

Exchange rates and hedging instruments

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Introduction

Over the past decades after the war, statistics show that international trade has grown even more rapidly than domestic economic activity¹ in an endeavour to optimise the global allocation of resources. One reason for this growth was the reduction in barriers to trade and investment through the development of free-trade areas such as the European Union, the North American Free Trade Agreement and the Association of South East Asian Nations. Another reason was the rapid improvement in transportation and communication infrastructures. The proportion of Gross Domestic Product exported (export ratio) had increased dramatically between 1958 and 1990 for countries such as Korea (0.4% to 25.8%), France (8.8% to 18.3%), Canada (from 14.5% to 23.1%), Spain (3.5% to 11.4%), to mention just a few. This rapid growth in international trade has brought with it a similar increase in the importance of international money market activity and internationally oriented financial products. Another effect of this growth in international trade was the rise of MNCs (multi-national corporations). The United Nations estimates that cross-border corporate investment grew four times faster than world output and three times faster than international trade itself between 1980 and 1995, resulting in around 40,000 MNCs and 250,000 foreign affiliates².

Apart from risks associated with changes in interest rates and commodity prices, companies with substantial overseas interests encounter a variety of other hazards, which include political risks and currency fluctuations. Overseas interests may include, amongst others:

- Imports
- Exports
- Overseas branches or subsidiaries
- Foreign investments
- Foreign financial instruments
- Receivables and payables denoted in foreign currencies
- Different reporting currencies within the same group
- Finance leases in currencies different to the reporting currency
- Foreign competitors

¹ University of Leicester, 2506 International Finance, page1.2

² University of Leicester, 2506 International Finance, page1.5

Since exchange rates between currencies are volatile, these interests all bear currency risk. The consequences of movements in foreign currency exchange rates can vary from receiving higher cash flows or paying lower amounts than expected at the date of the transaction, to receiving lower amounts or paying higher sums due to an appreciation of the currency of the transaction. Movements in foreign exchange rates can also affect positively or negatively the value of a company after integrating the results of a foreign branch.

As we shall analyse below, currency risk or foreign exchange risk is normally distilled into three components, namely *transaction, translation and economic risks*. The term *risk* is usually characterised in terms of adverse effects on a firm's activity. Exposure to risk arises as a consequence of uncertainty about the future. In as much as risk management techniques that are being ingrained in operations and methods adopted by companies, would include for example using insurance to cover or *hedge* against perils, firms use various instruments to hedge against foreign exchange risk.

In the text below we shall be looking at what changes in exchange rates, and the effects thereof, so as to understand better the *transaction, translation and economic risks* involved. We shall then dissect *hedging instruments* into the alternative derivatives, winding down with a discussion about the merits of such derivatives.

[What determines Foreign Exchange Rates](#)

The foreign exchange rate is the price of one currency in terms of another. Therefore if the exchange rate between the USD and the GBP is $USD/GBP=2.0000$, this would mean that *buying* GBP1 would cost USD2, and conversely, *selling* USD1 would fetch GBP0.50. The market-place where one can buy or sell currencies is operated electronically by banks. These *foreign exchange (FX) markets* normally give two exchange rates such as USD/GBP 1.8630 – 1.8660, which means that the bank sells at 1.8630 and buys at 1.8660. Therefore, if one customer wishes to pay a bill of USD1,000 and is paying using GBP, the bank will *sell* her the USD at the rate of USD/GBP1.8630. The cost to the customer would be $USD1000 \div 1.8630 = GBP536.77$. If another customer sells USD1,000 to the bank on the same day, then the foreign exchange market will give her $USD1000 \div 1.8660 = GBP535.91$, implying that the bank always buys cheap and sells at the higher price. The difference is the profit of the bank. Apart from this profit, the bank also charges commissions on the transaction.

