Asset–liability management (ALM) is a generic term that is used to refer to a number of things by different market participants. We believe however that it should be used to denote specifically the high-level management of a bank’s assets and liabilities; as such it is a strategy-level discipline and not a tactical one. It may be set within a bank’s Treasury division or by its asset–liability committee (ALCO). The principal function of the ALM desk is to manage interest-rate risk and liquidity risk. It will also set overall policy for credit risk and credit risk management, although tactical-level credit policy is set at a lower level within credit committees. Although the basic tenets of ALM would seem to apply more to commercial banking rather than investment banking, in reality it is important that it is applied to both functions. A trading desk still deals in assets and liabilities, and these must be managed for interest-rate risk and liquidity risk. In a properly integrated banking function the ALM desk must have a remit overseeing all aspects of a bank’s operations.

In this chapter we introduce the key ALM concepts of liquidity, management policy and the internal cost of funds.

**Basic concepts**

In financial markets the two main strands of risk management are interest-rate risk and liquidity risk. ALM practice is concerned with managing this risk. Interest-rate risk exists in two strands. The first strand is the more obvious one, the risk of changes in asset–liability value due to changes in interest rates. Such a change impacts the cash flows of assets and liabilities, or rather their present value, because financial instruments are valued with reference to market interest rates. The second strand is that associated with
optionality, which arises with products such as early redeemable loans. The other main type of risk that ALM seeks to manage is liquidity risk, which refers both to the liquidity of markets and the ease with which assets can be translated to cash.

ALM is conducted primarily at an overview, balance sheet level. The risk that is managed is an aggregate, group-level risk. This makes sense because one could not manage a viable banking business by leaving interest-rate and liquidity risk management at individual operating levels. We illustrate this in Figure 5.1, which highlights the cornerstones of ALM. Essentially, interest-rate risk exposure is managed at the group level by the Treasury desk. The drivers are the different currency interest rates, with each exposure being made up of the net present value (NPV) of cash flow as it changes with movements in interest rates. The discount rate used to calculate the NPV is the prevailing market rate for each time bucket in the term structure.

The interest-rate exposure arises because rates fluctuate from day to day, and continuously over time. The primary risk is that of interest-rate reset, for floating-rate assets and liabilities. The secondary risk is liquidity risk: unless assets and liabilities are matched by amount and term, assets must be funded on a continuous rolling basis. Equally, the receipt of funds must be placed on a continuous basis. Whether an asset carries a fixed or floating-rate reset will determine its exposure to interest-rate fluctuations. Where an asset is marked at a fixed rate, a rise in rates will reduce its NPV and so reduce its value to the bank. This is intuitively easy to grasp, even without recourse to financial arithmetic, because we can see that the asset is now paying a below-market rate of interest. Or we can think of it as a loss due to opportunity cost foregone, since the assets are earning below what they could earn if they were employed elsewhere in the market. The opposite applies if there is a fall in rates: this causes the NPV of the asset to rise. For assets marked at a floating-rate of interest, the risk exposure to fluctuating rates is lower, because the rate receivable on the asset will reset at periodic intervals, which will allow for changes in market rates.
We speak of risk exposure as being for the group as a whole. This exposure must therefore aggregate the net risk of all the bank’s operating business. Even for the simplest banking operation, we can see that this will produce a net mismatch between assets and liabilities, because different business lines will have differing objectives for their individual books. This mismatch will manifest itself in two ways:
Bank Asset and Liability Management

- the mismatch between the different terms of assets and liabilities across the term structure;
- the mismatch between the different interest rates that each asset or liability contract has been struck at.

This mismatch is known as the ALM gap. The first type is referred to as the liquidity gap, while the second is known as the interest-rate gap. We value assets and liabilities at their NPV; hence, we can measure the overall sensitivity of the balance sheet NPV to changes in interest rates. As such ALM is an art that encompasses aggregate balance sheet risk management at the group level.

Figure 5.2 shows the aggregate group-level ALM profile for a securities and derivatives trading house based in London. There is a slight term mismatch as no assets are deemed to have “overnight” maturity whereas a significant portion of funding (liabilities) is in the overnight term. One thing we do not know from looking at Figure 5.2 is how this particular institution is defining the maturity of its assets. To place these in the relevant maturity buckets, one can adopt one of two approaches, namely:

- the actual duration of the assets;
- the “liquidity duration”, which is the estimated time it would take the firm to dispose of its assets in an enforced or “firesale” situation, such as a withdrawal from the business.

