20

USING FUTURES, FORWARDS AND SWAPS TO MANAGE RISK

Introduction

There are two main classes of derivative contracts. Firstly there are those where you have a right but not the obligation to go ahead with a transaction – options. Given that the future is uncertain and that the right to abandon may turn out to be valuable you are obliged to pay the option writer a premium. Option writers expose themselves to unfavorable outcomes because they grant you the right to go ahead with the deal if it is favorable to you; or to abandon it, if that is your most profitable course of action.

The second class of derivative, the subject of this chapter, commit you to going ahead with the agreed transaction at some point(s) in the future regardless of the change in underlying conditions – you have no right to abandon the bargain.[1]

Futures

Futures are contracts between two parties to undertake a transaction at an agreed price on a specified future date. In contrast to buying options, which give you the choice to walk away from the deal, with futures you are committed and are unable to back away. This is a very important difference. In purchasing an option the maximum you can lose is the premium paid whereas you can lose multiples of the amount you employ in taking a futures position.

In contrast to buying options, with futures you are committed and are unable to back away.

A simple example will demonstrate this. Imagine a farmer wishes to lock-in a price for his wheat, which will be harvested in six months. You agree to purchase the wheat from the farmer six months hence at a price of £60 per tonne. You are hoping that by the time the wheat is delivered the price has risen and you can sell at a profit. The farmer is worried that all he has from you is the promise to pay £60 per tonne in six months, and if the market price falls you will walk away from the deal. To reassure him you are asked to put money into what the farmer calls a *margin account*. He asks, and you agree, to deposit £6 for each tonne you have agreed to buy. If you fail to complete the bargain the farmer will be able to draw on the money from the margin account and then sell the wheat as it is harvested at the going rate for immediate ('spot') delivery. So as far as the farmer is concerned the price of wheat for delivery at harvest time could fall to £54 and he is still going to get £60 for each tonne: £6 from what you paid into the margin account and £54 from selling at the spot price.

But what if the price falls below £54? The farmer is exposed to risk – something he had tried to avoid by entering a futures deal. It is for this reason that the farmer asks you to top up your margin account on a daily basis so that there is always a buffer. He sets a *maintenance margin* level of £6 per tonne.

You have to maintain at least £6 per tonne in the margin account. So, if the day after buying the future, the harvest time price in the futures market falls to £57

you have only £3 per tonne left in the margin account as a buffer for the farmer. You agreed to buy at £60 but the going rate is only £57. To bring the margin account up to a £6 buffer you will be required to put in another £3 per tonne. If the price the next day falls to £50 you will be required to put up another £7 per tonne. You agreed to buy at £60, with the market price at £50 you have put a total of £6 + £3 + £7 = £16 into the margin account. By providing top ups as the price moves against you there will always be at least £6 per tonne providing security for the farmer. Even if you go bankrupt or simply renege on the deal he will receive at least £60 per tonne, either from the spot market or from a combination of a lower market price plus money from the margin account. As the price fell to £50 you have a £10 per tonne incentive to walk away from the deal except for the fact that you have put £16 into an account that the farmer can draw on should you be so stupid or unfortunate. If the price is £50 per tonne at expiry of the contract and you have put £16 in the margin account you are entitled to the spare £6 of margin.

It is in the margin account that we have the source of multiple losses in the future markets. Say your life savings amount to £10 and you are convinced there will be a drought and shortage of wheat following the next harvest. In your view the price will rise to £95 per tonne. So, to cash-in on your forecast you agree to buy a future for one tonne of wheat. You have agreed with the farmer that in six months you will pay £60 for the wheat, which you expect to then sell for £95. (The farmer is obviously less convinced that prices are destined to rise than you.)

To gain this right to buy at £60 you need only have £6 for the *initial margin*. The other £4 might be useful to meet day-to-day *margin calls* should the wheat price fall from £60 (temporarily in your view). If the price does rise to £95 you will make a £35 profit having laid out only £6 (plus some other cash temporarily). This is a very high return of 583 percent over six months. But what if the price at harvest time is £40. You have agreed to pay £60 therefore the loss of £20 wipes out your savings and you are made bankrupt. You lose three times your initial margin. That is the downside to the gearing effect of futures.

The above example demonstrates the essential features of futures market trading but in reality, participants in the market do not transact directly with each other but go through a regulated exchange. Your opposite number, called a *counterparty*, is not a farmer but an organization that acts as counterparty to all futures traders, buyers or sellers, called the *clearing house*. This reduces the risk of non-compliance with the contract significantly for the buyer or seller of a future, as it is highly unlikely that the clearing house will be unable to fulfil its obligation.

The exchange provides standardized legal agreements traded in highly liquid markets. The fact that the agreements are standardized allows a wide market appeal because buyers and sellers know what is being traded: the contracts are for a specific quality of the underlying, in specific amounts with specific delivery dates. For example, for sugar traded on Euronext.liffe (*see* Exhibit 20.1) one contract is for a specified grade of sugar and each contract is for a standard 50 tonnes with fixed delivery days in late August, October, December, March and May.

COMMODITY PRICES

		Change
Alum HG (cash, t)	$1645.5–46	+8.3
Alum Alloy (cash, t)	$1510–11	+8.0
Copper Gr A (cash, t)	$2577–77.5	+30.0
Lead (cash, t)	$829.5–30	+25.0
Nickel (cash, t)	$15100–150	+230
Tin 99.85% (cash, t)	$6500–510	+82.5
Zinc SHG (cash, t)	$1045–45.5	+1.5
Gold close (troy oz)	$399.50–400.00	–3.3
Gold am fix (troy oz)	$399.60	–2.2
Gold pm fix (troy oz)	$399.25	–2.2
Gold – GOFO, 3mth	0.07	nc
Silver fix (troy oz)	$608.00c	–9.5
Platinum (troy oz)	$826.0	–6.0
Palladium (troy oz)	$237.0	+7.0
Oil- Brent blend (Mar)	$29.25–9.31	–0.8
Unleaded Gas (95R)	$324–326	–6
Gas Oil (German Htg)	$262.3–64.3	–0.7
Heavy Fuel Oil	$120–122	–6
Naphtha	$296–300	–13
Jet fuel	$324.8–26.8	–13
Diesel (French)	$278.3–80.3	–4.8
NBP Gas (Mar)	21.25–21.35	+0.1
Euro Gas (Zeebrugge)	21.25–21.45	+0.1
UKPX Spot Index £/Mwh	19.22	–2.3
Conti Power Index €/Mwh	30.3037	nc
globalCOAL RB Index™ †	$43.33	nc
Maize (No 3 Yellow) ♠	66.9	nc
Wheat (US dark Nth)	100.9	nc
Rubber (KL RSS no1, c/kg)	472.5	nc
Palm Oil (Malay) ‡	505.0	nc
Soyabeans (US)	204.0	nc
Cotton A index (per lb)	74.05c	+0.0
Wooltops (Super, p/kg)	468.0	nc
Coffee fut (Jan)	$758	–19
Coca fut (Mar)	931	–14
Sugar fut (white, Mar)	$187.0	–4.00

Sources: LME/Amalgamated Metal Trading, lbma.org.uk/NM Rothschild, Petroleum Argus, UK power exchange, Platts, Global Coal, Reuters and Euronext.liffe. † US $ per metric tonne, week to date ‡ CIF Rotterdam. ♠ CIF UK. t per tonne.