We mentioned above (*FX*) markets. There are two FX markets namely the *Spot* and the *Forward FX market*. In the example mentioned above, the rate of exchange used on the day was the *Spot* rate. The forward market is where one can buy or sell a specific amount of currency at a specific forward rate of exchange, for exchange on a specific future date. The spot and forward rates may be given as:

		<u>Actual forward rate:</u>
USD/GBP spot	1.5840 – 1.5860	1.5840 – 1.5860
1 month forward	4.50c – 4.75c <i>discount</i>	1.6290 – 1.6335
3 months forward	6.85c – 7.00c <i>discount</i>	1.6565 – 1.6560

Discounts are added to the spot rate to derive the actual forward rate. In such a case, the forward markets expect the USD to weaken or *depreciate* against the GBP. The opposite of rates of discounts are *premiums*, which signify that the first rate is expected to *appreciate* against the second of the pair. The forward market is used to insure against loss on exchange rate fluctuations in the case where a person knows that she is going to pay out or receive foreign currency at some future date. We shall delve deeper into hedging instruments further down in this report. For the moment, we shall skim through the determinants of FX rates.

Basic economic theory suggests that exchange rates are determined by the forces of *supply and demand*. These forces stem from

1. *speculation* (in much the same way as on stock markets),
2. *international trade* (export and import),
3. *real investment* (in foreign assets) and
4. *international finance* (to take advantage of lower interest rates)

Estimates suggest that speculation account for around 90% of these market forces³.

One may at this stage be asking a few questions such as:

- a) Why are rates of exchange different for different currencies?
- b) Why would the forward rate of exchange of a currency be different from the spot rate?
- c) What determines the forward rates?

³ Steve Lumby & Chris Jones, *Investment Appraisal & Financial Decisions*, sixth edition, page 550

Exchange rates are interrelated with *interest rates* and *inflation rates* of the individual countries. Logically, assuming no transaction costs, an economic unit would prefer borrowing from a country that charges the lower interest rates. Similarly, a firm would be tempted to buy the currency of that country and invest it in that same country if the interest rates offered on deposits are higher than those of other countries including its home country. Inflation and the purchasing power of money also play an important role in the context of exchange rates in that economic units will probably decide to buy say, silver, from one country at a price per troy ounce and ship it to a country where the same silver would fetch a higher price. In both cases described however, the success of the transaction would still depend on the spot exchange rate on the day when the cash flows are repatriated to the home country. Differentials in interest rates and inflation rates possibly attract business units resulting in higher demands for a currency and lower demand for another currency bringing back on stage the theory of supply and demand in exchange rate determination.

The *IRPT* or *interest rate parity theorem* effectively works on the principle that international financial markets are efficient and that a gain from a more favourable interest rate in one country compared to another is balanced by an adverse movement in exchange rates. Forward exchange rates are set to bring about parity between interest rates in different currencies. Therefore an investor, for example should be indifferent as to whether she should invest an amount of home currency at a certain interest rate, or buy foreign currency at the spot rate, invest in the foreign currency and at the same time sell forward the principle plus interest. At the same time, IRPT suggests that if firms actually decide to invest in a foreign country because of advantageous interest rates, this would affect the future spot rate through the higher demand for that country's currency.

A further theory that contributes towards the determination of exchange rates is the *PPPT* or *Purchasing Power Parity Theorem*. This theorem states that exchange rates move to effectively bring about parity in the purchasing power of currencies of different countries. The rationale behind this theorem is that the price of a particular good in say GBP is the same as the price of that same good in another country converted into GBP at the spot rate of a particular point in time. The reasoning behind this '*law of one price*' is arbitrage. As explained above in the case of silver, if the firm exporting the silver was able to register gains from the transaction, this opportunity would not last long because of the effect on the higher demand for silver and the downward force on the currency of the importing country. In the real world of course, the argument becomes more complex because of other costs involved such as carriage and freight. Although Big Mac burgers bought in the Philippines

for an equivalent of USD1.17 in 2001 sold in Switzerland for USD3.65⁴, no rational person would think of buying the burgers in the Philippines, shipping them to Switzerland and selling them there because the costs would be prohibitive.

Forward rates mentioned above on page 5, are determined by IRPT, while actual future spot rates are determined by PPPT and supply and demand forces at that future point in time. Therefore, forward rates are not good predictors of future spot rates.

