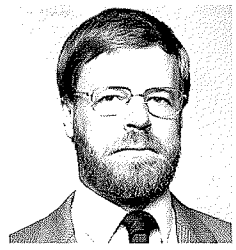
# Derivatives – friend or foe?

*Derivatives are widely, and properly, used to reduce corporate risks. However, writers* ***Wayne Lonergan*** *and* ***Andrew Thirsk*** *suggest that corporations which do not fully understand how to value, control and account for derivatives may suffer large losses, similar to those incurred by AWA in foreign exchange trading. This danger has grown partly out of the increased speculative trading that has taken the use of derivative instruments beyond their original hedging role.*



*Wayne Lonergan*

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Derivatives — essentially hedging instruments having some option and/or future element — are generally traded through an equity or futures exchange (derivatives in this instance include exchange-traded options and share-price index futures), or on an "over-the-counter" (OTC) basis in which transactions are made party-to-party instead of through the exchange. In most OTC transactions, one party is a bank or investment bank.

The instruments are used by corporations for the following principal reasons:

■ *To match the risk profile of associated assets and liabilities, thereby creating a natural hedge against volatility in exchange and/or interest rates.*

For example, an Australian company with operations in the United States that have been funded with $A-denominated borrowings may seek to swap the $A borrowings into $US-denominated borrowings. In this way, exchange rate volatility in the $US profit stream will be "matched" with a similar (and opposite) volatility in the $US borrowing cost stream and exchange-rate risk will have been minimised. Similarly, a company with long-term assets funded with short-term borrowing will be exposed to risk associated with short-term volatility in interest rates.

This risk was demonstrated dramatically by the US savings and loan industry in which long-term (often fixed-rate) home mortgages were funded with short-term or at-call deposits. Changes in interest rates in the 1980s led to interest margins being squeezed, leaving the US government with responsibility for a multi-billion-dollar rescue of the industry.

■ *To manage the risk associated with volatile commodity prices and interest rates.*

Companies having future interest obligations that are subject to change with interest-rate volatility may seek to fix that obligation to a predetermined amount. Similarly, companies producing commodities (such as mining and resource companies) or purchasing commodities may want to set the future cashflows associated with those commodities at predetermined amounts, preventing events outside their control from having an undue

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impact on future profits and cashflows. Many Australian gold producers sell forward part of their output to establish a more predictable profit stream than one dependent on movements in the gold price and the $US/$A exchange rate.

■ *To reduce borrowing costs and improve flexibility of borrowing.*

A corporation may be able to raise cheaper funding with, say, floating-rate borrowings. However, if the operations being funded would be more appropriately funded with fixed-rate borrowings, the corporation may swap the floating-rate borrowings into fixed-rate borrowings, retaining the commercial benefit (reduced cost) of the floating rate while ensuring that borrowings are on the required basis (fixed rate).

The failure to make proper use of available derivatives products was highlighted in a recent Indiana Court of Appeal case, *Brane v Roth*. This case, which was quoted with approval by Rogers J in *AWA v Daniels*, held that the directors of a grain elevator cooperative, by failing to use hedging techniques, had not adequately protected the cooperative from losses arising from movements in grain prices. In this respect, hedging was analogous to insurance, and the court presumably believed a reasonable businessman should be aware that hedging was appropriate.

## Fundamental risks of derivatives

While the primary function of derivative instruments is risk management, derivatives themselves are not risk-free. There are a series of fundamental commercial risks:

- price/market risk
- management risk
- credit risk
- legal risk
- regulatory risk
- liquidity risk

*Price/market risk.* Derivatives can be highly sensitive to changes in the value of the underlying financial instrument or commodity. For example, a corporation that writes foreign-exchange options technically has an unlimited market risk exposure on the derivative, although, in practice, the risk of significant price movements is generally not substantial.

