hong Kong, New Zealand and USA. It has a centralised treasury which acts as a clearing centre and takes responsibility for all external fund flows through the subsidiary companies. The total currency flows at one point in time are as follows in Table.

Table

The Hong Kong Subsidiary	HK$	US$	NZ$
Payables	24,000,000	5,000,000	
The US Subsidiary			
Payables	-	-	10,000,000
Receivables	20,000,000	10,000,000	-
The New Zealand Subsidiary			
Payables	10,000,000	4,000,000	-
Receivables	-	5,000,00	8,000,000
The total unmatched funds for hedging receipts/(payments)	(14,000,000)	6,000,000	(2,000,000)

Without a centralised system there are different transactions with a total value of. With matching only three transactions are necessary with a value of. It could be possible that all cash flows would be matched with the result of no unmatched cash flows needing to be hedged. This is unlikely due to timing differences.

- Leading and Lagging

A process for adjusting the timing of the interest payments and receipts. Leading refers to making payments early, lagging involves delaying payments. This technique could only be used for internal company transactions as lagging payments to third parties or asking companies to lead could adversely affect relationships with third parties. It enables the group to take advantage of expected devaluations or revaluations of the appropriate currencies.

- **Pricing Considerations**

A simple way to avoid the problems of FX would be to change the currency of invoicing of supplier or customer to the home currency or the currency of the costs (risk shifting). This obviously requires agreement from the suppliers or customers as the company is simply transferring their currency risk onto their supplier or customers. They may require compensation for this. Is it possible to gain from risk shifting? Not if one is dealing with informed customers or suppliers. If a customer agrees to a price it will be because it knows it can buy the currency forward so that its maximum price is known.

The general rule on credit sales overseas is to convert between the foreign currency price and the home currency price by using the forward rate, not the spot rate. This rule recognised that a pound today (or any other currency) is not the same as a pound tomorrow.

For example, Tomberg is a Swedish company which produces paper. It is a major exporter to Germany, where its main competition is from other Swedish exporters. All of these companies invoice the products in the Swedish Krona (the home currency). If the Euro strengthens, German customers can purchase Tomberg's goods with fewer marks. Since Tomberg's competitors also invoice their exports in Krona, Tomberg will not gain a competitive advantage. Nevertheless, the overall demand for the product could increase because it is now less expensive to German customers. If the Euro weakens, German customers will need to pay more Euros to purchase Tomberg's goods. Since Tomberg's competitors also invoice their exports in Euros, Tomberg may not necessarily lose some of its market share. However, the overall German demand for paper could decline because the prices they pay for them have increased. If the Krona remained weak for several years, some companies in Germany may begin to recycle paper, so that customers could avoid purchasing Krona with weak Euros. That is, the Swedish exporters could be priced out of the German market over time if the Euro continually weakened.

Currency Protection Clauses

Protection clauses in the sales or purchase contract fix the range within which a FX rate may move without any adjustment to price. If exchange rates move outside a prescribed band they can be adjusted. This can be particularly useful in pricing long term contracts. However, it is obviously dependent on detailed negotiations with the supplier or customer who may demand similar protection.

Margin Protection Clauses

Margin protection is a process of adjusting selling prices to offset cost escalations due in this case to currency fluctuations. Where these is a cost increase the company can pass this onto the buyer resulting in a protected margin. The effectiveness of this system is obviously dependent on the competitive position of the company in the market since in a competitive market customers would not agree to this margin protection as they would simply seek alternative suppliers. Also, the time lag between changes in costs and effects on income is often uncontrollable. The process is illustrated below:

External Hedging Methods

Money Market Hedge

A money market hedge involves simultaneous borrowing and lending activities in two different currencies to lock in the value of a future FX currency cash flow. This is best illustrated in an example.

EXAMPLE MONEY MARKET HEDGE

Consider a UK company, Paradise plc, which purchases raw materials from a Danish supplier with payment due in six months' time. The current spot rate of exchange is DKR 1.5 per £. If the company feels that sterling will strengthen over the next six months it may choose to do nothing. Alternatively, if they desire certainty, or feel that sterling will weaken it may be decided to hedge their exposure.