Foreign Exchange Risks

A simple common transaction between firms of different countries will quickly illustrate the exchange risk involved in international trade. Assume an exporting US company A which regularly secures contracts of sale which involve substantial delays in payment. It is the practice of the company to secure payment using Bills of Exchange maturing after 90 days. Assume that at the time of the transaction which involved a sale to a UK company B invoiced at GBP30,000, the spot rate was USD/GBP 2.0000. Company A therefore anticipates revenue of USD60,000. Over the 90 days however, the USD appreciates so that the exchange rate when the funds are paid by company B to company A, is USD/GBP 1.5000. The funds thus transferred were just USD45,000. Company A has just made a loss on exchange of USD15,000. This example demonstrates '*transaction exposure*' to exchange rate risk. Companies are also exposed to *transaction risk* if they undertake real investment such as building a warehouse in a foreign country since such an investment would be expected to generate positive net cash flows in the foreign currency. *Transaction risks* include also risks involved in borrowing or lending money denominated in a foreign currency since these would involve interest and principle repayments in foreign currency.

Another type of exposure that exists is '*translation risk*'. If the same company A decides to establish a UK branch and this branch is expected to earn a profit of GBP500,000 (equivalent to USD1000,000 when translated at the current rate of exchange is USD/GBP 2.000), then company A will only be registering USD750,000, a shortfall of USD250,000, if the exchange rate changes to 1.5000. As such this type of exposure is only an accounting one since at this stage it has no cash flow impact. However, related to this is the case where the investment in the foreign branch was taken on the basis of positive NPV calculated using, in our case, GBP to project the cash flows and the UK cost of capital so as to discount the cash flows. The expectations of the shareholders of company A would

⁴ Big Mac Currencies, The Economist, April 21 2001, page 74

fall should the USD appreciate especially where the branch is expected to repatriate its profits for distribution. This is also referred to as '*economic risk*'.

This type of risk can be viewed as a longer-term version of transaction risk. One must note however that *economic risk* arises also in the case where competitors gain advantage over a company even in its own home country as a result of appreciation of the home currency. Assume that the same company A exports its product for the price of USD1,000 per unit, which when converted at the spot rate on the date of the transaction (USD/GBP 2.000) sells in the UK for GBP500. Assume also that a UK company C is competing with company A in the UK and is also selling similar products for GBP500 each. Assume that the following year the USD depreciated to USD/GBP 2.5000. This would result in the product of company A selling in the UK for GBP400 straining the competitiveness of company C's product. This is also known as '*economic risk*'.

Managing exposure

In the above simple examples we have identified possible consequences that economic units may face as a result of exchange rate fluctuations. The main objective of management is that of *adding value to the firm*. To *add value*, companies need to take risks but at the same time avoid those risks that carry no compensating gains. Currency risk is one such type of exposure which companies try to avoid so as to have more funds for their normal operations. We seldom find companies putting stakes on race-horses using shareholder funds to do so, because of the unknowns. Similarly, companies try as much as possible to insure or *hedge* against risks including currency risk, especially when they are not in the risk business and therefore they do not have a forecasting edge.

Broadly defined, *hedging exchange rate risk*, means altering the composition of assets and liabilities so as to fully or partially offset an existing or potential exposure⁵. A series of questions might help the firm in evaluating the type and extent of hedging activity it should enter into. These questions might include:

- a) Are real FX rate changes expected to be short or long-term phenomena?
- b) What is the primary objective of the firm vis-à-vis home currency earnings, profit and market share?
- c) What are competitors likely to do?
- d) Which of the alternative hedging instruments is most adaptable for the situation?

⁵ University of Leicester, 2506 International Finance, page8.5

e) Are there possible strategic measures that the company may implement?

Alternative hedging instruments

The firm has various alternatives available so as to help it contain FX risks to acceptable limits. These can be listed as:

- i. Do nothing
- ii. Natural hedging
- iii. Swaps
- iv. Forward market hedging
- v. Money market hedging
- vi. Leading hedge
- vii. Futures hedge
- viii. Options contracts
- ix. Exposure netting
- x. Risk shifting
- xi. Risk sharing

The case study below which looks into the operations of our company A attempts to illustrate how firms could cope with the exposure of exchange rate fluctuations.