EXHIBIT 20.1 Commodity prices

Source: *Financial Times* 4 February 2004

In examining the table in Exhibit 20.1, it is important to remember that it is the contracts themselves that are a form of security bought and sold in the market. Thus the March future priced at $187 per tonne is a derivative of sugar and is not the same thing as sugar. To buy this future is to enter into an agreement with

rights. The rights are being bought and sold and not the commodity. When exercise takes place *then* sugar is bought. However, as with most derivatives, usually future positions are canceled by an offsetting transaction before exercise.

Marking to market and margins

With the clearing house being the formal counterparty for every buyer or seller of a futures contract, an enormous potential for credit risk is imposed on the organization given the volume of futures traded and the size of the underlying they represent (Euronext.liffe has an average daily volume of around £500bn). If only a small fraction of market participants fail to deliver this could run into hundreds of millions of pounds. To protect itself the clearing house operates a margining system. The futures buyer or seller has to provide, usually in cash, an initial margin. The amount required depends on the futures market, the level of volatility of the underlying and the potential for default; however it is likely to be in the region of 0.1 percent to 15 percent of the value of the underlying. The initial margin is not a 'down-payment' for the underlying; the funds do not flow to a buyer or seller of the underlying, but stay with the clearing house. It is merely a way of guaranteeing that the buyer or seller will pay up should the price of the underlying move against them. It is refunded when the futures position is closed.

The clearing house also operates a system of daily marking to market. At the end of every trading day each counterparty's profits or losses created as a result of that day's price change are calculated. The counterparty that made a loss has his/her member's margin account debited. The following morning, the losing counterparty must inject more cash to cover the loss if the amount in the account has fallen below a threshold level, called the maintenance margin. An inability to pay a daily loss causes default and the contract is closed, thus protecting the clearing house from the possibility that the counterparty might accumulate further daily losses without providing cash to cover them. The margin account of the counterparty that makes a daily gain is credited. This may be withdrawn the next day. The daily credits and debits to members' margin accounts are known as variation margin.

Worked example showing margins

Imagine a buyer and seller of a future on Monday with an underlying value of £50,000 are each required to provide an initial margin of 10 percent, or £5,000. The buyer will make profits if the price rises while the seller will make profits if the price falls. In Table 20.1 it is assumed that counterparties have to keep the entire initial margin permanently as a buffer. (In reality this may be relaxed by an exchange.)

At the end of Tuesday the buyer of the contract has £1,000 debited from his/her member's account. This will have to be handed over the following day or the exchange will automatically close the member's position and crystallize the

loss. If the buyer does provide the variation margin and the position is kept open until Friday the account will have an accumulated credit of £5,000. The buyer has the right to buy at £50,000 but can sell at £55,000. If the buyer and the seller closed their positions on Friday the buyer would be entitled to receive the initial margin plus the accumulated profit, £5,000 + £5,000 = £10,000, whereas the seller would receive nothing (£5,000 initial margin minus losses of £5,000).

TABLE 20.1
Example of initial margin, variation margin and marking to market

	Day				
£	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
Value of future (based on daily closing price)	50,000	49,000	44,000	50,000	55,000
Buyer's position					
Initial margin[1]	5,000				
Variation margin (+ credited) (– debited)	0	–1,000	–5,000	+6,000	+5,000
Accumulated profit or loss	0	–1,000	–6,000	0	+5,000
Seller's position					
Initial margin	5,000				
Variation margin (+ credited) (– debited)	0	+ 1,000	+ 5,000	–6,000	–5,000
Accumulated profit (loss)	0	+ 1,000	+ 6,000	0	–5,000

[1]Initial margin is the same as maintenance margin in this case

This example illustrates the effect of leverage in futures contracts. The initial margin payments are small relative to the value of the underlying. When the underlying changes by a small percentage the effect is magnified for the future, and large percentage gains and losses are made on the amount committed to the transaction:

$$\text{Underlying change (Monday–Friday)} \quad \frac{£55{,}000 - 50{,}000}{£50{,}000} \times 100 = 10\%$$

$$\text{Percentage return to buyer of future} \quad \frac{£5{,}000}{£5{,}000} \times 100 = 100\%$$

$$\text{Percentage return to seller of future} \quad \frac{-£5{,}000}{£5{,}000} \times 100 = -100\%$$

Clearly, playing the futures market can seriously damage your wealth. This was proved with a vengeance by Nick Leeson of Barings Bank. He bought futures in the Nikkei 225 Index – the main Japanese share index – in both the Osaka and

the Singapore derivative exchanges. He was betting that the market would rise as he committed the bank to buying the index at a particular price. When the index fell margin payments had to be made. Leeson took a double-or-quits attitude, 'I mean a lot of futures traders when the market is against them will double up' (Nick Leeson in an interview with David Frost reported in *Financial Times*, 11 September 1995). He continued to buy futures. To generate some cash, to make variation margin payments, he wrote combinations of call and put options ('straddles'). This compounded the problem when the Nikkei 225 Index continued to fall in 1994. The put options became an increasingly expensive commitment to bear – counterparties had the right to sell the index to Barings at a price much higher than the prevailing price. Over £800m was lost.

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Settlement

Historically the futures markets developed on the basis of the *physical delivery* of the underlying. So if you had contracted to buy 40,000 lb. of lean hogs you would receive the meat as settlement. However in most futures markets today (including that for lean hogs) only a small proportion of contracts result in physical delivery. The majority are *closed out* before the expiry of the contract and all that changes hands is cash, either as a profit or a loss. Speculators certainly do not want to end up with five tonnes of coffee or 15,000 lb. of orange juice and so will *reverse their trade* before the contract expires; for example, if they originally bought 50 tonnes of white sugar they later sell 50 tonnes of white sugar for the same future delivery date.

Hedgers, say a confectionery manufacturer, may sometimes take delivery from the exchange but in most cases will have established purchasing channels for sugar, cocoa, etc. In these cases they may use the futures markets not as a way of obtaining goods but as a way of offsetting the risk of the prices of goods moving adversely. So a confectionery manufacturer may still plan to buy, say, sugar, at the spot price from its longstanding supplier in six months and simultaneously, to hedge the risk of the price rising, will buy six-month futures in sugar. The position will then be closed before expiry. If the price of the underlying has risen the manufacturer pays more to the supplier but has a compensating gain on the future. If the price falls the supplier is paid less and so the confectioner makes a gain here, but, under a perfect hedge, the future has lost an equal value.

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As the futures markets developed it became clear that most participants did not want the complications of physical delivery and this led to the development of futures contracts where cash settlement takes place. This permitted a wider range of futures contracts to be created. Futures contracts based on intangible

commodities such as a share index or a rate of interest are now important financial instruments. With these, even if the contract is held to the maturity date one party will hand over cash to other (via the clearing house system).

For example, the FTSE 100 futures (*see* Exhibit 20.2) are notional futures contracts. If not closed out before expiry they are settled in cash based on the average level of the FTSE 100 Index between stated times on the last trading day of the contract. Each index point is valued at £10.

The equity index futures table (Exhibit 20.2) in the *Financial Times* shows futures in indices from stock markets around the world for 4 February 2004. We will focus on the line for the FTSE 100 index future. This is very much a cut down version of the futures available to traders. As well as the March delivery future shown Euronext.liffe also offers traders the possibility of buying or selling futures that 'deliver' in December, June and September.

