TECHNOLOGY FOR RISK CONTROL

by Permjit Singh, Manager, Treasury Operations, Mortgage Services Limited

Mortgage Services Limited (MSL) is a UK lending company whose principal activity is the provision of loans to individuals to purchase or refinance UK residential properties. Having entered the UK residential property market in 1990, MSL's portfolio has grown to over 24,000 loans – totalling £1.4bn.

THE purpose of this article is to define – using practical examples – the fundamental features of technology which have facilitated the control of risks within the treasury operation at Mortgage Services Limited (MSL). The use of technology – whilst effectively controlling treasury risks – can create its own risks and these will also be examined.

For a technological solution to be found, it is first necessary to define the specific treasury risks to be controlled. A brief review of MSL's business will indicate the nature of such risks. MSL is a UK investment company with a £1bn plus balance sheet. Its assets comprise, almost exclusively, sterling denominated loans to home-buyers. Such loans may be charged at a fixed or variable rate of interest and usually extend for 25 years. Borrowers, however, have the option to repay their loans at any time in full or in part. Where the charging rate is fixed, this is usually for up to five years – after which the borrower can convert to a variable rate loan for the remaining term.

MSL usually raises debt to match the corresponding assets in terms of amount, interest rate basis (fixed or variable), currency and (if fixed rate) term to maturity. Where debt has been raised in a foreign currency, this is exchanged for sterling. The currency exchange rate risk on repayment of the currency loan is hedged by using forward foreign exchange contracts. Interest rate risks can be hedged using other derivatives such as interest rate futures contracts or forward rate agreements (FRAs). Risks which the treasury must therefore control include interest rate, currency, liquidity and counterparty risks. It is important to realise that such hedging, although mitigating one form of risk (eg currency risk), can open up a new risk, ie counterparty risk (which therefore also needs to be controlled).

Having defined the critical risks, the subsequent control task can be sub-divided into three distinct phases: identification, quantification and management, as shown in chart 1.

Identification of risk

The MSL treasury has acquired an off-the-shelf software package to facilitate the administration of treasury dealing activities and the control of defined treasury risks. The system can be likened to a 'warehouse' – storing treasury's deals. Such deals typically involve financial instruments such as FRAs, loans, deposits, spot and forward foreign exchange contracts and option products (interest rate caps). Each deal comprises elements which contribute to one or more of the risks defined earlier. For example. a typical treasury deal will include a currency (currency risk), a maturity date (liquidity risk), rate resetting dates (repricing risk) and a counterparty (CP risk).

Treasury deals are manually input to the system, where each is assigned a unique deal reference number and a set of associated 'storage boxes', each holding (separately) a risk element of the deal, eg the currency, the interest rate, the counterparty, the maturity date, whether the deal is a loan, deposit or FRA and so on. This 'storage box' facility is fundamental to the system's ability to quantify risk – the second phase of the risk control process.