Our company A had started off business as a small but profitable business established in the US. In its infancy, the company had relatively small amounts of exports and even so, it was not very yielding with its strict cash against documents credit policy. Therefore, at that time, management did not consider FX fluctuations to pose that great a risk to the company. In actual fact, at that time it *did nothing* ([alternative i - Do nothing](#)) to cover for this hazard. As the company grew however, its policy had to evolve since export orders were growing. With creditworthy customers, the company acceded to a 90 day credit period but its risk averse management insisted on invoicing in USD, its home currency thereby protecting the company fully against changes in exchange rates by shifting the risk completely onto the customer ([alternative x - Risk shifting](#)). The export department of the company however soon realised that this policy was restraining the growth potential of the firm's export sales, because it was losing valuable orders from good customers that were willing to quote in their own currency. It was evident that the customers who were being approached by company A's competitors understood that under the present conditions of sale, wherein all FX risks were borne by them, prices quoted by the company were not so

competitive. Long discussions ensued at higher management level to evaluate proposals presented by the export department.

Whilst management sympathised with the arguments of the export department and wanted to give it as much freedom of action as possible, it was still very cautious and risk averse. Accepting to invoice in the currency of the customer was going to expose the company to an unknown extent of risk. The company's management deliberated at length whether it should start off by adjusting the selling prices down but still invoicing in USD. The company also debated on whether its customers would be interested in sharing the FX risk ([alternative xi - Risk sharing](#)) by inserting a price adjustment clause in the sales contracts that would be linked to ranges of movements in exchange rates between the home currency and the customer's currency.

Discussion also explored the possibility of looking at hedging alternatives so as avoid the FX gamble should it accede to change its invoicing policy to charge in the customers' currencies. The risk management team of the company also explored the level of imports and the countries of origin. In fact company A had quite a few customers and suppliers hailing from the UK. The team involved the procurement department to get a better understanding of the forces commanding the import side of the operation. The idea that was being studied involved accepting the FX risk on purchases from the UK which should secure better terms from the UK suppliers as these would be effectively shifting the risk to our company as described above ([alternative x - Risk shifting](#)). Then, if the procurement department could work in tandem with the sales department so as to match the time credit periods and amounts payable and receivable in GBP or any other positively correlated currency, then there would be a netting effect of the FX risk ([alternative ii - Natural hedging](#)). In practical terms our company A had invoiced company B in GBP for the equivalent of USD500,000 when the spot rate was USD/GBP 1.4285. The invoice amount was GBP350,000 and was payable in 90 days by 30th April. Some time later, the procurements division was negotiating a purchase of USD400,000 payable within 60 days payable on the 10th April. The spot rate at that time was USD/GBP 1.3333. It was decided to offer the exporting UK company C that company A accepts a GBP denominated invoice thereby accepting FX risk, for a better deal. It was proposed to accept liability for GBP290,000 instead of GBP300,000 (USD400,000 converted at the spot rate of 1.3333) and extend credit up till the 30th April. Company C could have had provisions of the future spot rate of the USD/GBP which was at the time expected to appreciate in the coming months, and accepted the offer. On the 30th April, our company A planned to use part of the receipt from its customer B to settle company C. However, it would still have remained

exposed with the GBP350,000 – GBP290,000 = GBP60,000. The company resolved to explore alternative hedging derivatives to cover for this remaining exposure.

Further discussions with company B resulted in the possibility of swapping currencies with our company to the extent of the GBP60,000 because it had itself receivables denominated in USD ([alternative iii - Swaps](#)). Arrangements were therefore made with the bank whereby our company accepted to receive USD80,000 from a US company D which was a customer of the UK company B, instead of the GBP60,000 from B. The deal was closed off.

Whilst at the bank however, discussions drifted towards other hedging instruments which were available for the company without so much matching negotiations. The bank explained that the exposure due to the sale in GBP could have been hedged using another hedging device, [alternative iv - Forward market hedging](#). Basically the bank could have offered a forward contract whereby it could arrange to buy the GBP350,000 three months' forward at a fixed rate of exchange (the three month forward rate). The three-month forward rate (Bank buying rate) on the day of the transaction, when the spot rate was USD/GBP 1.4285, was quoted at a premium of 3.35c. This means that had the company entered into the contract, when it would have cashed in on the receipt of GBP350,000 from company B, it would have sold them to the bank at the pre-agreed rate of USD/GBP1.3950. The company would have therefore received USD488,250 from B, and would have paid the USD400,000 to C leaving in with an unexposed cash surplus of USD88,250 compared to the USD80,000 realised after the complex netting and swap arrangements described above.