Each approach has its adherents, and we believe that actually there is no “right” way. It is up to the individual institution to adopt one method and then consistently adhere to it. The second approach has the disadvantage, however, of being inherently subjective – the estimate of the time taken to dispose of an asset book is not an exact science and is little more than educated guesswork. Nevertheless, for long-dated and/or illiquid assets, it is at least a workable method that enables practitioners to work around a specified ALM framework with regard to structuring the liability profile.

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1 This report is discussed in full in the Case Study later in the chapter.
Liquidity gap

There is an obvious risk exposure arising because of liquidity mismatch of assets and liabilities. The maturity terms will not match, which creates the liquidity gap. The amount of assets and liabilities maturing at any one time will also not match (although overall, as we saw in Chapter 2, by definition assets must equal liabilities). Liquidity risk is the risk that a bank will not be able to refinance assets as liabilities become due, for any reason.² To manage this, the bank will hold a large portion of assets in very liquid form.³ A surplus of assets over liabilities creates a funding requirement. If there is a surplus of liabilities, the bank will need to find efficient uses for those funds. In either case, the bank has a liquidity gap. This liquidity can be projected over time, so that one knows what the situation is each morning, based on net expiring assets and liabilities. The projection will change daily of course, due to new business undertaken each day.

² The reasons can be macro-level ones, affecting most or all market participants, or more firm- or sector-specific. The former might be a general market correction that causes the supply of funds to dry up, and would be a near-catastrophe situation. The latter is best illustrated with the example of Barings plc in 1995: when it went bust overnight due to large, hitherto covered-up losses on the Simex exchange, the supply of credit to similar institutions was reduced or charged at much higher rates, albeit only temporarily, as a result.

³ Such assets would be very short-term, risk-free assets such as T-bills.
We could eliminate liquidity gap risk by matching assets and liabilities across each time bucket. Actually, at individual loan level this is a popular strategy: if we can invest in an asset paying 5.50% for three months and fund this with a three-month loan costing 5.00%, we have locked in a 50-basis point gain that is interest-rate risk free. However, while such an approach can be undertaken at individual asset level, it would not be possible at an aggregate level, or at least not possible without imposing severe restrictions on the business. Hence, liquidity risk is a key consideration in ALM. A bank with a surplus of long-term assets over short-term liabilities will have an ongoing requirement to fund the assets continuously, and there is the ever-present risk that funds may not be available as and when they are required. The concept of a future funding requirement is itself a driver of interest-rate risk, because the bank will not know what the future interest rates at which it will deal will be. So a key part of ALM involves managing and hedging this forward liquidity risk.

**Definition and illustration**

To reiterate then, the liquidity gap is the difference in maturity between assets and liabilities at each point along the term structure. Because for many banks ALM concerns itself with a medium-term management of risk, this will not be beyond a five-year horizon, and in many cases will be considerably less than this. Note from Figure 5.2 how the longest-dated time bucket in the ALM profile extends out to only “12-month plus”, so that all liabilities longer than one year were grouped in one time bucket. This recognises that most liabilities are funded in the money markets, although a proportion of funding will be much longer term, up to 30 years or so.

For each point along the term structure at which a gap exists, there is (liquidity) gap risk exposure. This is the risk that funds cannot be raised as required, or that the rate payable on these funds is prohibitive. To manage this risk, a bank must perforce:

- disperse the funding profile (the liability profile) over more than just a short period of time. For example, it would be excessively risky to concentrate funding in just the overnight to one-week time bucket, so a bank will spread the profile across a number of time buckets. Figure

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4 It can of course lock in future funding rates with forward-starting loans, which is one way to manage liquidity risk.

5 Of course the opposite applies: the gap risk refers to an excess of liabilities over assets.
5.3 shows the liability profile for a European multi-currency asset-backed CP programme, with liabilities extending from one month to one year:

- manage expectations so that large-size funding requirements are diarised well in advance, as well as not planned for times of low liquidity such as the Christmas and New Year period;
- hold a significant proportion of assets in the form of very liquid instruments such as very short term cash loans, T-bills and high-quality short-term bank CDs.

Observing the last guideline allows a bank to maintain a reserve of liquidity in the event of a funding crisis, because such assets can be turned into cash at very short notice.

