

Swaps and Other Derivatives

This is the second edition. Much has changed since the first was written in 2000. For the first seven years of the new century, the derivative market continued to grow at an exponential pace. From 2008, its growth reversed, albeit not by much, as the global economic recession bit. In terms of notional amount, it reduced by just over 13% in the second half of 2008, to just under USD600 trillion. Between the publication of the first edition and the writing of the second, there have been some major developments. Two in particular stand out: the growth in the credit transfer market, and the massive issuance of complex securities enabling investors to earn potentially higher returns by taking on more risks.¹ Hence the requirement for a second edition, which addresses both of these topics in considerable detail.

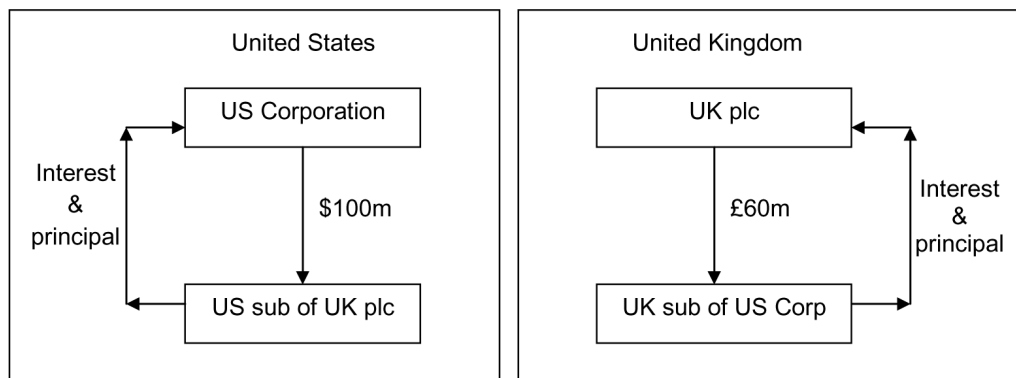
1.1 INTRODUCTION

In the 1970s there was an active Parallel Loan market. This arose during a period of exchange controls in Europe. Imagine that there is a UK company that needs to provide its US subsidiary with \$100 million. The subsidiary is not of sufficiently good credit standing to borrow the money from a US bank without paying a considerable margin. The parent however cannot borrow the dollars itself and then pass them on to its subsidiary, or provide a parent guarantee, without being subject to the exchange control regulations which may make the transaction impossible or merely extremely expensive.

The Parallel Loan market requires a friendly US company prepared to provide the dollars, and at the same time requiring sterling in the UK, perhaps for its own subsidiary. Two loans with identical maturities are created in the two countries as shown. Usually the two principals would be at the prevailing spot FX rate, and the interest levels at the market rates. Obviously credit is a major concern, which would be alleviated by a set-off clause. This clause allowed each party to off-set unpaid receipts against payments due. As the spot and interest rates moved, one party would find that their loan would be “cheap”, i.e. below the current market levels, whilst the other would find their loan “expensive”. If the parties marked the loans to market—in other words, valued the loans relative to the current market levels—then the former would have a positive value and the latter a negative one. A “topping-up” clause, similar in today’s market to a regular mark-to-market and settlement, would often be used to call for adjustments in the principals if the rates moved by more than a trigger amount.

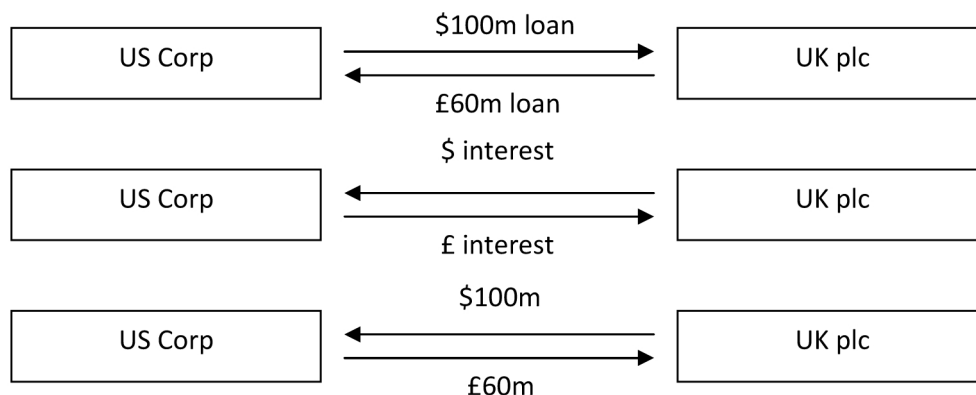
¹ Whether investors actually understood the risks they were taking on is an unanswered question, and very much outside the remit of this book.