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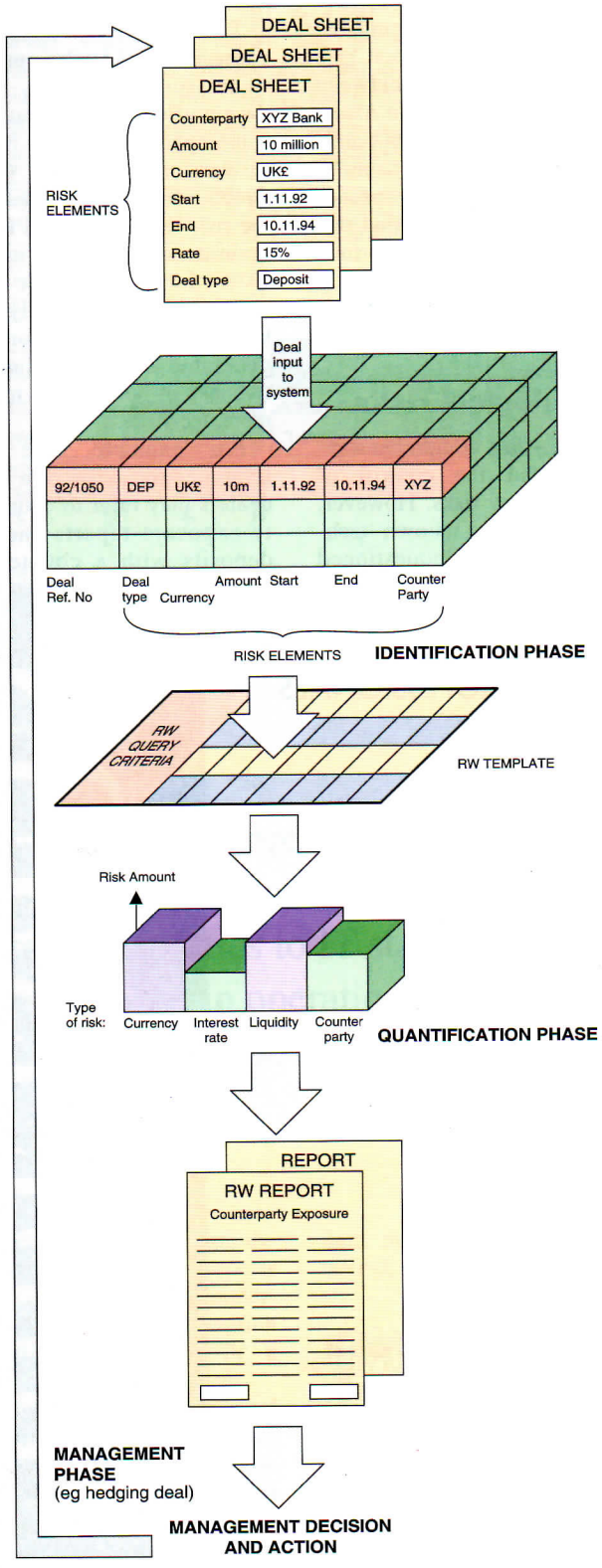
Quantification of risk

The warehouse is useless if the individual storage boxes cannot be isolated for quantification of their contents (the risk elements). For example, treasury may wish to know when a deal done with a unique counterparty matures, ie it needs to isolate the storage box associated to the deal which contains the maturity date. Isolation and quantification of risk elements is facilitated by a report writing software package (RW) which is linked to the warehouse. Using RW, treasury staff can literally write a so-called 'query' which creates a

1 – THE THREE DISTINCT PHASES OF THE CONTROL TASK



unique template through which the 'storage boxes' must pass in order to be quantified.

The query defines the criteria which an individual deal must satisfy in order for that deal (and its associated risk elements) to pass through the RW template. For example, treasury may wish to quantify the counterparty risk to XYZ bank. A query could be written with the following criteria:

Show all deals where:

1. Counterparty = XYZ Bank.
2. Deal maturity date is greater than TODAY (ie the deal and hence risk has not expired).
3. Deal type is 'Deposit' (to exclude loans taken from XYZ bank).

The reporting package then scans the warehouse and inspects the contents of each storage box. Any deals whose storage boxes meet all of the criteria will be isolated and transported through the query template for quantification.

Reporting

Having passed through the template, RW can sort the deals as required, for example by currency and then by ascending order of maturity date within each currency. The risk element showing the principal amount can be quantified and totalled for each currency and if required, sub-totalled for each maturity date within each currency. Formulae can also be written into the report to manipulate the risk elements. Many permutations and report formats are possible, and one example is illustrated in chart 2.

When a query has been written and a template created, this can be stored in RW and re-used at any time to quantify a specific risk. For example, prior to dealing, a dealer may wish to quantify counterparty risk to XYZ Bank, and compare the current exposure to approved credit limits. RW queries can be written to quantify other treasury risks. For MSL , these include:

- The average days to maturity of variable rate debt (repricing risk).
- Credit limits – sorted by type of financial instrument, eg FRAs and futures contracts with a counterparty.
- Total debt raised by subsidiary companies.
- Amounts of debt maturing in forthcoming 3 month periods (liquidity risk and repricing risk).

Approximately 50 reports have been written to date, either for a one-off exercise or periodically – reflecting the flexibility and ease of use of RW.

Management of risk

Having identified and quantified defined risks, treasury can set about deciding if and how to manage these risks – the third phase in the control process. Technology has also assisted in the decision-making process. For example, the agreed strategy to hedge a potential rise in market borrowing rates (such as 3-month Libor) may be to buy an FRA. Current market rates for such instruments can be readily obtained by treasury using a real-time data service accessed via a desk-top PC terminal. Other market data is also available via such terminals to assist in the decision-making process, for example economic news.