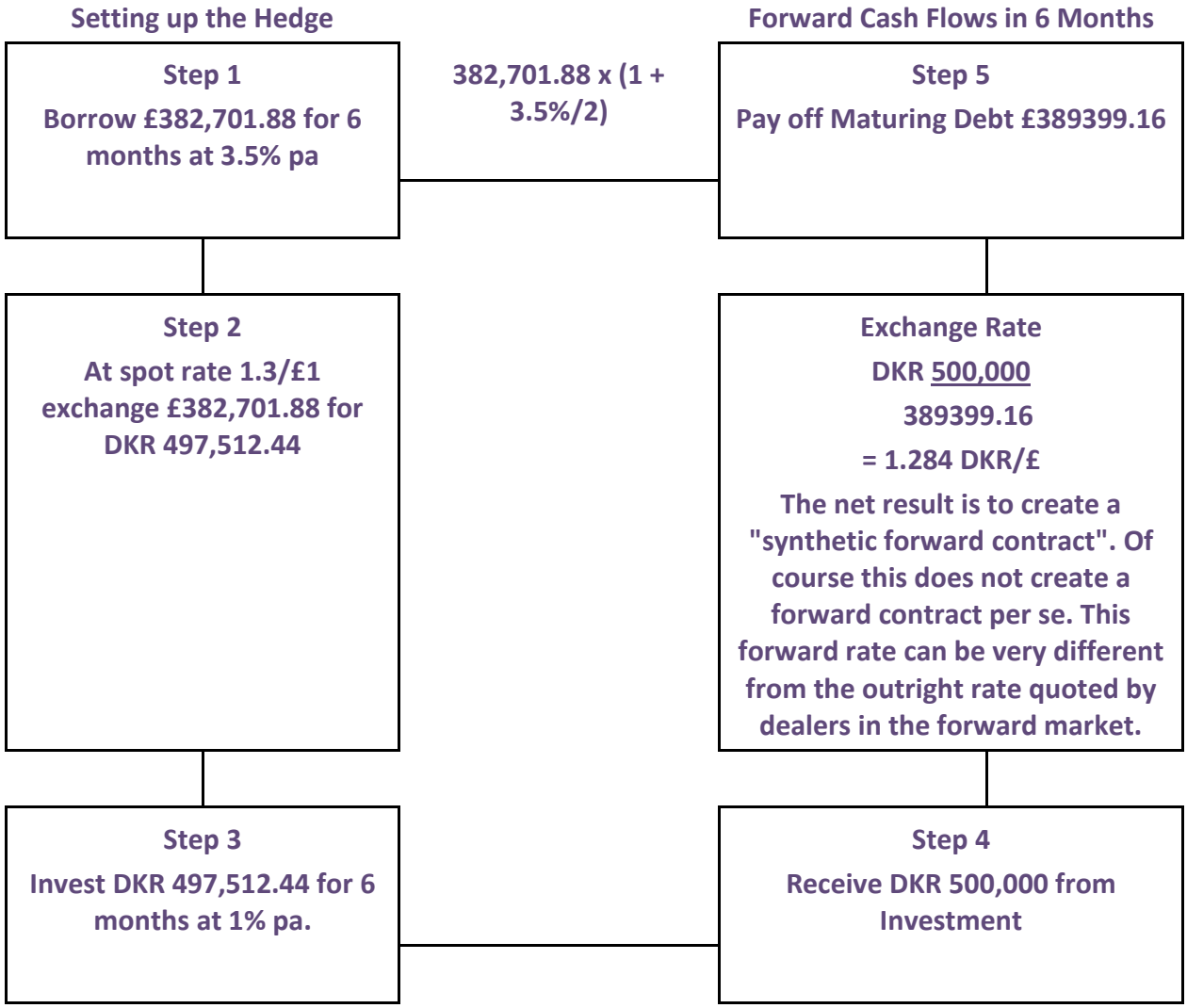
If the company has excess cash it can create a short term deposit in the Danish Krona that it will need in the future. For example, Paradise could deposit funds in a DKR bank deposit with a matching maturity. If the DKR interest rate is 1% per annum. The amount of deposit necessary in DKR is:

$$\frac{DKR\ 500{,}000}{(1\ +\ \frac{0.01}{2})}\ =\ DKR\ 497{,}512.44$$

This is obviously less than the DKR500,000 required as we earn interest on the deposit.

With a spot rate of DKR 1.3/£1 we will need £382,701.88 to purchase the required DKR securities. In six months the security will mature and we will receive DKR500,000 which can be used to pay the supplier. Regardless of how the DKR/£ exchange rate moves over the period the UK company's investment can be used to pay the supplier.