Parallel loans



As exchange controls were abolished, the Parallel Loan became replaced with the back-to-back Loan market whereby the two parent organisations would enter into the loans directly with each other. This simplified the transactions, and reduced the operational risks. Because these loans were deemed to be separate transactions, albeit with an off-setting clause, they appeared on both sides of the balance sheet, with a potential adverse effect on the debt/equity ratios.

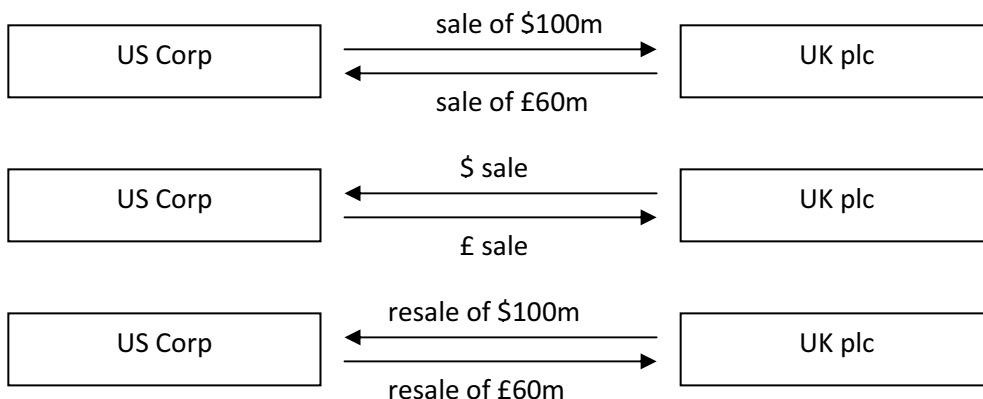
Back-to-Back Loan



The economic driving force behind back-to-back loans is an extremely important concept called “comparative advantage”. Suppose the UK company is little known in the US; it would be expensive to raise USD directly. Therefore borrowing sterling and doing a back-to-back loan with a US company (who may of course be in exactly the reverse position) is likely to be cheaper. In theory, comparative advantage cannot exist in efficient markets; in reality, markets are not efficient but are racked by varieties of distortions. Consider the simple corporate tax system: if a company is profitable, it has to pay tax; if a company is unprofitable, it doesn’t. The system is asymmetric; unprofitable companies do not receive “negative” tax (except possibly in the form of off-sets against future profits). Any asymmetry is a distortion, and it is frequently feasible to derive mechanisms to exploit it—such as the leasing industry.

Cross-currency swaps were rapidly developed from back-to-back loans in the late 1970s. In appearance they are very similar, and from an outside observer only able to see the cashflows, identical. But subtly different in that all cashflows are described as contingent sales or purchases, i.e. each sale is contingent upon the counter-sale. These transactions, being forward conditional commitments, are off-balance sheet. We have the beginning of the OTC swap market!

Cross-currency Swap



The structure of a generic (or vanilla) cross-currency swap is therefore:

- initial exchange of principal amounts;
- periodic exchanges of interest payments;²
- re-exchange of the principal amounts at maturity.

Notice that, if the first exchange is done at the current spot exchange rate, then it possesses no economic value and can be omitted.

Interest rate, or single-currency swaps, followed soon afterwards. Obviously exchange of principals in the same currency makes no economic sense, and hence an interest swap only consists of the single stage:

- periodic exchanges of interest payments;

where interest is calculated on different reference rates. The most common form is with one side using a variable (or floating) rate which is determined at regular intervals, and the other a fixed reference rate throughout the lifetime of the swap.

1.2 APPLICATIONS OF SWAPS

As suggested by its origins, the earliest applications of the swap market were to assist in the raising of cheap funds through the comparative advantage concept. The EIB–TVA transaction in 1996 was a classic example of this, and is described in the box below. The overall

² Remember: legally these cashflows are not “interest” but contingent sales, but for clarity of exposition they will be called “interest” as they are calculated in exactly the same way.

benefit to the two parties was about \$3 million over a 10-year period, and therefore they were both willing to enter into the swap.