The table shows the first price traded at the beginning of the day (Open), the settlement price used to mark to market (usually the last traded price), the change from the previous day, highest and lowest prices during the day, the number of contracts traded that day (Est. vol.) and the total number of open contracts (these are trading contracts opened over the last few months that have not yet been closed by an equal and opposite futures transaction).

Worked example 20.1
HEDGING WITH A SHARE INDEX FUTURE

It is 4 February 2004 and the FT 100 is at 4398.5. A fund manager wishes to hedge a £13m fund against a decline in the market. A March FTSE 100 future is available at 4376 – *see* Exhibit 20.2. The investor retains the shares in the portfolio and *sells* 296 index futures contracts. Each futures contract is worth £43,760 (4,376 points × £10). So 297 contracts are needed to cover £13m (£13m/(£10 × 4,376) = 297).

Outcome in March

For the sake of argument assume that the index falls by 10 percent to 3959, leaving the portfolio value at £11,700,000. The closing of the future position offsets this £1,300,000 loss by buying 297 futures at 3959 producing a profit of*:

Able to sell at	$4376 \times 297 \times £10$	=	£12,996,720
Able to buy at	$3959 \times 297 \times £10$	=	£11,758,230
			£ 1,238,490

These contracts are cash settled so £1,238,490 will be paid, plus the investor gets back margin, less broker's fees.

* Assuming that the futures price is equal to the spot price of the FTSE 100. This would occur close to the expiry date of the future.

EQUITY INDEX FUTURES

Feb 4		Open	Sett	Change	High	Low	Est. vol.	Open int.
DJIA	Mar	10446.0	10475.0	–3.0	10507.0	10418.0	8,722	36,831
DJ Euro Stoxx‡	Mar	2834.0	2821.0	–27.0	2841.0	2820.0	368,716	1226,828
S&P 500	Mar	1132.90	1127.50	–5.50	1133.60	1123.00	44,306	585,763
Mini S&P 500	Mar	1133.00	1127.50	–5.50	1133.50	1122.00	594,482	539,366
Nasdaq 100	Mar	1488.50	1468.00	–19.00	1488.50	1462.00	9,985	72,861
Mini Nasdaq	Mar	1488.00	1468.00	–19.00	1489.00	1461.50	256,983	249,320
Russell 2000	Mar	576.50	567.00	–11.15	576.50	565.25	969	22,953
CAC 40	Feb	3626.0	3614.0	–29.5	3632.5	3608.0	64,999	346,178
DAX	Mar	4050.0	4029.5	–31.0	4056.0	4018.0	110,890	286,286
AEX	Mar	351.20	349.35	–2.85	351.70	349.10	12,758	60,152
MIB 30	Mar	27595.0	27750.0	+65.0	27795.0	27565.0	12,567	14,098
IBEX 35	Feb	7940.0	7891.5	–79.0	7945.0	7878.0	9,406	52,906
SMI	Mar	5703.0	5759.0	+55.0	5768.0	5695.0	32,159	128,756
FTSE 100	Mar	4340.0	4376.0	+10.0	4386.5	4339.5	58,244	426,861
Hang Seng	Feb	13060.0	13036.0	–11.0	13161.0	12990.0	19,775	92,557
Nikkei 225†	Mar	10600.0	10420.0	–210.0	10640.0	10410.0	65,291	228,737
Topix	Mar	1043.5	1020.0	–24.5	1043.5	1018.0	28,119	260,356
KOSPI 200	Mar	109.60	109.60	–0.35	110.25	109.20	173,389	95,218

North American Latest. The contracts shown are among the 20 most traded based on estimates of average volumes in the first half of 2002. Previous day's Open interest. † Osaka contract. ‡ Eurex contract.

EXHIBIT 20.2 Equity index futures

Source: *Financial Times* 5 February 2004

Buying and selling futures

A trader in futures must deal through a registered broker. Euronext.liffe provide a list of designated brokers (these follow rules and codes of conduct imposed by the regulators and the exchange).

Gone are the days of open pit trading and those brightly colored jackets in the UK. Trades are now conducted over a computer system on Euronext.liffe (LIFFE CONNECT™). You can place a price limit for your trade – a maximum you are willing to pay if you are buying or a minimum if you are selling. Alternatively you can make an 'at-the-market order', that is, to be executed immediately at the price determined by current supply and demand conditions. The buyer of a contract is said to be in a long position – he/she agrees to receive the underlying. The seller who agrees to deliver the underlying is said to be in a short position.

Gone are the days of open pit trading and those brightly colored jackets in the UK.

If the amount in the trader's account falls below the maintenance margin the trader will receive a demand to inject additional money. This may happen every day so the trader cannot buy/sell a future and then ignore the markets (unless he/she leaves plenty of cash with the broker to meet margin calls). Prices are set by competing market makers on LIFFE CONNECT™. Real time market prices are available on the internet, as well as historical prices (e.g. www.liffe-style.com).

The trader cannot buy/sell a future and then ignore the markets (unless he/she leaves plenty of cash with the broker to meet margin calls).

Short-term interest rate futures

Trillions of pounds worth of trading takes place every year in the short-term interest rate futures markets. These are notional fixed-term deposits, usually for three-month periods starting at a specific time in the future. The buyer of one contract is buying the right to deposit a notional sum of money at a particular rate of interest for three months. So if the current time is February you could arrange a futures contract for you to 'deposit' and 'receive interest' on say £1m with the deposit starting in June and ending in September. The rate of interest you will 'receive' over the three summer months is agreed in February. (This is a notional receipt of interest, as these contracts are cash settled rather than actual deposits made and interest received – see below for an example.) So you now own the right to deposit £1m and receive x% interest for three months (at least in notional terms).

Short-term interest rate futures will be illustrated using the three-month sterling market. That is, deposits of pounds receiving notional interest for three months starting some point in the future. Note, however, that there are many other three-month deposits you could make. For example, you could deposit euros for three months, the interest rate on which is calculated with reference to 'Euribor 3m', which is the interest rate highly rated banks pay to other banks for three month deposits of the new currency for continental Europe, the euro.

Other three-month deposits are often for money held outside of the jurisdiction of the currency's country of origin (i.e. 'Euro' currencies, in the sense of being international money and *not* the new currency in the eurozone) include Swiss francs deposited in London (Euroswiss), Eurodollars and Euroyens (*see* Exhibit 20.3). (Eurocurrency is discussed in Chapter 16.)

The unit of trading for a three-month sterling time deposit is £500,000. Cash delivery by closing out the futures position is the means of settlement, so the buyer would not actually require the seller of the future to place the £500,000 on deposit for three months at the interest rate indicated by the futures price. Although the term 'delivery' no longer has significance for the underlying it does define the date and time of the expiry of the contract. This occurs in late September, December, March and June (see www.liffe.com for precise definitions and delivery dates).

Short-term interest contracts are quoted on an index basis rather than on the basis of the interest rate itself. The price is defined as:

$$P = 100 - i$$

where:

P = price index;
i = the future interest rate in percentage terms.

Thus, on 4 February 2004 the settlement price for a June three-month sterling future was 95.56, which implies an interest rate of 100 – 95.56 = 4.44 percent for the period June to September – *see* Exhibit 20.3. Similarly the September quote would imply an interest rate of 100 – 95.36 = 4.64 percent for the three months September to December 2004.