When the hedging deal has been executed, its details (risk elements) can be input to the treasury system and the three control phases repeated – as depicted in chart 1. Thus the effects of management strategies can be quantified and observed to confirm if risks have been effectively controlled.

Simulation – to aid decision making

Before executing a chosen strategy, management may wish to observe the effects of one or more courses of action, ie to simulate scenarios where key variables are adjusted and the effects quantified. To perform such simulations manually would be impractical in terms of time and effort. Instead MSL has utilised software to create spreadsheets where key variables can be changed using a few key strokes and their effects observed immediately. The benefit of simulation technology has therefore been to reduce the time delay dramatically between changing scenarios and observing the effects. What it has not been able to do (yet?!) is replace the skill of the person to create the spreadsheet.

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Simulation has also been beneficial in observing the effects of forecast changes in the interest rate yield curve on the cost of debt in future, eg for budgeting purposes, or managing the risk of a reduced interest rate margin (the difference between the interest income from assets and the interest charge on liabilities). Although such simulations are possible on spreadsheets, MSL has found that this would be more easily performed using technology specifically designed for asset and liability management.

Technological risks

Technology has comprehensively facilitated the control of defined treasury risks. However, its use has created its own 'technological' risks. Unquestioned acceptance of information produced via technology can lead to wrong conclusions, inappropriate action and unfortunate (costly) consequences.

The truism 'garbage in ... garbage out ...' is also applicable to treasury technology. Given the significance of treasury risks, it is imperative that the integrity of treasury databases (eg the warehouse) is maintained. Thus, the risk elements stored must be accurate, complete and in a consistent form. Missing or inaccurate data will adversely affect the quality of the information generated and hence the effectiveness of subsequent management decisions.

For example, one could imagine the situation where dealers may refer to counterparty exposure reports and place deposits with a counterparty,

2 – RW COUNTERPARTY EXPOSURE REPORT FOR XYZ BANK

Dealer Ref	Deal Principal (m)	Start date	End date	Deal Type
92/1050	10	1.11.92	10.11.94	Deposit
92/1054	5	4.11.92	10.11.95	Deposit
92/1048	4	3.12.92	11.12.94	Deposit
Total exposure in UK£	19			
92/1044	4	1.8.93	11.12.94	Deposit
92/1046	2	1.9.93	30.12.94	Deposit
Total exposure in US$	6			

unaware that further deals are still awaiting input to the database (from which reports are created) or that may not have been recorded correctly onto the database. The exposure reports used by dealers therefore understate the true exposure position – resulting, possibly, in a breach of credit limits.

To avoid such operational risks, controls should be implemented to ensure treasury databases (and hence, information generated from them) are correct. Deal data should be reconciled back to the original deal sheet following manual input to the database and any discrepancies in the database amended immediately. The ability to amend data must be rigorously controlled, however.

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Relationships with IT divisions

MSL's treasury has, in line with other major corporates, placed considerable reliance on technology to manage its treasury operations. This has brought two distinct professions into close contact, Information Technology and Treasury Management.

Treasury staff work closely with IT staff to ensure the continuous operation of treasury technology and, where appropriate, to enhance its efficiency or to find technological solutions. IT staff can also advise on security of data and install effective data back-up routines or contingency arrangements. They can also liaise with software and hardware suppliers in the event of technical faults. It may be tempting for treasury to delegate or transfer technical responsibilities to IT staff, but this could result in operational problems and conflict in the event of IT failures, where such delegation had been presumed or incorrectly defined. Treasury should therefore remain proactive and control all of its risks including those of a technological nature.

A cyclical process

Treasury risks arise and recede constantly – reflecting the changing asset and liability composition of the MSL balance sheet. Consequently, as depicted in chart 1, the control of treasury risks is a constant, cyclical process of identification, quantification and management of defined risks. Technology has facilitated this process by its ability to sub-divide the control process into these three distinct phases – at the level of the risk elements within each treasury deal.

However, treasury staff still have to use skill and judgement in deciding the optimal course of action to manage such risks. Here too technology has supported the decision making process by its ability to simulate various scenarios.

The deployment of technology, however, introduces its own risks, which also need to be controlled. For MSL at least, the risk/reward trade-off has been firmly in favour of the latter. □

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His five years of treasury experie have been with financial services sector companies and he is currently Manager, Treasury Operations at Mortgage Services Limited.

His particular interests include interest rate risk management.