The price risks associated with a derivative agreement can be managed by:

- accepting an outright risk position;
- taking an opposite but not exactly mirrored position in the same type of instrument with a different counterparty (this may involve different dates of maturity, resets, size or a combination of all three) and managing the residual risk;
- taking an opposite position but using a different type of agreement (for example, using forward bills to hedge a forward rate agreement);
- taking an opposite position in the futures market which, while not exactly mirroring the risk associated with the derivative, reduces the total risk position;
- taking an offsetting position in a physical instrument of similar characteristics.

The price risks of most concern arise from:

- changes in the price of the derivative — generally a function of a change in the price of the underlying physical market;
- basis risk — the risk of non-convergence;
- spread risk — the risk of changes to the relative prices of similar instruments (for example, margin between

# What are they?

In the 1970s, the increasing risk of losses through volatile exchange rates and interest rates led corporations to reassess the importance of risk management. New financial instruments were developed to permit the transfer of the price risk associated with changes in interest and exchange rates to a party more willing to accept them.

These financial instruments or derivatives are essentially hedging instruments that derive their value from the performance of another financial instrument currently traded or issued into the financial market place, or a rate or an index of rates or financial instruments. They enable the control or management of certain potentially volatile characteristics of the underlying financial instrument.

The traditional hedging instruments or derivatives were the forward contract, the futures contract and the option contract, which were used to hedge against uncertainty in physical commodity prices.

The increased volatility in global financial markets, however, emphasised the importance of hedging and extended its application from commodities to financial instruments. Increased demand for hedging instruments in turn led to further variations with foreign exchange futures appearing in 1972, interest rate futures in 1975, currency swaps in 1981, currency options, interest rate swaps and options in 1982, and forward rate agreements in 1983. In addition, repos (repurchase agreements), swaptions, collars, caps and floors are now available from most major trading banks.

Competition among banks, cost pressures, increasing demand for hedging instruments applicable to specific risks, and speculative pressures led to further product development. Exotic and proprietary derivative instruments continue to be developed, such as:

**TOPS** — Trust Obligation Participating Securities;
**SAFE** — Synthetic Agreement for Foreign Exchange;
**QUANTO** — Quantity Adjusting Option;
**STARs** — Securities Transferred Repackaged;
**SCOUT** — Shared Currency Option Under Tender;
**EXTRA** — Export Tender Risk Avoidance;
**FOX** — Forward with Optional Exit;
**BECS** — Bearer Eurodollar Collateralised Securities.

Turnover in the derivative markets has grown rapidly in recent years. Estimated global trading in over-the-counter derivatives in 1991 was more than $US10 trillion ($US10,000,000,000,000), a five-fold increase in three years.

In Australia, domestic over-the-counter market turnover is estimated at more $1 billion — more than double Australia's gross domestic product. ■

semi-government and commonwealth bonds);

■ yield curve risk — the risk of changes to the shape of the yield curve (this is of particular importance when using instruments of different maturities to hedge one another).

*Management risk.* First, there is the risk that the treasury departments of corporations may not have sufficient technical knowledge of derivative transactions to be able to carry out necessary risk-management functions. Second, there is a risk that the senior management and board of directors of the corporation may not have sufficient knowledge of derivatives and/or not be provided with adequate information on the position of the corporation in relation to derivatives trading, to carry out their responsibilities for strategic and general management.

If the company's derivative experts cannot explain to the board what they are doing and the risks involved in simple and readily understandable terms, the chances are they do not understand it themselves.

An example of the losses that may arise from management risk was the foreign-exchange loss sustained by AWA Limited in 1987. The company had a foreign-exchange department which was established to hedge against the currency risks associated with the purchase of foreign-sourced products. The department began to speculate in foreign currencies, apparently without the knowledge and/or control of the AWA board. Subsequent losses of $50 million would have been significantly avoidable had management at various levels in the company been fully aware of the activity and the risks.

A similar example occurred in the UK when the drinks and food conglomerate Allied Lyons Plc lost £147 million through trading in foreign-exchange derivatives. In 1989 the group's treasury department had expanded its foreign-exchange hedging activities to include the writing of foreign-currency options, and in 1990, the scale of options trading was far beyond that required to manage the company's foreign-currency cashflows. This eventually led to significant losses. That this occurred without the knowledge or authority of the board indicates the potential consequence of inadequate control of derivatives operations.