In both cases the implied interest rate refers to a rate applicable for a notional deposit of £500,000 for three months on expiry of the contract – the June futures contract expires in June and the September future expires in September. The 4.44 percent rate for three-month money starting from June 2004 is the *annual* rate of interest even though the deal is for a deposit of only one-quarter of a year.

The price of 95.56 is not a price in the usual sense – it does not mean £95.56. It is used to maintain the standard inverse relationship between prices and interest rates. For example, if traders in this market one week later, on 11 February 2004, adjusted supply and demand conditions because they expect generally raised inflation and raised interest rates by the middle of 2004, they would push up the interest rates for three-month deposits starting in June 2004 to, say, 5.0 percent. Then the price of the future would fall to 95.00. Thus, a rise in interest rates for a three-month deposit of money results in a fall in the price of the contract – analogous to the inverse relationship between interest rates offered on long-term bonds and the price of those bonds.

It is this inverse change in capital value when interest rates change which is of crucial importance to grasp about short-term interest rate futures. This is more important than trying to envisage deposits of £500,000 being placed some time in the future.

INTEREST RATE FUTURES

Feb 4		Open	Sett	Change	High	Low	Est. vol.	Open int.
Euribor 3m*	Mar	97.94	97.94	+0.01	97.95	97.93	64,639	562,698
Euribor 3m*	Jun	97.91	97.90	+0.01	97.92	97.89	107,643	511,614
Euribor 3m*	Sep	97.77	97.76	+0.02	97.78	97.75	99,905	428,741
Euribor 3m*	Dec	97.55	97.55	+0.04	97.57	97.53	149,711	436,055
Euribor 3m*	Mar	97.32	97.31	+0.03	97.34	97.30	59,811	301,516
Euroswiss 3m*	Mar	99.73	99.73	–	99.74	99.72	1,790	95,989
Euroswiss 3m*	Jun	99.61	99.57	–0.02	99.61	99.56	6,593	81,441
Sterling 3m*	Mar	95.76	95.76	–	95.77	95.75	21,865	188,159
Sterling 3m*	Jun	95.57	95.56	–	95.58	95.54	26,292	201,882
Sterling 3m*	Sep	95.38	95.36	–	95.40	95.34	28,033	153,843
Sterling 3m*	Dec	95.21	95.20	–	95.24	95.19	22,615	139,045
Sterling 3m*	Mar	95.10	95.08	–	95.13	95.06	10,782	83,684
Eurodollar 3m†	Mar	98.84	98.84	–	98.85	98.84	85,990	827,925
Eurodollar 3m†	Jun	98.69	98.69	–	98.70	98.67	105,193	838,794
Eurodollar 3m†	Sep	98.42	98.41	–	98.43	98.38	123,159	794,586
Eurodollar 3m†	Dec	98.05	98.04	–	98.07	98.00	165,779	600,750
Eurodollar 3m†	Mar	97.65	97.64	–	97.67	97.59	100,338	419,479
Eurodollar 3m†	Jun	97.24	97.23	–	97.27	97.19	36,116	330,839
Eurodollar 3m†	Sep	96.88	96.87	–	96.91	96.82	35,044	260,971
Fed Fnds 30d‡	Feb	99.000	99.000	–	99.000	98.995	781	64,359
Fed Fnds 30d‡	Mar	98.995	98.990	–	98.995	98.990	1,381	48,219
Fed Fnds 30d‡	Apr	98.995	98.990	–	98.995	98.990	2,792	71,817
Euroyen 3m‡‡	Mar	99.915	99.910	–0.005	99.915	99.910	19,481	207,689
Euroyen 3m‡‡	Jun	99.920	99.920	–	99.920	99.915	7,733	183,104
Euroyen 3m‡‡	Sep	99.895	99.900	–	99.900	99.895	733	124,973

Contracts are based on volumes traded in 2001.

Sources: * LIFFE. † CME.‡ CBOT. ‡‡ TIFFE

EXHIBIT 20.3 Interest rate futures

Source: *Financial Times* 5 February 2004

Worked example 20.2
HEDGING THREE-MONTH DEPOSITS

An example of these derivatives in use may help with gaining an understanding of their hedging qualities. Imagine the treasurer of a large company anticipates the receipt of £100m in December 2004, $10\frac{1}{2}$ months hence. She expects that the money will be needed for production purposes in the Spring of 2005 but for the three months following late December it can be placed on deposit. There is a risk that interest rates will fall between now (February 2004) and December 2004 from their present level of 4.80% per annum for three-month deposits starting in late December. (The Sterling 3m Dec. future in Exhibit 20.3 shows a price of 95.20, indicating an interest rate of 4.80, that is 100 – 95.20 = 4.80.)

The treasurer does not want to take a passive approach and simply wait for the inflow of money and deposit it at whatever rate is then prevailing

without taking some steps to ensure a good return.

To achieve certainty in December 2004 the treasurer buys, in February, December expiry three-month sterling interest rate futures at a price of 95.20. Each future has a notional value of £500,000 and therefore she has to buy 200 to hedge the £100m inflow.

Suppose in December that three-month interest rates have fallen to 4%. Following the actual receipt of the £100m the treasurer can placed it on deposit and receive a return over the next three months of £100m × 0.04 × 3/12 = £1m. This is significantly less than if December 2004 three-month deposit interest rates had remained at 4.80% throughout the $10\frac{1}{2}$ month waiting period.

Return at 4.80% (£100m × 0.048 × $\frac{3}{12}$)	= £1,200,000
Return at 4.00% (£100m × 0.040 × $\frac{3}{12}$)	= £1,000,000
Loss	£200,000

However the cautiousness of the treasurer pays off because the futures have risen in value as the interest rates have fallen.

The 200 futures contracts were bought at 95.20. With interest rates at 4% for three-month deposits starting in December the futures in December have a value of 100 – 4 = 96.00. The treasurer in December can close the futures position by selling the futures for 96.00. Thus, a purchase was made in February at 95.20 and a sale in December at 96, therefore the gain that is made amounts to 96.00 – 95.20 = 0.80.

This is where a *tick* needs to be introduced. A tick is the minimum price movement on a future. On a three-month sterling interest rate contract a tick is a movement of 0.01% on a trading unit of £500,000.

One-hundredth of 1% of £500,000 is equal to £50, but this is not the value of one tick. A further complication is that the price of a future is based on annual interest rates whereas the contract is for three months. Therefore £50/4 = £12.50 is the value of a tick movement in a three-month sterling interest rate futures contract. In this case we have a gain of 80 ticks with an overall value of 80 × £12.50 = £1,000 per contract, or £200,000 for 200 contracts. The profit on the futures exactly offsets the loss of anticipated interest when the £100m is put on deposit for three months in December.

Note that the deal struck in February was not to enter into a contract to actually deposit £100m with the counterparty on the euronext.liffe market. The £100m is deposited in December with any one of hundreds of banks with no connection to the futures contract that the treasurer entered into. The actual deposit and the notional deposit (on euronext.liffe) are two separate transactions. However, the transactions are cleverly arranged so that the value movement on these two exactly offset each other. All that is received from euronext.liffe is the tick difference, based on the price change between buying and selling prices of the futures contracts – no interest is received.