Comparative Advantage:

European Investment Bank–Tennessee Valley Authority swap

Date: September 1996

Both counterparties had the same objective: to raise cheap funds. The EIB, being an European lender, wanted deutschmarks. The TVA, all of whose revenues and costs were in USD, wanted to borrow dollars. Their funding costs (expressed as a spread over the appropriate government bond market) are shown in the matrix below:

	USD	DEM
EIB	$T + 17$	$B + 13$
TVA	$T + 24$	$B + 17$
Spread	7 bp	4 bp

Whilst both organisations were AAA, the EIB was deemed to be the slightly better credit.

If both organisations borrowed directly in their required currency, the total funding cost would be (approximately—because strictly the spreads in different currencies are not additive) 37 bp over the two bond curves.

However, the relative spread is much closer in DEM than it is in USD. This was for two reasons:

- the TVA had always borrowed USD, and hence was starting to pay the price of excess supply;
- it had never borrowed DEM, hence there was a considerable demand from European investors at a lower rate.

The total cost if the TVA borrowed DEM and the EIB borrowed USD would be only 34 bp, saving 3 bp pa.

The end result:

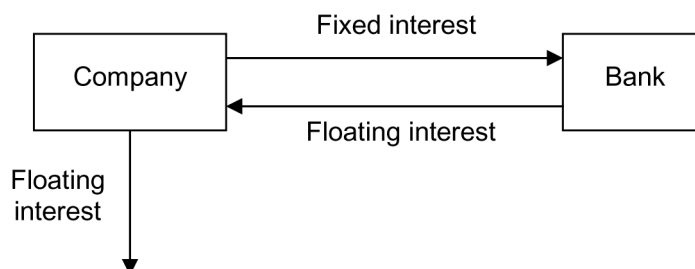
- EIB issued a 10-year \$1 billion bond;
- TVA issued a 10-year DM1.5 billion bond; and
- they swapped the proceeds to raise cheaper funding, saving roughly \$3 million over the 10 years.

This was a real exercise in Comparative Advantage; neither party wanted the currency of their bond issues, but it was cheaper to issue and then swap.

It was quickly realised that swaps, especially being off-balance sheet instruments, could also be effective in the management of both currency and interest rate medium-term risk. The commonest example is of a company who is currently paying floating interest, and who is concerned about interest rates rising in the future; by entering into an interest rate swap to pay a fixed rate and to receive a floating rate, uncertainty has been removed.

To ensure that the risk management is effective, the floating interest receipts under the swap must exactly match the interest payments under the debt. Therefore the swap must mirror any structural complexities in the debt, such as principal repayment schedules, or

options to repay early, and so on. Usually a swap entered into between a bank and a customer is tailored specifically for that situation. This book will provide details of many of the techniques used to structure such swaps.



A well-known and very early example of the use of swaps is the one conducted between the World Bank and IBM in August 1981—described in the box below. This swap had the reputation of kick-starting the swap market because it was performed by two extremely prestigious organisations, and received a lot of publicity which attracted many other end-users to come into the market. It was the first long-term swap done by the World Bank, who is now one of the biggest users of the swap market.

World Bank–IBM Swap

Date: August 1981

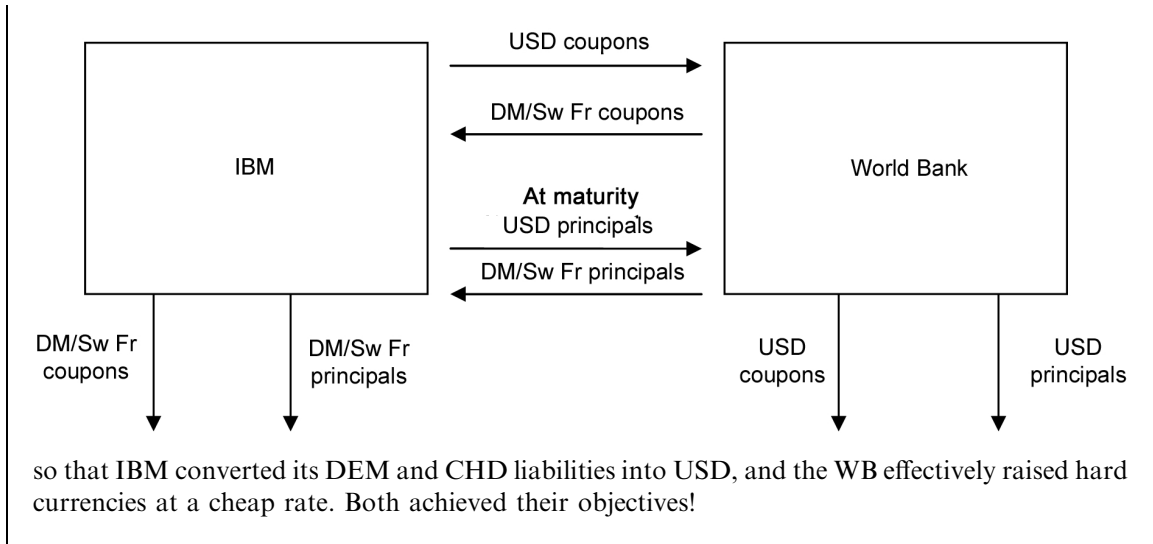
This is a simplified version of the famous swap. The two counterparties have very different objectives.