Forward contracts are normally available for maturities ranging from one, two, three, six and twelve months, but can at times extend also to longer terms. Custom contracts for say seventy-five days, can be negotiated at a higher cost. Forward contracts are 'over the counter' products and are not traded on the FX market. The advantages of forward contracts are:

- No cash outflows until the maturing of the contract
- Flexible with regards to size, currency and time-period forward
- Available any time a company identifies a short position in the future

The drawbacks with forward contracts are that:

- They cannot be stopped before maturity to cash in on gains against the spot rate
- The company must have a high credit standing with the bank

The company could have also opted for another method that is available that would discount the receivable into cash at the time of the contract. This method, which is [*alternative v - Money market hedging*](#), has quite a distinct a simple logic. The company could have borrowed GBP from the money market as soon as the sale of GBP350,000 was made to company B, for an amount that would crystallise into a GBP350,000 liability inclusive of interest as soon as the credit limit allowed to B expires. This loan in GBP would be repaid using the receipt from B. At the same time of the contract, the amount borrowed would have been converted into USD at the prevailing spot rate of USD/GBP 1.4285. The money market offers companies and individuals the possibility to borrow and lend for a short period of time, short running from 'overnight' (1500hrs of one day to 1500hrs of the next day), to as long as twelve months. Each time-period has its own interest rates.

In our example, the bank explained to the company that on the date of sale to B, the data for *money market hedging* was as follows:

USD/GBP spot	1.4100 – 1.4285	
3-mth forward	3.35c premium	
Three-month money market interest rates:		
	<i>Deposit</i>	<i>Loan</i>
USD	7%	9%
GBP	5%	8%

In order to end up with a liability of GBP350,000 at the end of the three month period, the company would have had to take a loan of

$$\frac{GBP350,000}{1 + \frac{0.08}{4}} = GBP343,137$$

The loan in GBP would have then been converted at spot rate into USD resulting in an *immediate* cash inflow of USD490,172. The obvious advantage is the *time value* of this amount. In order to compare with the *Forward Market Hedging* one could assume that the receipt of USD490,172 could be deposited forward at the rate of 7% per annum for three

months quoted in the table above. This would yield an amount of USD498,750 which is far better than the USD488,250 receivable under the Forward Contract alternative⁶.

Another derivative is the Leading Hedge (alternative vi on page 9). The amount receivable today under the *Money market hedging* device explained above was USD490,172. Company A could attempt asking company B to forego the three month credit period and pay immediately the amount of GBP343,138 ($USD490,172 \div 1.4285$), instead of the agreed GBP350,000.

Yet another hedging device that is similar to the FX Forward market hedging is the Futures hedge, (alternative vii on page 9). In contrast to forward contracts, futures deals are

- in the form of standardised contracts of fixed amount of money
- available only in a limited range of currencies
- available only for a limited range of forward time periods
- cheaper as regards transaction costs than forward contracts
- always involve the USD on one side of the contract
- only transacted in whole contracts of the fixed amounts available, or multiples thereof
- issued on a three monthly cycle usually March, June, September and December, expiring on the third Wednesday of the month
- bought through a dealer from the futures market⁷
- *marked to market* on a daily basis obliging the buyer of the futures contract to deposit a *margin* as a sort of collateral against the trader defaulting upon her trading obligations
- contracts that require a daily cash flow (which is uncertain) to adjust the margin so as to reflect the daily fluctuations in the exchange rate

That told, the futures market hedging is normally better suited for the smaller users of the FX markets.