Lack of internal controls is another management risk. Many firms start trading in derivatives before setting up proper control systems, claiming that the cost of control systems is justifiable only when the operation becomes established. Unfortunately, because of the rapid growth in the derivatives market, the belated establishment of control systems may prove to be too little, too late.

There is a further risk that management may be aware only of the "tip of an iceberg". In most cases there is no cash outflow associated with a company's initial exposure to a transaction involving derivatives. Even when a cash transaction occurs, it is usually for a net sum representing only a small proportion of the total potential exposure. Normal cheque-payment authorisation procedures should therefore not be relied on to bring such transactions to the attention of senior management and the board.

*Credit risk.* The development of the private or over-the-counter market for derivatives has meant that many counterparties are other companies, and that the protection of clearing house arrangements does not exist. Users are therefore faced with greater credit risks and the risk that the credit quality of a counterparty may deteriorate. This risk is exacerbated because financial statements generally disclose only limited information about derivatives. Further, even if reasonable financial details are available about the counterparty the exposure of others to that counterparty and the potential "domino" effect is normally impossible to measure.

The losses that may stem from counterparty failure can vary widely, depending on the characteristics of the derivative. A counterparty that fails on a deep in-the-money option will generate a large loss for the holder; conversely, the failure to honour a deep out-of-the-money option will result in no loss for the holder other than the cost of replacing the option in the market.

The failure by a counterparty to a swap or other futures-based derivative will, in most cases, not result in the loss of anything like the gross exposure of the user to the counterparty. This is because most swap transactions do not oblige the parties to exchange the gross cashflows involved, but instead require periodic net payments dependent on the prevailing interest and/or exchange rates. The real credit risk is limited to the holder's need to obtain a replacement derivative instrument in the market. Therefore, in the case of swaps, if interest rates have changed, the loss to the user will represent the price difference (if any) between the initial transaction with the failed counterparty and the replacement transaction with a new counterparty.

However, in the event of a failure by a counterparty, if a party suddenly has a large exposure requiring cover, liquidity problems may arise. Specifically, the sudden short-term increase in demand for cover may make it costly or difficult to obtain.

*Legal risks.* The continuous development of derivatives has often outpaced the evolution of the laws concerning counterparty default. In some overseas instances, corporations have found that a counterparty was not legally entitled to enter into a

## Deceiving the eye

It should be noted that gross exposure to derivatives as reported in company accounts is not the true exposure to economic loss.

**$100m SWAP at 8% for 5 years**

| | $ Million |
|---|---|
| Exposure per notes to accounts | 100 |
| True exposure is a function of the change in interest rates. For example, a 100% change in rates = 8% x 5 years x discounted to net present value | 30 |
| "Likely" exposure per 1% change in interest rates (approximately) | 3.8 |

transaction and that the transaction was therefore *ultra vires*, or beyond the authority of the law.

This risk was demonstrated in the 1980s, when some 130 local authorities in the UK entered into interest-rate swaps to manage their borrowing costs. Following movements in interests rates one authority, Hammersmith & Fulham LBC, incurred substantial losses, with the exposure on swaps going well beyond existing debt levels. This indicated that lack of controls may have led to speculative activities on the part of the local authorities' treasury departments.

In 1991, following attempts by the counterparty banks to enforce the swap transactions, the House of Lords ruled that the local councils had no authority to enter into such transactions. The banks were left with losses in the order of £600 million.

Even where both parties can legally undertake a derivative transaction, it is important that the documentation should specify all risks, rights and obligations. Standard legal documentation is used in the common derivative transactions, although with newly developed and esoteric instruments, legal guidance may be advisable.

The trading and issue of derivatives across international frontiers also results in legal risk because of variations in law between countries. Further, changes in cross-border laws may have a flow-on impact on companies in several countries.