IBM had embarked upon a world-wide funding programme some years earlier, raising money *inter alia* in deutschmarks and Swiss francs. The money was remitted back to the US for general funding. This had created a FX exposure, because IBM had to convert USDs into DEMs and CHFs regularly to make the coupon payments. Over the years the USD had significantly strengthened, creating a gain for IBM. It now wished to lock in the gain and remove any future exposure.

The World Bank had a policy of raising money in hard currency; namely DEM, CHF and yen. It was a prolific borrower, and by 1981 was finding that its cost of funds in these currencies was rising simply through an excess supply of WB paper. Its objective, as always, was to raise cheap funds.

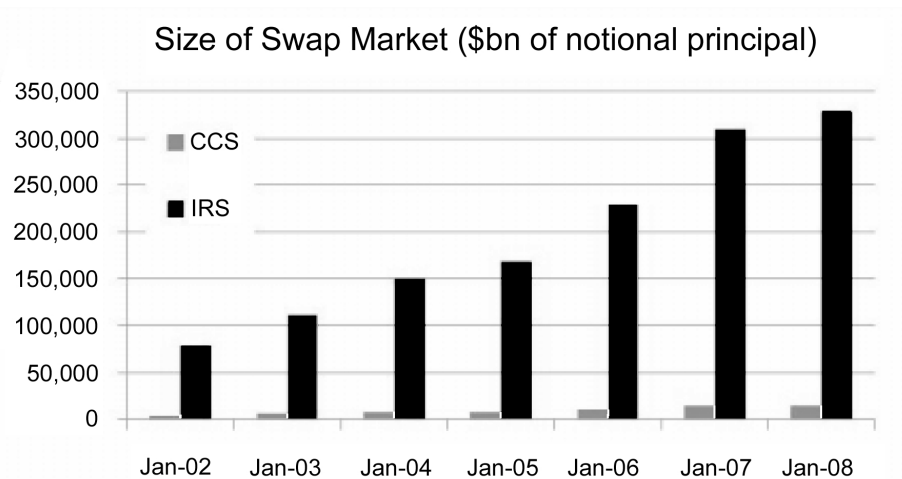
Salomon Brothers suggested the following transactions:

- (a) The WB could still raise USD at relatively cheap rates, therefore it should issue two euro-dollar bonds:
 - one matched the principal and maturity of IBM's DEM liabilities equivalent to \$210 million;
 - the other matched IBM's Swiss franc liabilities equivalent to \$80 million.
 Each bond had a short first period to enable the timing of all the future cashflows to match.
- (b) There was a 2-week settlement period, so WB entered into a FX forward contract to:
 - sell the total bond proceeds of \$290 million;
 - buy the equivalent in DEM and CHF;
- (c) IBM and WB entered into a two-stage swap whereby:



1.3 AN OVERVIEW OF THE SWAP MARKET

From these earliest beginnings, the swap market has grown exponentially. As the graph shows, the volume of interest rate swap business now totally dominates cross-currency swaps,³ suggesting that risk management using swaps is commonplace.



The graph is shown in terms of notional principal outstanding, i.e. the principals of all swaps transacted but not yet matured; for the cross-currency swap described above, this would be recorded as $[\$100m + £60m * S]/2$ where S is the current spot rate. The market has shown a remarkable and consistent growth in activity.

³ The source of these data is the Bank for International Settlement (BIS) which conducts a semi-annual survey of some 48 central banks and monetary authorities. It also does a more extensive triennial survey.

It is arguable whether this is a very appropriate way of describing the current size of the market, although it certainly attracts headlines. Many professionals would use “gross market value” or total replacement cost of all contracts as a more realistic measure. This measure had been in broad decline as banks improve their risk management, and are unwilling to take on greater risks due to the imposition of capital charges. However, as can be seen from the figures below, the gross value increased in the second half of 2008, especially in interest rate and credit derivatives, due to the dramatic movements in these markets.