Worked example 20.3
HEDGING A LOAN

In February 2004 Holwell plc plans to borrow £5m for three months at a later date. This will begin in June 2004. Worried that short-term interest rates will rise Holwell hedges by *selling* ten three-month sterling interest rate futures contracts with June expiry. The price of each futures contract is 95.56, so Holwell has locked into an annual interest rate of 4.44% or 1.11% for three months. The cost of borrowing is therefore:

$$£5\text{m} \times 0.0111 = £55{,}500$$

Suppose that interest rates rise to annual rates of 6%, or 1.5% per quarter. The cost of borrowing for Holwell will be:

$$£5\text{m} \times 0.015 = £75{,}000$$

However, Holwell is able to *buy* ten futures contracts to close the position on the exchange. Each contract has fallen in value from 95.56 to 94.00 (100 – 6); this is 156 ticks. The profit credited to Holwell's margin account of euronext.liffe will now stand at:

Bought at 94.00, sold at 95.56:

$$156 \text{ ticks} \times £12.50 \times 10 \text{ contracts} = £19{,}500$$

Holwell pays interest to its lender for the three months June to September at 6% annual rate. The extra interest is £75,000 – £55,500 = £19,500. However, the derivative profit offsets the extra interest cost on the loan Holwell takes out in June.

Note that if interest rates fall Holwell will gain by being charged lower interest on the actual loan, but this will be offset by the loss of the futures. Holwell sacrifices the benefits of potential favorable movements in rates to reduce risk.

As Exhibit 20.4 shows, the price of short-term interest rate futures are followed closely as they give an indication of the market view on the level of short-term interest rates a few months hence.

Forwards

Imagine you are responsible for purchasing potatoes to make crisps for your firm, a snack food producer. In the free market for potatoes the price rises or falls depending on the balance between buyers and sellers. These movements can be dramatic. Obviously you would like to acquire potatoes at a price that was as low as possible, while the potato producer wishes to sell for a price that is as high as possible. However both parties may have a similar interest in reducing the uncer-

Betting on interest rates

Graham Bowley

The short sterling market has its own advice to offer

As the Chancellor and the Governor of the Bank of England sit down to ponder interest rate policy at their monthly monetary meeting today, a £40bn-a-day industry will be pronouncing its own judgment on where rates are going next.

The betting in the so-called 'short sterling' futures market is that policymakers will leave rates unchanged until well into next year. Banks and companies use this market to protect themselves against adverse changes in rates, while speculators use it to gamble on how rates might move.

Short sterling futures are traded on the London International Financial Futures and Options Exchange. Their current price implies a prediction that base rates will still be at $6\frac{3}{4}$ per cent by the end of this year, rising to 7 per cent by the end of next year. With more than £10,000bn each year backing these bets, this is a forecast that policymakers ignore at their peril.

'Short sterling takes in all the latest economic and political news to give an indication of where the money market thinks short-term interest rates will be going in the future,' said Mr Nigel Richardson, an economist at Yamaichi International, a Japanese bank.

The companies and banks buying short sterling futures are making a simple bet. The price of the short sterling contract is equal to 100 minus whatever interest rate is expected when the three month contract expires, so the price of the contract rises when interest rates fall.

If a company thought interest rates would be $6\frac{3}{4}$ per cent by December it would expect the price of the December contract to be 93.25. If the current price of the December contract was below 93.25 – in other words the market expected interest rates to be higher than $6\frac{3}{4}$ per cent at the end of the year – then the company could buy the contract and expect to profit when it expired in December.

This allows a short sterling trader to protect itself against a possible interest rate movement, effectively fixing the interest rate at which it borrows or lends. A more aggressive investor can use short sterling to gamble on an interest rate change.

Imagine a company has a sum of money to invest in a bank, but fears interest rates will fall. The company could buy a short sterling contract expiring in three months. If, by then, interest rates had not fallen, the company would have lost nothing. If rates did fall the company would get a lower return on its investment, but this would have been offset by a rise in the price of the futures contract.

Another company might want to borrow money, but fear that interest rates are set to rise. It could hedge against this risk by selling short sterling futures. If rates did rise the company's borrowing costs would be higher, but it would be able to buy the contract back at a lower price and use the profit to offset the cost.

This is useful for banks providing fixed-rate mortgages. They use the short sterling market to fix the interest rates at which they borrow, which they can then pass on to customers.

Economists in the City use the forecast provided by the short sterling market as a basis for their own projections. 'It is very useful. It tells you what the market is predicting and you then take the market into account when making your own forecast,' said Mr Stuart Thomson, economist at Nikko, a Japanese bank.

But there have been times when the forecasts have been very different – and short sterling has not always been right. This year the short sterling market was expecting interest rates to be close to 9 per cent by December. Economists were expecting a more modest increase, and in the event they were proved more accurate.

Similarly, after the pound's exit from the European exchange rate mechanism in 1992, short sterling predicted that interest rates would have to remain high. In event they were cut aggressively.

'If you just want an average of the views of everybody acting in the market, then short sterling is fine,' said Mr Ian Shepherdson, an economist at HSBC Markets. 'But if you want an opinion, you need an economist. Short sterling gives the consensus, but the consensus is not always right.'

Policymakers will no doubt draw solace from the fact that markets can be wrong sometimes too.

EXHIBIT 20.4 Betting on interest rates

Source: *Financial Times* 1 November 1995

tainty of price. This will assist both to plan production and budget effectively. One way in which this could be done is to reach an agreement with the producer(s) to purchase a quantity of potatoes at a price agreed today to be delivered at a specified time in the future. Bensons, the UK crisp producer, buys 80 percent of its potatoes up to 19 months forward. Once the forward agreements have been signed and sealed Bensons may later be somewhat regretful if the spot price (price for immediate delivery) subsequently falls below the price agreed months earlier. Unlike option contracts, forwards commit both parties to complete the deal. However Bensons is obviously content to live with this potential for regret in order to remove the risk associated with such an important raw material.

Unlike option contracts, forwards commit both parties to complete the deal.

A forward contract is an agreement between two parties to undertake an exchange at an agreed future date at a price agreed now.

There are forward markets in a wide range of commodities but the most important forward markets today are for foreign exchange, in which hundreds of billions of dollars worth of currency are traded every working day – this is considered in Chapter 21.

Forward contracts are tailor-made to meet the requirements of the parties. This gives flexibility on the amounts and delivery dates. Forwards are not traded on an exchange but are 'over-the-counter' instruments – private agreements outside the regulation of an exchange. This makes them different to futures, which are standardized contracts traded on exchanges. Such an agreement exposes the counterparties to the risk of default – the failure by the other to deliver on the agreement. The risk grows in proportion to the extent to which the spot price diverges from the forward price as the incentive to renege increases.

Forward contracts are difficult to cancel, as agreement from each counterparty is needed. Also to close the contract early may result in a penalty being charged. Despite these drawbacks forward markets continue to flourish.

Forward rate agreements (FRAs)

FRAs are useful devices for hedging future interest rate risk. They are agreements about the future level of interest rates. The rate of interest at some point in the future is compared with the level agreed when the FRA was established and compensation is paid by one party to the other based on the difference.

For example, a company needs to borrow £6m in six months' time for a period of a year. It arranges this with bank X at a variable rate of interest. The current rate of interest for borrowing starting in six months is 7 percent. (For the sake of argument assume that this is Libor rate for borrowing starting in six months and this company can borrow at Libor). The company is concerned that by the time the loan is drawn down interest rates will be higher than 7 percent, increasing the cost of borrowing.

The company enters into a separate agreement with another bank (Y) – an FRA. It 'purchases' an FRA at an interest rate of 7 percent. This is to take effect six months from now and relate to a 12-month loan. Bank Y will never lend any money to the company but it has committed itself to paying compensation should interest rates (Libor) rise above 7 percent.