*Regulatory risks.* Regulators taking an increasing interest in derivatives and derivatives trading include the United States Senate, the Bank of International Settlements and the Australian Securities Commission. If new or amended regulations result, they could affect the ability of counterparties to fulfil their obligations.

*Liquidity risks.* In general, the more esoteric, customised and longer-term the derivative, the less liquid will be the market. The lack of liquid markets can in turn decrease the overall liquidity of a derivatives user and, in turn, diminish creditworthiness. In many financial markets, including Australia, derivatives trading is concentrated among a small number of major counterparties. This could produce liquidity problems in the event that a major position had to be unwound.

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## Financial reporting of derivatives

The release in March 1993 of Exposure Draft ED59 "Financial Instruments" focused debate on the accounting treatment of financial instruments generally and derivatives in particular.

ED59 proposes external reporting requirements for financial instruments, which are defined as contracts that give rise to both a financial asset of one entity and a financial liability or equity instrument of another entity. Financial assets are then defined as either:

- cash;
- a contractual right to receive cash or another financial asset from another entity;
- a contractual right to exchange financial instruments with another entity under conditions that are potentially favourable;
- an equity instrument of another entity.

Examples of financial assets include:

- primary financial instruments such as trade accounts receivable and payable, loans receivable and payable and equity securities;
- secondary (or derivative) financial instruments such as options, futures and forward contracts relating to financial instruments, and interest rate and currency swaps.

ED59, however, is not concerned with all derivative instruments. It excludes financial assets or liabilities that arise from commodity-linked or other financial instruments that also give rise to non-financial rights or obligations, until such time as the non-financial asset arising from the instrument has expired or until the non-financial obligation has been extinguished.

On this basis, derivatives that are used to manage the commercial risks associated with commodities would be excluded. Such derivatives would include oil futures, orange juice futures — and one of the more recent contracts traded in the United States, pollution rights swaps.

ED59 requires financial instruments to be analysed between:

- long term — investing or financing instruments that are held for the long term or until maturity (which may be a short period);
- short term — trading instruments;
- hedging instruments — financial instruments that are intended and able to be held to offset an exposure to financial risk.

Finally, ED59 introduces two alternative bases by which corporations should report financial instruments, being either:

- net market value, defined for assets as the amount expected to be received from the disposal of the asset in an orderly market after deducting costs expected to be incurred in realising the proceeds of such a disposal. Similarly, for liabilities, the amount expected to be paid to extinguish the liability in an orderly market, including the costs of such an extinguishment;
- purpose-led basis, in which the measurement of financial assets and liabilities is based upon the primary purpose for which they are intended and able to be held. Long-term (investing and financing) financial instruments are to be reported on a cost basis (except where such cost is greater than net market value); short-term (trading) financial instruments are to be reported at net market value; and hedging financial instruments are to be reported on the same basis as the financial assets and liabilities being hedged.

In summary, ED59 seeks to encourage reporting of more financial assets and liabilities on a net market value basis, limiting the use of historical cost to those instances where cost is equal to or lower than net market value and the purpose-led basis allows the use of historical cost. Should ED59, as it is currently formulated, become an accounting standard, corporations

will be required to focus on the net market value and, where no active market exists, will be required to establish appropriate valuation methods.

## Valuation of derivatives

The valuation of a derivative instrument will normally be undertaken by assessing the likely future cashflows to be derived from the instrument, discounted to the date of valuation at an appropriate risk-adjusted market discount rate. This simple approach, however, ignores a number of practical and theoretical difficulties in selecting the appropriate valuation methodology.

- The valuer should initially analyse the economic behaviour of the derivative instrument. That is, whether the derivative instrument is an option, forward or future contract, or a combination. In instances where the derivative instrument is a compound financial instrument (such as a swaption — an option to enter into a swap arrangement at a future date, but at current prices) it is necessary to separate the underlying economic components.
- The valuer should consider the period over which the derivative instrument will be held or will mature. This should be considered in view of the discount rate to be applied, in addition to any theoretical or practical weaknesses in the valuation models that may need to be adjusted for.
- the valuer should consider the derivative instrument's commercial risks (price/market, management, credit, legal, regulatory, liquidity), all of which should be taken into account in the selection of the risk-adjusted market discount rate.