There exists another type of hedging instrument which, unlike the other hedging methods that lock the firm into a specific FX rate hedging against both adverse and favourable movements. Firms can use to hedge against an adverse movement in FX rates whilst at

⁶ the rates of exchange used in our example are fictitious and the highlighted advantages are mentioned to outline the logic that should be used in evaluating the alternatives available

⁷ such as the LIFFE – London International Financial Futures and Options Exchange

the same time allowing the company to take advantage of a favourable movement in exchange rates. This device is termed Options contracts (alternative viii on page 9). There are two basic types of option contracts:

1. *Over-the-counter (OTC) options*⁸
2. *Traded currency options*⁹

OTCs are operated by the banks and are available for any amount of money, in any currency and for any time period. In our case study of company A, it could have bought an option to sell GBP350,000 three months forward at the rate of USD/GBP 1.3950. However, if the spot rate in three months' time is above the 1.3950, then A will exercise the option since it would cash in a higher amount. If however the spot rate is lower, then the company would be better off to allow the option to lapse and sell the GBP350,000 on to the spot market.

Traded currency options on the other hand are operated by futures markets such as LIFFE. They always involve the USD on one side of the contract and are traded in three-month cycles, typically: March, June, September and December. There are two basic types of traded currency options namely 'call' and 'put' options. Basically the difference is that a *call option* is one to buy a particular currency and a *put option* is an option to sell. Traded currency options are quoted in three different exchange rates, technically better known as 'exercise or strike price'. Normally one is approximately equal to the spot rate, one is a bit below and the other one is a bit above. Obviously, the more favourable is the option exercise price, the more expensive is the option cost and vice-versa.

One important difference between OTC options and Traded Currency Options is that the latter are freely marketable whilst the former are not. Due to their fixed cycles, it may not always be possible to buy a traded currency option that covers for the exact duration of exposure resulting from a transaction. In practice, firms buy these options extending beyond the liquidation date of a FX transaction. Under normal circumstances, we find that on that date, it is more advantageous to convert the foreign currency resulting from the sale using the spot rate and to sell forward the Traded Currency Option. This is supported by the Black-Scholes option valuation model which states that:

$$\text{Market price of option} = \text{Intrinsic value} + \text{Gamble value}$$

Early exercise of the option provided only the intrinsic value whilst selling the option provides its market price.

⁸ analogous to the tailor-made FX Forward contracts

⁹ analogous to the FX Futures contracts

Option contracts are the '*only feasible*' hedging methods of all the other alternatives, in the case where companies have contingent exposure to a foreign exchange risk. An example would be as in the case where a bid for a contract is being made in foreign currency and the duration of the contract and the credit period are such that they pose difficulty and risk in the pricing method used for the bid. An option hedge is ideal at the time of bidding. If the bidding company wins the contract, then it would be covered with the option contract. If it lost the contract it would either allow the option to lapse or else it would sell forward the option depending on whether the spot rate of exchange is higher than the exercise price of the option.

International Financial Reporting Standards

Worth a brief mention at this stage is the regulatory framework that has been developed and constantly fine-tuned by the International Accounting Standards Board. There are various standards which concern translation and recording methods so as to facilitate comparability of financial statements. The relevant standards and interpretations are:

- IAS21 Effects of changes in foreign exchange rates
- IAS39 Financial instruments: recognition and measurement
- SIC7 Introduction of the Euro
- SIC11 Foreign exchange – capitalisation of losses resulting from severe currency devaluation
- SIC19 Reporting currency – measurement and presentation of financial statements under IAS21 and IAS29
- SIC30 Reporting currency – translation from measurement currency to presentation currency

Whilst it is not the scope of this study to go into the regulations of these standards, it is at least worth mentioning that standards exist to harmonise the global reporting of FX transactions, translations and also qualifying hedges.

Conclusions

Risk management practices are becoming ever more important as cut-throat competitiveness intertwined with increasing pressures on management to add to shareholder value are the main concerns of today's businesses. We have seen a rapid

growth in foreign transactions and operations over the last decades as firms and markets try hard to make best use of resources. This trend has brought with it a flow of sophistications in hedging instruments so as to manage foreign exchange exposure inherent in foreign transactions and operations, to acceptable minimum levels. We have discussed above the main derivatives available. They all have their own characteristics, advantages and disadvantages. At the end of the day, as with many of the different facets of finance, managers have to use their highest degree of judgement skills to understand their particular situation, assess the risks involved, evaluate the various hedging alternatives and finally decide which is best suited for their case.

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