Suppose that in six months spot one-year interest rates are 8.5 percent. The company will be obliged to pay Bank X this rate: £6m × 0.085 = £510,000; this is £90,000 more than if the interest rates were 7 percent.[2] However, the FRA with Bank Y entitles the company to claim compensation equal to the difference between the rate agreed in the FRA and the spot rate. This is (0.085 – 0.07) × £6m = £90,000. So any increase in interest cost above 7 percent is exactly matched by a compensating payment provided by the counterparty to the FRA. However, if rates fall below 7 percent the company makes payments to Bank Y. For example, if the spot rate in six months is 5 percent the company benefits because of the lower rate charged by Bank X, but suffers an equal offsetting compensation payment to Bank Y of (0.07 – 0.05) × £6m = £120,000. The company has generated certainty over the effective interest cost of borrowing in the future. Whichever way the interest rates move it will pay £420,000.

This example is a gross simplification. In reality FRAs are generally agreed for three-month periods. So this company could have four separate FRAs for the year. It would agree different interest rates for each three-month period. If three-month Libor turns out to be higher than the agreed interest rate, Bank Y will pay the difference to the company. If it is lower the company pays Bank Y the difference. The 'sale' of an FRA by a company protects against a fall in interest rates. For example, if £10m is expected to be available for putting into a one-year bank deposit in three months the company could lock into a rate now by selling an FRA to a bank. Suppose the agreed rate is 6.5 percent and the spot rate in three

months is 6 percent, then the depositor will receive 6 percent from the bank into which the money is placed plus $\frac{1}{2}$ percent from the FRA counterparty bank.

The examples above are described as 6 against 18 (or 6 × 18) and 3 against 15 (or 3 × 15). The first is a 12-month contract starting in six months, the second is a 12-month contract starting in three months. More common FRA periods are 3 against 6 and 6 against 12. Typically sums of £5m–£100m are hedged in single deals in this market. Companies do not need to have an underlying lending or borrowing transaction – they could enter into an FRA in isolation and make or receive compensating payments only.

A comparison of options, futures and FRAs

We have covered a lot of ground in field of derivatives. It is time to summarize the main advantages and disadvantages of the derivatives covered so far – *see* Table 20.2.

Caps

An interest rate cap is a contract that gives the purchaser the right to effectively set a maximum level for interest rates payable. Compensation is paid to the purchaser of a cap if interest rates rise above an agreed level. This is a hedging technique used to cover interest rate risk on longer-term borrowing (usually two to five years). Under these arrangements a company borrowing money can benefit from interest rate falls but can place a limit to the amount paid in interest should interest rates rise.

Worked example 20.4
INTEREST RATE CAP

For example, Oakham plc may wish to borrow £20m for five years. It arranges this with bank A at a variable rate based on Libor plus 1.5%. The interest rate is reset every quarter based on three-month Libor. Currently this stands at an annual rate of 7%. The firm is concerned that over a five-year period the interest rate could rise to a dangerous extent.

Oakham buys an interest rate cap set at Libor of 8.5%. For the sake of argument we will assume that this costs 2.3% of the principal amount, or £20m × 0.023 = £460,000 payable immediately to the cap seller. If over the subsequent five years Libor rises above 8.5% in any three-month period Oakham will receive sufficient compensation from the cap seller to exactly offset any extra interest above 8.5%. So if for the whole of the third year Libor rose to 9.5% Oakham would pay interest at 9.5% plus 1.5% to bank A but would also receive 1% compensation from the cap seller (a quarter every three months), thus capping the interest payable. If interest rates fall Oakham benefits by paying bank A less.

The premium (£460,000) payable up front covers the buyer for the entire five years with no further payment due.

TABLE 20.2

A comparison of options, futures, forwards and forward rate agreements

Options	Futures	Forwards and FRAs
Advantages		
Downside risk is limited but the buyer is able to participate in favorable movements in the underlying.	Can create certainty: Specific rates are locked in.	Can create certainty: Specific rates are locked in.
Available on or off exchanges. Exchange regulation and clearing house reduce counterparty default risk for those options traded on exchanges.	Exchange trading only. Exchange regulation and clearing house reduce counterparty default risk.	Tailor-made, off-exchange. Not standardized as to size, duration and terms. Good for companies with non-standard risk exposures.
	No premium is payable. (However margin payments are required.)	No margins or premiums payable. (Occasionally a good faith performance margin is required by one or more parties in a forward. Also credit limits may be imposed.)
For many options there are highly liquid markets resulting in keen option premium pricing and ability to reverse a position quickly at low cost. For others trading is thin and so premiums payable may become distorted and offsetting transactions costly and difficult.	Very liquid markets. Able to reverse transactions quickly and cheaply.	
Disadvantages		
Premium payable reduces returns.	No right to let the contract lapse. Benefits from favorable movements in underlying are forgone.	No right to let the contract lapse. Benefits from favorable movements in underlying are forgone.
	In a hedge position if the underlying transaction does not materialize, resulting in a switch from a covered to an uncovered position, the potential loss is unlimited.	In a hedge position if the underlying transaction does not materialize, resulting in a switch from a covered to an uncovered position, the potential loss is unlimited.
Margin required when writing options.	Many exchange restrictions – on size of contract, duration (e.g. only certain months of the year), trading times (e.g. when euronext.liffe is open).	Greater risk of counterparty default – not exchange traded therefore counter-party is not the clearing house.
	Margin calls require daily work for 'back office'.	More difficult to liquidate position by creating offsetting transaction that cancels position.

The size of the cap premium depends on the difference between current interest rates and the level at which the cap becomes effective; the length of time covered; and the expected volatility of interest rates. The cap seller does not need to assess the creditworthiness of the purchaser because it receives payment of the premium in advance. Thus a cap is particularly suitable for highly geared firms, such as leveraged buyouts.

Floors and collars

Buyers of interest rate caps are sometimes keen to reduce the large cash payment at the outset. They can do this by simultaneously selling a floor, which results in a counterparty paying a premium. With a floor, if the interest rate falls below an agreed level, the seller (the floor writer) makes compensatory payments to the floor buyer. These payments are determined by the difference between the prevailing rates and the floor rate.

Returning to Oakham, the treasurer could buy a cap set at 8.5 percent Libor for a premium of £460,000 and sell a floor at 6 percent Libor receiving, say, £200,000. In any three-month period over the five-year life of the loan, if Libor rose above 8.5 percent the cap seller would pay compensation to Oakham; if Libor fell below 6 percent Oakham would save on the amount paid to bank A but will have to make payments to the floor buyer, thus restricting the benefits from falls in Libor. Oakham, for a net premium of £260,000, has ensured that its effective interest payments will not diverge from the range 6 percent + 1.5 percent = 7.5 percent at the lower end, to 8.5 percent + 1.5 percent = 10 percent at the upper end.

Selling a floor at a low strike rate and buying a cap at a higher strike rate is called a collar.

The combination of selling a floor at a low strike rate and buying a cap at a higher strike rate is called a collar.

Swaps

A swap is an exchange of cash payment obligations. An interest-rate swap is where one company arranges with a counterparty to exchange interest-rate payments. For example, the first company may be paying fixed-rate interest but prefers to pay floating rates. The second company may be paying floating rates of interest, which go up and down with Libor, but would benefit from a switch to a fixed obligation. Imagine that firm S has a £200m ten-year loan paying a fixed rate of interest of 8 percent, and firm T has a £200m ten-year loan on which interest is reset every six months with reference to Libor, at Libor plus 2 percent. Under a swap arrangement S would agree to pay T's floating-rate interest on each due date over the next ten years, and T would be obligated to pay S's 8 percent interest.