A brief overview of the OTC derivative market is shown in the table below. Probably the most important statistic is that, despite all the publicity given to more exotic transactions, the overwhelming workhorse of this market is the relatively short-term interest rate swap.

The derivative markets continue to grow at an astounding rate—why? There are two main sources of growth—breadth and depth:

- financial markets around the world have increasingly deregulated over the past 30 years, witness activities in Greece and Portugal, the Far East and Eastern Europe. As they do, cash and bond markets first develop followed rapidly by swap and option markets;
- the original swaps were done in relatively large principal amounts with high-credit counterparties. Banks have however been increasingly pushing derivatives down into the lower credit depths in the search of return. It is feasible to get quite small transactions, and some institutions even specialise in aggregating retail demand into a wholesale transaction.

A brief overview of the current state of the derivative market (in December 2008)

(extracted from the semiannual BIS surveys)

The total OTC derivative market was estimated to be just under \$600 trillion, measured in terms of outstanding principal amount, broken up as shown below (in US billions):

	Notional principal			Gross values		
	Dec-06	Dec-07	Jun-08	Dec-08	Jun-08	Dec-08
FX	40,271	56,238	62,983	49,753	2,262	3,917
Forwards	19,882	29,144	31,966	24,562	802	1,732
Swaps	10,792	14,347	16,307	14,725	1,071	1,588
Options	9,597	12,748	14,701	10,466	388	597
IR	291,582	393,138	458,304	418,678	9,263	18,420
FRAs	18,668	26,599	39,370	39,262	88	153
Swaps	229,693	309,588	356,772	328,114	8,056	16,573
Options	43,221	56,951	62,162	51,301	1,120	1,694
Equity	7,488	8,469	10,177	6,494	1,146	1,113
Commodity	7,115	8,455	13,229	4,427	2,209	955
CDS	28,650	57,894	57,325	41,868	3,172	5,652

	Notional principal			Gross values		
	Dec-06	Dec-07	Jun-08	Dec-08	Jun-08	Dec-08
S–N CDS	17,879	32,246	33,334	25,730	1,889	3,695
M–N CDS	10,771	25,648	23,991	16,138	1,283	1,957
Unallocated	39,740	71,146	81,708	70,742	2,301	3,831
Exchange-traded	70,444	79,078	82,008	57,876		

The table shows the fairly dramatic slowdown and then drop during 2008, especially with equity, commodity and credit-related derivatives, but also the increase in gross value.

Maturity	FX	IRS
Under 1 year	65%	33% of total market
1–5 years	19%	33%
Over 5 years	16%	34%

The above table shows that the majority of FX derivatives, predominantly forwards, are under 1 year in maturity, interest rate derivatives are typically much longer, averaging between 5 and 10 years. The Eurozone, UK and US routinely now trade swaps out to 50 years. In terms of currencies, the major ones have little changed over the past 10 years. The main development is the increased rise in euro products, and the relative decline in USD.

Currency	Percentage of market share of IR derivatives Dec-08
USD	36.6%
Euro	38.7
Yen	14.1
GBP	7.4
Sw Fr	1.2
Can \$	0.7
Sw Kr	1.3

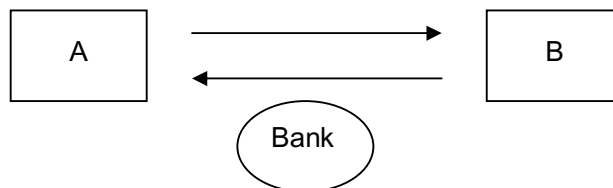
1.4 THE EVOLUTION OF THE SWAP MARKET

The discussion below refers to the evolution of the early swap market in the major currencies during the 1980s. It is however applicable to many other generic markets as they have developed.

There are typically three phases of development of a swap market:

1. In the earliest days of a market, it is very much an arranged market whereby two swap end-users would negotiate directly with each other, and an “advisory” bank may well extract an upfront fee for locating and assisting them. This was obviously a slow

market, with documentation frequently tailored for each transaction. The main banks involved are investment or merchant banks, long on people but low on capital and technology as of course they were taking no risk. Typical counterparties would be highly rated, and therefore happy to deal directly with each other.



The first swap markets in the major currencies were even slower, as there was considerable doubt about the efficacy of swaps. End-users were dubious about moving the activities off-balance sheet, and there was apprehension that the accounting rules would be changed to force them back on-balance sheet. The World Bank–IBM swap (described above) played a major role in persuading people that the swap market was acceptable.