Essentially, the valuer will be required to value any option component separately from any future or forward cashflow component.

## Market-based valuation of options

An option can be valued by reference to the current trading price where it is actively traded on an options or stock exchange. The financial markets also trade interest-rate and exchange-rate options on a party-to-party basis, providing another, less formal, source of market data. However, this market data should only be adopted after considering the following:

- Is there sufficient active trading of the option, and the underlying financial instrument, to ensure that the quoted price reflects the market's perception of all factors likely to affect the option price? A thinly traded option (or an option based on a thinly traded financial instrument) may not have a quoted price at which it would be possible to realise a large number of options.
- Options and stock exchanges are not always perfect markets in the economic sense. Quoted prices may reflect delays in reacting to, or overreactions from, price-sensitive events. Similarly, prices may incorporate sentiment or speculation about future events which bear no relation to the prospective future cashflows.
- Trading in shares and listed options over shares generally reflects trading of small minority interests in those companies. A valuer assessing options that are equivalent to a controlling or influential interest should consider whether a control premium should be applied (or an allowance made for "blockage").

*The valuer should consider the practical pitfalls that can often result in either unreliable data being used, or in an absence of data.*

## Option valuation models

The Black-Scholes option pricing model, first published in a paper in 1973 by Fischer Black and Myron Scholes, was developed as a basis for valuing options over shares listed on stock exchanges.

Empirical testing, in addition to much anecdotal evidence, indicates that, for the most part, the model works well. However, it should be noted that the Black-Scholes model has some biases, appearing to work best with medium-maturity (three months or over), at-the-money calls.

The practical application of the Black-Scholes model requires market data on share price, option exercise price, risk-free interest rate, time to maturity, volatility of the share price, and future dividend payments (if the model variation that incorporates the use of dividends is being used).

These data inputs would appear to be readily obtainable, making the application of the model a mechanical exercise. In practice this mechanical approach is often adopted, although the valuer should consider the practical pitfalls that can often result in either unreliable data being used, or in an absence of data. These pitfalls include:

- Obtaining the share price can often be as simple as obtaining the daily newspaper. However, while actively traded shares will provide an accurate and timely indication of share price, prices of shares which are thinly traded, or in unlisted companies, will not be readily obtainable.
- The risk-free interest rate is assumed to be constant over the period of the option, whereas interest rates change over time.
- The volatility of actively traded shares can be readily assessed but difficulties will arise with shares that are thinly traded or not traded at all. Further, the volatility of a company's share price may change over time, and the volatility indicated by recent historical trading may not continue for the period of the option, especially where this is an extended period.
- Forecasts of dividends and ex-dividend dates will be required for models that apply dividend correction to the Black-Scholes model. While many corporations will maintain relatively stable dividend growth patterns, and it may be possible to make short-term predictions of future dividends, longer-term forecasting may be difficult. Companies in the resources sector or those suffering the effects of the recession may have no recent (or at least an erratic) dividend history. Further, private companies' dividend payment criteria may be subject to private or family matters that make prediction difficult.

These theoretical and practical issues suggest that the use of the Black-Scholes model to value options over shares needs to be carefully considered.

## The Black-Scholes option valuation model and foreign-exchange options

The model is often applied to the valuation of a European-style foreign-currency option in the same way as it is used to value a European call option on a share, if it is assumed that interest rates in both domestic and foreign countries are constant and also that changes in the foreign-exchange rate follow a log normal probability distribution.

On this basis, practical and theoretical difficulties, similar to those that are faced with the application of the Black-Scholes model to share options, will apply to foreign-currency options. Specifically, options that are either deep in-the-money or deep out-of-the-money, or are for a short period, will not be accurately valued. Further problems associated with determining the volatility of exchange rates will be incurred.