A swap is an exchange of cash payment obligations.

One motive for entering into a swap arrangement is to reduce or eliminate exposure to rises in interest rates. Over the short run, futures, options and FRAs could be used to hedge interest-rate exposure. However for longer-term loans (more than two years) swaps are usually more suitable because they can run the entire lifetime of the loan. So if a treasurer of a company with a large floating-rate loan forecasts that interest rates will rise over the next four years, he/she could arrange to swap interest payments with a fixed-rate interest payer for those four years.

Another reason for using swaps is to take advantage of market imperfections. Sometimes the interest-rate risk premium charged in the fixed-rate borrowing market differs from that in the floating-rate market for a particular borrower.

Worked example 20.5
SWAPS

Take the two companies, Cat plc and Dog plc, both of which want to borrow £150m for eight years. Cat would like to borrow on a fixed-rate basis because this would better match its asset position. Dog prefers to borrow at floating rates because of optimism about future interest-rate falls. The treasurers of each firm have obtained quotes from banks operating in the markets for both fixed- and floating-rate eight-year debt. Cat could obtain fixed-rate borrowing at 10% and floating rate at Libor +2%. Dog is able to borrow at 8% fixed and Libor +1% floating:

	Fixed	*Floating*
Cat can borrow at	10%	Libor +2%
Dog can borrow at	8%	Libor +1%

In the absence of a swap market Cat would probably borrow at 10% and Dog would pay Libor +1%. However with a swap arrangement both firms can achieve lower interest rates.

Notice that because of Dog's higher credit rating it can borrow at a lower rate than Cat in both the fixed and the floating-rate market – it has an absolute advantage in both. However the risk premium charged in the two markets is not consistent. Cat has to pay an extra 1% in the floating-rate market, but an extra 2% in the fixed-rate market. Cat has an absolute disadvantage for both, but has a comparative advantage in the floating-rate market.

To achieve lower interest rates each firm should borrow in the market where it has comparative advantage. So Cat borrows floating-rate funds, paying Libor +2%, and Dog borrows fixed-rate debt, paying 8%.

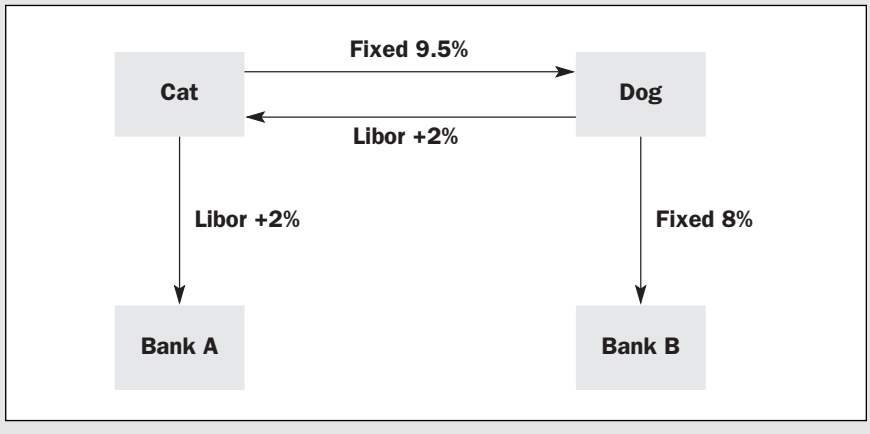
Then they agree to swap interest payments at rates which lead to benefits for both firms in terms of (a) achieving the most appropriate interest

pattern (fixed or floating), and (b) the interest rate that is payable is lower than if Cat had borrowed at fixed and Dog had borrowed at floating rates. *One* way of achieving this is to arrange the swap on the following basis:

- Cat pays to Dog fixed interest of 9.5%;
- Dog pays to Cat Libor +2%.

This is illustrated in Figure 20.1.

FIGURE 20.1
An interest rate swap



Now let us examine the position for each firm.

Cat pays Libor +2% to a bank but also receives Libor +2% from Dog and so these two cancel out. Cat also pays 9.5% fixed to Dog. This is 50 basis points (0.5%) lower than if Cat had borrowed at fixed rate directly from the bank. On £150m this is worth £750,000 per year.

Cat:	
Pays	Libor +2%
Receives	Libor +2%
Pays	Fixed 9.5%
Net payment	Fixed 9.5%

Dog takes on the obligation of paying a bank fixed interest at 8% while receiving 9.5% fixed from Cat on the regular payment days. The net effect is 1.5% receivable less the Libor +2% payment to Cat – a floating-rate liability of Libor +0.5%.

Dog:	
Pays	Fixed 8%
Receives	Fixed 9.5%
Pays	Libor +2%
Net payment	Libor +0.5%

Again there is a saving of 50 basis points or £750,000 per year.[3] The net annual £1.5m saving is before transaction costs.

Prior to the widespread development of a highly liquid swap market each counterparty incurred considerable expense in making the contracts watertight. Even then, the risk of one of the counterparties failing to fulfil its obligations was a potential problem. Today intermediaries (for example banks) take counterparty positions in swaps and this reduces risk and avoids the necessity for one corporation to search for another with a corresponding swap preference. The intermediary generally finds an opposite counterparty for the swap at a later date. Furthermore, standardized contracts reduce the time and effort to arrange a swap and have permitted the development of a thriving secondary market, and this has assisted liquidity.

There are many variations on the swaps theme. For example, a 'swaption' is an option to have a swap at a later date. In a currency swap the two parties exchange interest obligations (or receipts) and the principal amount for an agreed period, between two different currencies. On reaching the maturity date of the swap the principal amounts will be re-exchanged at a pre-agreed exchange rate. An example of such an arrangement is shown in Exhibit 20.5.

Derivatives users

There are three types of user of the derivatives markets: hedgers, speculators and arbitrageurs.

Hedgers

To hedge is to enter into a transaction(s) that protects a business or assets against changes in some underlying. The instruments bought as a hedge tend to have the opposite-value movements to the underlying. Financial and commodity markets are used to transfer risk from an individual or corporation to another more willing and/or able to bear that risk.

To hedge is to enter into a transaction(s) that protects a business or assets against changes in some underlying.

TVA, EIB find winning formula

Richard Lapper

The back-to-back swap deal priced yesterday for the Tennessee Valley Authority and the European Investment Bank will give both cheaper funding than they could obtain through conventional bond issuance.

TVA, the US government-owned power utility, is issuing a 10-year DM1.5bn eurobond with a Frankfurt listing, while EIB is raising $1bn with a 10-year issue in the US market. The issuers will swap the proceeds.

Speaking in London yesterday, the treasurers of both organisations said the arrangement – now relatively unusual in the swaps market – had allowed them to reduce borrowing costs, although they did not specify by what amount.

Two elements of the deal were important in this respect. First, the EIB has a much stronger comparative advantage over TVA in funding in dollars than it does in D-Marks. Lehman Brothers, co-bookrunner on both deals, said the EIB priced its 10-year dollar paper at 17 basis points over Treasuries, about 6 to 7 points lower than TVA could have done.