In many cases, companies would prefer to hedge payables without using their cash balances or may not have the funds required. Paradise may therefore have to borrow sterling. The UK borrowing rate is 3.5% p.a. for Paradise. This money market hedge is illustrated below:



Money market hedges can also clearly be used to hedge cash inflows.

EXAMPLE MONEY MARKET HEDGE FOR AN EXPORTER

GE (US firm) has been awarded a contract to supply turbine blades to Lufthansa. GE is to receive €25m exactly one year after the award of the contract. The spot rate of exchange and the interest rates are as follows

Current spot price for €1 = $0.40

€	interest rate	1.5%
US	dollar interest rate	1.0%

GE borrows €25m/1.015m = €24.63m for one year, converts it in the spot market, and invests the $9.85m raised for one year receiving 1.01 * $9.85m = $9.9485m. GE use these dollars to pay back the 1.015 * €24.63m = €25m it owes in principal and interest.

The exchange gain or loss on the borrowing and lending transactions exactly offsets the dollar loss or gain on GE €'s receivable. In effect, the simultaneous borrowing and lending transactions associated with a money market hedge enable GE to create a 'homemade' forward contract. The effective rate on this forward contract will equal the actual forward rate if interest rate parity holds. A money market hedge will always be cheaper than a lead payment unless a cash discount can be negotiated in association with the lead payment.

Self Assessment Question 1

You work for SHart (a small Canadian importing firm). SHart is interested in having your help to manage the exchange rate exposure on its foreign currency transactions. In your first month the firm agrees to buy goods from a US supplier Payment of US$10,850,000 is to be made in 90 days. To help with your decisions, you obtain the following information from the international money markets.

Exchange Market
Spot (C$/US$1) 1.5876 / 1.5886
F(C$/US$1) 90 days 1.5898 / 1.5908
Money Market Rates (annual)
90-day C$ interest rates 1.8750 / 1.5625%
90 day US$ interest rate 1.2500 / 1.0000%

i. Determine the C$ value of the payable if you lock in using a forward contract.
ii. Describe the money market hedge for this situation.

Forward Contracts

When two parties enter into a forward contract for foreign currency the long side of the transaction agrees to buy a fixed amount of a foreign currency from the short side at a specified price on a future date. The company that is long in a foreign currency sells the foreign currency forward and a company that is short of a foreign currency buys the currency forward. In this way the company can fix the home currency value of its future foreign currency cash flow. The delivery location and size of the transaction are part of the forward contract and are tailored to the participants needs. The maturities of standard contracts are standardised. Forward exchange rates are normally quoted with buying and selling rates for periods of one, two, three, six, and for major trading currencies up to nine months and one

year. Beyond these maturities the market is fairly "thin" and large single transactions can produce wide rate fluctuations. Treasurers should seek a number of quotes for the desired contract from financial institutions and choose the most favourable.

A forward exchange contract is:

- an immediately firm and binding contract between a bank and its customer
- for the purchase or sale of a specified quality of a stated foreign currency
- at a rate of exchange fixed at the time the contract is made
- for performance (i.e. delivery of the currency and payment for it) at a future time which is agreed upon when mailing the contract. This future time will be either a specified date, or at any time between two specified dates.

In a forward contract typically no money changes hands until maturity. However, there could be some security requirement placed on companies. NOTE as forward contracts are OTC they are MANY variations of the basic forward contract described here.

The most obvious application of a forward contract is a situation where a company is importing raw materials from abroad and is required to pay a price expressed in a foreign currency. Transaction exposure by taking out a forward contract to mature around the time when it expects to pay its foreign supplier, the company is able to lock in to a defined domestic cost for its imports. This cost can be used as a basis for developing its pricing policy for the finished product.

EXAMPLE FORWARD CONTRACT

Consider the previous example with the UK company Paradise importing good from Switzerland. Paradise can lock in the cost of buying DKR six months from now. The company enters into an agreement to today to purchase DKR500,000 in six months at DKR 1.25 per £. This agreement would require the company to pay £400,000 (DKR500,000/1.25). This is the price the company will pay no matter how exchange rates move. They have removed the potential for losses due to a weakening of sterling. However, the opportunities for profits have also been removed. This is clearly an opportunity loss and the treasurer would have appeared to make a wrong decision. This is a perfect hedge as all of the foreign currency risk has been removed. If the pound strengthens over this period to DKR 1.50/£1 the company would have been better purchasing the DKR in the spot market and will have an “opportunity loss" £66,667 (DKR500,000/1.25 – 500,000/1.50) through taking out the forward contract.