This is also the case with foreign-currency options, for the impact of government policy changes, various economic announcements and high levels of speculation mean that the volatility of exchange rates can vary significantly.

The effective collapse of the European Monetary System in 1993 as one currency after another was apparently targeted by speculators clearly illustrates the practical difficulties associated with predicting the volatility of foreign-currency exchange rates. It also illustrates the problems of the interaction of a near-regulated market (the EMS) with an unregulated market (the foreign-exchange markets) and how this can result over time in significant changes in volatility.

## The Black-Scholes option valuation model and commodity options

Fischer Black has shown that as long as the volatility of the underlying physical commodity is constant and the cost of carry (ie, the cost of holding the commodity in, say, a warehouse and the interest saving from not purchasing the commodity now) is constant, then an adjusted version of the Black-Scholes model may also be applied to commodity options.

However, again there remain various theoretical and practical difficulties associated with the model's application.

## Interest-rate options

Interest-rate options can be obtained by an option on an interest rate, or an option on the price of the corresponding bond, or on a futures contract on the bond. Most exchanges quote options on bond prices, although the Sydney Futures Exchange and the OTC market have options on rates.

The valuation of interest-rate options is more complicated than the valuation of share options because the time-series behaviour of interest rates differs from the time-series behaviour of shares. In particular, changes in the slope of the yield curve mean that the structure of interest rates is difficult to model. Further, the volatility of interest rates changes according to the term of the underlying bond and as the bond approaches maturity.

*Government policy changes, economic announcements and high levels of speculation mean that the volatility of exchange rates can vary significantly.*

However, it has been shown that a variation of the Black-Scholes model can be used to value interest-rate options, although it works well only with a short-term option on a long-term bond.

Other models developed by Rendleman and Bartter together with Ho and Lee are based on a binomial approach to modelling future interest rates and bond prices. They depend on reliable market-based data and care is necessary to ensure that the data is appropriate.

## Valuation of forwards, futures and swaps

***Forwards.*** At the start of a contract, the net present value of the combined cashflows of the buyer and seller of an at-market forward contract is zero (ignoring the buy/ask spread). That is, the exercise price of the contract is set at the expected future price, and neither the buyer nor the seller of the forward will obtain value unless the exchange rates, commodity prices or interest rates differ from the initial expectations. Therefore, the exercise price of the forward is the price that equates the buyer's expected cashflow to the seller's expected cashflow.

***Futures.*** The price of a futures contract will be a function of the spot price at the time the contract is entered into, together with the time to maturity and the cost of carry. The cost of carry is a function of the cost of the physical storage and insuring of a commodity (where the future contract is on a commodity) and the interest cost associated with having the money available to the buyer of the futures contract until maturity. On the same basis as a forward, the net present value of the combined cashflows of a buyer and seller of a futures contract will be zero at inception, representing equal and opposite cashflows for the buyer and seller. Hence, if interest rates, exchange rates and/or commodities prices change, the value of the future will change.

***Swaps.*** A swap contract effectively involves the exchange by two parties of two cashflow streams that are determined on different bases, such as fixed and floating for interest rates, and two currencies for exchange rates. Swaps are priced at inception at the zero expected net present value of these two cashflow streams. Changes in interest rates or exchange rates will affect the net present value of these cashflows and therefore the value of the swap.

## Valuing forwards, futures and swaps — marking to market

Once forwards, futures and swaps have been contracted, their value depends on what happens to the market price on which the instrument is based. The valuation of this change in the market can be illustrated by, say, an interest-rate swap. Essentially the same approach can be used for forwards and futures. This example (see box) is taken from *Managing Financial Risk*, by Smith, Smithson and Wilford.

## Valuation issues with marking to market

This calculation for marking a swap

to market is based solely on changes in interest rates. It does not incorporate any of the commercial risk issues, including credit risk, liquidity risk, legal risk and regulatory risk, and therefore assumes that the assessment of these factors (if indeed it has been made) at the start of the transaction remains unchanged for the period of the derivative instrument.