In the German market EIB enjoys a smaller advantage; it could raise funds at about 4 basis points less than the 17 points over bonds achieved by TVA.

Second, by swapping the proceeds on a back-to-back basis rather than through counter-parties, bid/offer spreads were eliminated and transaction costs reduced.

Resulting savings were pooled, providing benefits for both borrowers.

Both also diversified their funding sources. Lehman said some 65 per cent of the TVA bonds were placed in Europe, 20 per cent in Asia, and 15 per cent in the US. About half the EIB issue was placed in the US, 35 per cent in Europe, and 15 per cent in Asia.

EXHIBIT 20.5 TVA, EIB find winning formula

Source: *Financial Times* 12 September 1996

Consider a firm that discovers a rich deposit of platinum in Kenya. The management is afraid to develop the site because they are uncertain about the revenues that will actually be realized. Some of the sources of uncertainty are that: (a) the price of platinum could fall; (b) the floating-rate loan taken out to develop the site could become expensive if interest rates rise; and (c) the value of the currencies could move adversely. The senior managers have more or less decided that they will apply the firm's funds to a less risky venture. A young executive steps forward and suggests that this would be a pity, saying: 'The company is passing up a great opportunity, and Kenya and the world economy will be poorer as a result. Besides, the company does not have to bear all of these risks given the sophistication of modern financial markets. The risks can be hedged, to limit the downside. For example, the platinum could be sold on the futures market, which will provide a firm price. The interest-rate liability can be capped or swapped into a fixed-rate loan. Other possibilities include using the FRA and the interest futures markets. The currency risk can be controlled by using currency forwards or options.' The

Board decides to press ahead with development of the mine and thus show that derivatives can be used to promote economic well-being by transferring risk.

Speculators

Speculators take a position in financial instruments and other assets with a view to obtaining a profit on changes in value. Speculators accept high risk in anticipation of high reward. The gearing effect of derivatives makes speculations in these instruments particularly profitable, or particularly ruinous. Speculators are also attracted to derivatives markets because they are often more liquid than the underlying markets. In addition the speculator is able to sell before buying (to 'short' the market) to profit from a fall. More complex trading strategies are also possible.

Speculators take a position in financial instruments and other assets with a view to obtaining a profit on changes in value.

The term speculator in popular parlance is often used in a somewhat critical fashion. This is generally unwarranted. Speculators are needed by financial markets to help create trading liquidity. Prices are more, not less, likely to be stable as a result of speculative activity. Usually speculators have dissimilar views regarding future market movements and this provides two-way liquidity that allows other market participants, such as hedgers, to carry out a transaction quickly without moving the price. Imagine if only hedgers with an underlying were permitted to buy or sell derivatives. Very few trades would take place each day. If a firm wished to make a large hedge this would be noticed in the market and the price of the derivative would be greatly affected – moving against the trader. Speculators also provide a kind of insurance for hedgers – they accept risk in return for a premium.

Arbitrageurs

The act of arbitrage is to exploit price differences on the same instrument or similar assets. The arbitrageur buys at the lower price and immediately resells at the higher price. So, for example, Nick Leeson claimed that he was arbitraging Nikkei 225 Index futures. The same future is traded in both Osaka and Singapore. Theoretically the price should be identical on both markets, but in reality this is not always the case, and it is possible simultaneously to buy the future in one market and sell the future in the other and thereby make a risk-free profit. An arbitrageur waits for these opportunities to exploit market inefficiency. The problem for Barings Bank was that Nick Leeson obtained funds to put down as margin payments on arbitrage trades but then bought futures in both markets – surreptitiously switching from an arbitrage activity to a highly risky, speculative activity. True arbitrageurs help to ensure pricing efficiency – their acts of buying or selling tend to reduce pricing anomalies.

The act of arbitrage is to exploit price differences on the same instrument or similar assets.

Over-the-counter (OTC) and exchange-traded derivatives

An OTC derivative is a tailor-made, individual arrangement between counterparties, usually a company and its bank. Standardized contracts (exchange-traded derivatives) are available on dozens of derivatives around the world, for example the Chicago Board of Trade (CBOT), Chicago Board Options Exchange (CBOE), the Chicago Mercantile Exchange (CME), euronext.liffe, the MATIF in France and the Eurex in Germany and Switzerland. Roughly one-half of outstanding derivatives contracts are traded on exchanges.

An OTC derivative is a tailor-made, individual arrangement between counterparties, usually a company and its bank.

Many derivatives markets are predominantly, if not exclusively, OTC: interest-rate FRAs, swaps, caps, collars, floors, currency forwards and currency swaps. Figure 20.2 compares OTC and exchange-traded derivatives.

FIGURE 20.2
OTC and exchange-traded derivatives

OTC derivative

Advantages

- Contracts can be tailor-made, which allows perfect hedging and permits hedges of more unusual underlyings.

Disadvantages

- There is a risk (credit risk) that the counterparty will fail to honor the transaction.
- Low level of market regulation with resultant loss of transparency and price dissemination.
- Often difficult to reverse a hedge once the agreement has been made.
- Higher transaction costs.

Exchange-traded derivative

Advantages

- Credit risk is reduced because the clearing house is counterparty.
- High regulation encourages transparency and openness on the price of recent trades.
- Liquidity is usually much higher than for OTC – large orders can be cleared quickly due to high daily volume of trade.
- Positions can be reversed by closing quickly – an equal and opposite transaction is completed in minutes.

Disadvantages

- Standardization may be restrictive, e.g. standardized terms for quality of underlying, quantity, delivery dates.
- The limited trading hours and margin requirements may be inconvenient.

Conclusion

As derivatives become increasingly important we need to be aware of the potential for harm that can arise from their misuse. However, the danger must not lead us to reject their use entirely. For some firms in some circumstance they can help create value. In others they can be, as Warren Buffett has called them, financial weapons of mass destruction. Given the wide-ranging nature of this book we can only touch on the main characteristics of derivatives here. But hopefully, even this limited discussion has given you some insight into their power for both wealth creation and wealth destruction. The next chapter builds on knowledge of the main types of derivatives to show how they can be used to reduce the risk of companies that operate across international borders.

Websites

www.bloomberg.com	Bloomberg
www.reuters.com	Reuters
www.money.cnn.com	CNN Financial News
www.wsj.com	Wall Street Journal
www.ft.com	Financial Times
www.fow.com	Futures and Options World
www.liffe.com	London International Financial Futures and Options Exchange
www.liffeinvestor.com	Information and learning tools from LIFFE to help the private investor
www.liffe-style.com	Prices on LIFFE
www.cbot.com	Chicago Board of Trade
www.cboe.com	Chicago Board Options Exchange
www.amex.com	American Stock Exchange
www.nyse.com	New York Stock Exchange
www.eurexchange.com	Eurex, the European Derivative Exchange
www.isda.org	International Swaps and Derivatives Association

Notes

1 Caps, floors and collars are usually constructed from options on interest rates and so, in truth, belong in the option category. However, they are included in this chapter because they are another tool for managing interest rate risk, a major theme of this chapter.

2 All figures are slightly simplified because we are ignoring the fact that the compensation is received in six months whereas interest to Bank X is payable in 18 months.

3 Under a swap arrangement the principal amount (in this case £150m) is never swapped and Cat retains the obligation to pay the principal to bank A. Neither of the banks is involved in the swap and may not be aware that it has taken place. The swap focusses entirely on the three-monthy or six-monthly interest payments.