2. In the second phase, originally early to mid-1980s, commercial banks started to take an increasing role providing traditional credit guarantees.



The counterparties now would both negotiate directly with the bank, who would structure back-to-back swaps but take the credit risk, usually for an on-going spread not an upfront fee. The normal lending departments of the bank would be responsible for negotiating the transaction and the credit spread. The documentation is now more standardised and provided by the bank. This role is often described as acting as an “intermediary”, taking credit but not market risk.

The role of intermediary may also be encouraged by external legislation. In the UK for example, if a swap is entered into by two non-bank counterparties, the cashflows are subject to withholding tax. This is not true if one counterparty is a bank.

3. The concept of a market-making bank originally developed by the mid to late 1980s, whereby a bank would provide swap quotations upon request. This would mean that they would be dealing with a range of counterparties simultaneously, and entering into a variety of non-matching swaps. With increased market risk, such banks required considerably more capital, pricing and risk management systems, and very standardised documentation. The swap market became dominated by the large commercial banks who saw it as a volume, commoditised business.

These banks would be typically off-setting the market risk by hedging in another market, usually the equivalent government bond market as this is the most liquid. Therefore banks with an underlying activity in this market are likely to be at a competitive advantage. Local domestic banks usually have close links with the local government bond market, and hence they are frequently dominant in the domestic swap market. Probably the only market where this is not the case is the USD market, where the markets are so large that a number of foreign banks can also be highly active and competitive.

It might be worth making the point here that banks frequently and misleadingly talk about “trading” swaps, as if a swap were equivalent to a spot FX transaction which is settled and forgotten about within two days. A swap is actually a transaction which has created a long-term credit exposure for the bank. The exposure is likely to remain on the bank’s books long after the swap “trader” has been paid a bonus and has left the bank. From this perspective, swaps fit much more comfortably within the traditional lending departments with all the concomitant credit-controlling processes and not within a treasury which is typically far more lax about credit.

This link with the bond market has meant that a bank may well adopt different roles in different markets. For example, a Scandinavian bank such as Nordea Bank would be a market-maker in the Scandinavian and possibly some of the Northern European currencies. On the other hand, it would act as an intermediary in other currencies. For example, if a customer wanted to do a South African rand swap, it would enter into it taking on the credit risk, but immediately laying off the market risk with a rand market-making bank.

In this context, the 1996 EIB–TVA swap was interesting. The deal was brokered by Lehmann Brothers, but who played no role in the swap. At one point the swap had been out for tender from a bank but (rumour has it) the bid was a 1 bp spread. Why, asked the two counterparties, do we need to deal with a bank at all, especially given that we are both AAA which is better than virtually all banks? So they dealt directly! As the relative credit standing of banks declines, the market may well see more transactions of this nature—back full circle.

One cannot really talk about a “global” swap market. There are obviously some global currencies, notably USD, yen and the euro, which are traded 24 hours a day, and when it would be feasible to get swaps. But most swap markets are tied into their domestic markets, and hence available only during trading hours.

Swap brokers still play an important role in this market. Their traditional role has been to identify the cheapest suitable counterparty for a client, usually on the initial basis of anonymity. This activity creates liquidity and a uniformity of pricing, to the overall benefit of market participants. However, as the markets in the most liquid currencies continue to grow, the efficiency provided by a broker is less valued and their fees have been increasingly reduced to a fraction of a basis point. They are being forced to develop more electronic skills to survive.

1.5 CONCLUSION

The story of the swaps market has been one of remarkable growth from its beginnings only some 30 years ago. This growth has demonstrated that there is a real demand for the benefits swaps can bring, namely access to cheap funds and risk management, globally. Furthermore, the growth shows little sign of abating as swap markets continue to expand both geographically as countries deregulate and downwards into the economy. As we enter into 2009 and beyond, have derivatives suddenly become irrelevant?⁴ In my view, certainly not. The measurement and management of risk, whether it be interest rate, foreign exchange rate, credit and so on, is, and will remain, critical for all organisations. To suddenly deny the main mechanism for managing these risks is simply irrational. What is, of course, important is to ensure that users of derivatives understand and can assess

⁴ Or, as Warren Buffett famously described them, “toxic waste”.

derivatives, or at least employ people that do. I very much hope that this book will play some small role in the continued use of derivatives, and assisting the orderly development of the market, by ensuring that people are well-trained in their understanding of the pricing, structuring and risk management of swaps and related derivatives.