The traditional cost of hedging is identified as the forward discount or premium

$$\frac{Current\ Spot\ Rate\ Of\ \ Foreign\ Currency - Forward\ \ Rate}{Current\ Spot\ Rate} = \frac{1.3 - 1.25}{1.3} = 0.0384$$

The 'true' cost of hedging cannot be calculated in advance because it depends on the future spot rate which is unknown. True cost is an opportunity cost.

In an efficient market the expected cost of a forward contract must be zero, otherwise arbitrage is possible, i.e. the forward rate must be an unbiased estimate of the future spot

rate or else it would be profitable to deal. The *ex-ante* desirability of this hedge will largely depend on four factors:

1. the company's subjective expectation of the spot rate in six months;
2. the size of the bid/ask spread;
3. the volatility of the exchange rate; and
4. the company's attitude to risk, companies which are risk averse have a greater desire to hedge open positions than risk taking companies.

The company can compare the known result of hedging with the possible results of remaining unhedged. This involves estimating the probability of future exchange rates and comparing this with the hedged position. Once a company enters into a forward contract it must be carefully monitored. The treasurer usually compares the contracted forward rate with the way the forward rate moves after the deal. There can be a cost (in terms of the bid/ask spread) in trying to undo or alter the position. If, after three months, the company only needs DKR300,000 it must enter into an agreement with the dealer (or another dealer) to sell forward DKR200,000 for delivery in three months. If the bid ask spread on a three-month contract is 0.01 DKR per £, the transaction cost to the company in altering its position is DKR2,000 (0.01 DKR x DKR200,000)

Forward contracts have the advantage that they are simple to understand and report and there is only a small fee, if any, on such a forward contract. However, forward contracts have problems in that they can be inflexible and are not useful when covering uncertain cash flows. Also, forward rates do not exist in many currencies.

Forward contracts can obviously be compared to the money market hedge since both try to achieve the same thing and operate with the same rate if interest rate parity holds. Unlike a forward contract, where the exchange takes place at the end of the contract, to operate the money market hedge funds are required at the beginning of the hedge. Transaction costs are likely to be higher in a forward market hedge. In an efficient market the costs of the hedge and the forward should be the same. Markets are not always efficient and the difference in rates encountered by companies on two separate national markets may not be the same as the difference between risk free government rates.

In most cases the forward contract will offer the better rates due to differences in transaction costs. The exception may be due to arbitrage opportunities. Since the results of either hedge will be known beforehand the company can implement the one which offers the lowest cost.

Self Assessment Question 2

Your latest cash flow forecast indicates that you have significant net receipts of DKR over the next 9 months and a decision has been made to hedge the forecast exposure over the next 9 months.

Required

Using the figures provided below construct alternative hedges:

i. a forward contract

ii. money market hedge

for the DKR cash receipts due in 9 and 12 months' time and compute the resulting cash flows. Forecast cash flows: 9 months DKR 500,000.

Eurocurrency interest rates

	DKR	£
9 months	5 3/8 - 1/4	7 1/4 - 1/8

Exchange rates

DKR/£1

Spot	2.4522 - 2.4542
9 months	2.4230 - 2.4259

Currency Futures

A company that buys a currency futures contract is entitled to receive a specified amount in a specified currency for a stated price on a specified date. To hedge payment on future payables in a foreign currency, the firm may desire to purchase a currency futures contract representing the currency it will need in the near future. By holding this contract, it locks in the amount of its home currency needed to make payment on the payables. When two parties enter into a futures contract for foreign exchange, the long side agrees to buy foreign currency from the short side at a specified price on a future date. Unlike a forward contract, however, the size, maturity dates, and delivery location of the contract are completely standardised. For example, Paradise plc, as an alternative to entering into a forward position, could hedge its DKR raw material costs by engaging in a futures transaction.