In testing this assumption, the valuer should be aware that any calculation of additional value from a marking to market exercise will also result in a calculation of equal and opposite liability to the counterparty. In theory, this additional liability may provide an incentive for the counterparty to default (although this is infrequent), but, more important, depending on the extent of the liability, it will adversely affect the counterparty's capacity to meet its future financial commitments. This should be allowed for in the valuation methodology used to value futures, forwards and swaps.

Liquidity risk should be reviewed separately by the valuer to determine whether any change in the market or the general economy has affected the liquidity of the market for the derivative instrument. A reduction in liquidity should be reflected in the risk premium that is incorporated in the implicit discount rates used in marking to market.

Legal and regulatory risk will also have to be considered in the light of whether recent developments have affected the prospects for realisation of the instrument in the marketplace. For example, the privatisation or impending privatisation of government business enterprises could result in the termination of government guarantees of bonds issued by the entities. Derivatives based on the bonds would become riskier, and this should be allowed for in the valuation.

## Taxation

The taxation implications of derivative instruments will often be ignored by valuers on the basis that associated taxation charges will be incorporated generally within a company's taxation charge. However, as derivative instruments become more complex and trading crosses international boundaries, this assumption may at times be unjustified.

Even if derivative trading and exposure is under control, the impact of different taxation legislation in different countries in relation to derivatives can result in serious adverse tax consequences.

For example, soon after its prospectus issue Westpac discovered a $115 million tax liability resulting from interest-rate and currency swaps assigned between its New York branch and other non-US branches for the 1991 and 1992 financial years.

## Example of an interest rate swap

Assume on day zero, A and B enter into an interest-rate swap, in which A will pay cashflows based on a floating rate and receive cashflows based on a fixed rate. The following terms are agreed.

| | |
|---|---|
| Notional principal amount | $100 |
| Maturity | One year |
| Floating index | Six month LIBOR (in which the yield curve is 8% for 6 months and 10% for one year) |
| Fixed coupon | 9.7% (based on zero coupon yield) |
| Payment frequency | Semi-annual |

On Day One, the LIBOR yield curve increases by 1% to 9% for 6 months and 11% for one year. The only cashflow to change is the expected floating rate inflow after one year (the first payment after six months will have been fixed at inception based on the then prevailing six month LIBOR of 8%). Accordingly, under the new term structure, the forward rate (r) at one year is 12.4% calculated as follows:

$$(1 + 0.11) = [1 + \tfrac{1}{2}(0.09)]\,[1 + \tfrac{1}{2}(r)]$$

and the expected floating rate inflow is

$$\text{Inflow} = \$100 \times \tfrac{1}{2} \times 12.4\% = \$6.22$$

The cash inflows and outflows under the fixed and floating rate are:

**Inflows and Outflows**

| | Inflow* (Fixed) | Outflow* (Floating) | Net In/ Cash Flow |
|---|---|---|---|
| 6 months | $4.85 | $4.00 | 0.85 |
| 1 year | $4.85 | $6.22 | (1.37) |

*From perspective of A

These cashflows are then discounted to the present day based on the current yield curve of 9% for 6 months and 11% for one year. Solving this indicates that the rise in the yield curve has meant that A, being obliged pay floating-rate cashflows, has incurred a liability of 42 cents per $100. Conversely, B has derived an asset of 42 cents per $100.

*I hope this sounds like a warning, because it is, for unless we do something about it derivatives may be the FX fiasco of tomorrow!*

## Conclusion

Properly used, derivatives are an essential tool for risk minimisation. However, corporations should always remember what business they are in. It is prudent to recall that large losses were incurred in the late 1980s through a lack of understanding of proper valuation methods in other markets characterised by rapid growth; for example, property and media.

It is also appropriate to quote Gerald Corrigan, president of the Federal Reserve Bank, New York: "I hope this sounds like a warning, because it is, for unless we do something about it derivatives may be the FX fiasco of tomorrow!" ■