A company that sells a currency futures contract is entitled to sell a specified amount in a specified currency for a stated price on a specified date. To hedge the home currency value of future receivables in a foreign currency, the firm may desire to sell a currency futures contract representing the currency it will be receiving. This way the company knows how much of its home currency it will receive after converting the foreign currency receivables into its home currency. By locking in the exchange rate at which it will be able to exchange the foreign currency for its home currency, it insulates the value of its future receivables from the fluctuations in the foreign currency's spot rate over time.

As with the purchase of currency futures, a sale of currency futures can backfire. In our example in which the firm is hedging future receivables, the locked-in currency futures price at which the firm will sell the foreign currency may end up being lower than the spot rate of

the currency (if the foreign currency appreciates over time). Nevertheless, due to the uncertainty of future currency values, the firm may be more comfortable hedging than remaining exposed to exchange rate fluctuations.

EXAMPLE Hedging with Currency Futures

The current spot price is $0.039/1DKR. The September futures price was $.3907/1DKR. The position was closed on August 16, when the spot rate was $.4434/1DKR and the futures price was $.4436/1DKR. Assume the contracts are executed on the International Monetary Market where the Danish Krona contract is for 125,000 Danish Kronas. We will draw illustrate fully the cash flows in the hedge, clearly indicating the futures position at June 17th and August 16th.

The 100,000 watches currently cost = 100,000(225) = 22,500,000 Danish Kronas.

The importer needs to keep the cost in dollars from increasing. Current cost will be DKR22.5m x 0.39 = $8,775,000. This will happen if the Danish Krona increases in value against the dollar. The dealer needs to execute a long hedge by buying Danish Krona futures. Since the dealer needs to hedge 22,500,000 Danish Kronas, worth 22,500,000($0.3881) = $8,732,250.

It will require $22,500,000/$125,000 = 180 contracts.

June 17

The dealer buys 180 futures contracts. Each contract is priced at 125,000($0.3907) = $48,837.50

August 16

The Danish Krona has appreciated to $0.4434. This means that the Danish Kronas will cost 22,500,000($0.4434) = $9,976,500 an increase of $1,244,250. The futures price is $0.4436 or 125,000($0.4436) = $55,450 per contract.

The dealer sells the 180 contracts for a profit of 180($55,450 - $48,837.50) = $1,109,250

This reduced the overall increase in the price of the watches to $54,000.

Self Assessment Question 3

Using the information below (assuming today is the 21st of February), answer the following question. You work for a US company that is due to receive £1500 million in June. You decide to use currency futures to hedge this risk.

CURRENCY FUTURES

Feb 21		Open	Sett	Change	High	Low	Est. vol	Open int
€-Sterling*	Mar	0.7577	0.7561	-0.0022	0.7578	0.7544	81	9,618
€-Yen*	Mar	158.99	158.50	-0.20	159.06	158.70	770	11,369
$-Can $ †	Mar	0.9871	0.9886	+0.0013	0.9930	0.9856	49,780	85,628
$-Euro € †	Mar	1.4707	1.4809	+0.0102	1.4830	1.4694	177,173	201,842
$-Euro € †	Jun	1.4658	1.4758	+0.0101	1.4777	1.4645	681	7,047
$-Sw Franc †	Mar	0.9099	0.9188	+0.0086	0.9208	0.9065	70,032	65,235
$-Yen †	Mar	0.9270	0.9328	+0.0066	0.9350	0.9246	139,596	209,752
$-Yen †	Jun	0.9318	0.9378	+0.0067	0.9398	0.9299	455	28,752
$-Sterling †	Jun	1.9385	1.9588	+0.0186	1.9618	1.9385	96,949	94,194
$-Aust $ †	Mar	0.9170	0.9177	+0.0017	0.9185	0.9143	34,035	88,438
$-Mex Peso †	Mar	92575	92425	-	92675	92250	21,158	137,661

Sources: * NYBOT; Sterling €100,000 and Yen: €100,000. †CME: Australian $: A$100,000, Canadian $: C$100,000, Euro: €125,000; Mexican Peso: 500,000, Swiss Franc: SFr125,000; Yen: ¥12,5m ($ per ¥100); Sterling; £62,500. CME volume, high & low for pit & electronic trading at settlement. Contracts shown are based on the volumes traded in 2004.

i. Outline the hedge in February and draw the risk diagram (y axis £ revenue, x axis $/£) and add the effect of using the future position (the exchange has a spread of $0.0010 on each side of the closing quote).

ii. Illustrate the cash flows in June if the actual exchange rate and the future price are $1.90/£1.