The size of the liquidity gap at any one time is never more than a snapshot in time, because it is constantly changing as new commitments are entered into on both the asset and liability side. For this reason some writers speak of a “static” gap and a “dynamic” gap, but in practice one recognises that there is only ever a dynamic gap, because the position changes daily. Hence we will refer only to one liquidity gap.

A further definition is the “marginal” gap, which is the difference between the change in assets and change in liabilities during a specified time period. This is also known as the “incremental” gap. If the change in assets
is greater than the change in liabilities, this is a positive marginal gap, while if the opposite applies this is a negative marginal gap.\textsuperscript{6}

We illustrate these values in Table 5.1. This is a simplified asset–liability profile from a regional European bank, showing gap and marginal gap at each time period. Note that the liabilities have been structured to produce an “ALM Smile”, which is recognised to follow prudent business practice. Generally, no more than 20\% of the total funding should be in the overnight to one-week time bucket, and similarly for the 9–12 month bucket. The marginal gap is measured as the difference between the change in assets and the change in liabilities from one period to the next.

Figure 5.4 shows the graphical profile of the numbers in Table 5.1; and Figure 5.2 shown earlier illustrates the “ALM Smile”.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline
 & One week & One month & 3–month & 6–month & 9–12 month & > 12months & Total \\
\hline
Assets & 10 & 90 & 460 & 710 & 520 & 100 & 1890 \\
Liabilities & 100 & 380 & 690 & 410 & 220 & 90 & 1890 \\
\hline
Gap & -90 & -290 & -230 & 300 & 300 & 10 \\
Marginal gap & 200 & -60 & -530 & 0 & 290 \\
\hline
\end{tabular}
\caption{Simplified ALM profile for regional European bank}
\end{table}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{alm_profile}
\caption{ALM time profile}
\end{figure}

\textsuperscript{6} Note that this terminology is not a universal convention.
Liquidity risk

Liquidity risk exposure arises from normal banking operations. That is, it exists irrespective of the type of funding gap, be it excess assets over liabilities for any particular time bucket or an excess of liabilities over assets. In other words, there is a funding risk in any case, either funds must be obtained or surplus assets laid off. The liquidity risk in itself generates interest-rate risk, due to the uncertainty of future interest rates. This can be managed through hedging, and we discuss interest-rate hedging in chapters 13, 14 and 15.

If assets are floating-rate, there is less concern over interest-rate risk because of the nature of the interest-rate reset. This also applies to floating-rate liabilities, but only insofar that these match floating-rate assets. Floating-rate liabilities issued to fund fixed-rate assets create forward risk exposure to rising interest rates. Note that even if both assets and liabilities are floating-rate, they can still generate interest-rate risk. For example, if assets pay six-month Libor and liabilities pay three-month Libor, there is an interest-rate spread risk between the two terms. Such an arrangement has eliminated liquidity risk, but not interest-rate spread risk.

Liquidity risk can be managed by matching assets and liabilities, or by setting a series of rolling term loans to fund a long-dated asset. Generally, however, banks will have a particular view of future market conditions, and manage the ALM book in line with this view. This would leave in place a certain level of liquidity risk.

Matched book

The simplest way to manage liquidity and interest-rate risk is the matched book approach, also known as cash matching. This is actually very rare to observe in practice, even among conservative institutions such as the smaller UK building societies. In matched book, assets and liabilities, and their time profiles, are matched as closely as possible. This includes allowing for the amortisation of assets. As well as matching maturities and time profiles, the interest-rate basis for both assets and liabilities will be matched. That is, fixed loans to fund fixed-rate assets, and the same for floating-rate assets and liabilities. Floating-rate instruments will further need to match the period of each interest-rate reset, to eliminate spread risk.

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7 Many bank assets, such as residential mortgages and credit-card loans, are repaid before their legal maturity date. Thus the size of the asset book is constantly amortising.
Under a matched book, also known as *cash flow matching*, in theory there is no liquidity gap. Locking in terms and interest rate bases will also lock in profit. For instance, a six-month fixed-rate loan is funded with a six-month fixed-rate deposit. This would eliminate both liquidity and interest-rate risk. In a customer-focused business it will not be possible to precisely match assets and liabilities, but from a macro-level it should be possible to match the profiles fairly closely, by netting total exposure on both sides and matching this. Of course, it may not be desirable to run a matched book, as this would mean the ALM book was not taking any view at all on the path of future interest rates. Hence a part of the banking book is usually left unmatched, and it is this part that will benefit (or lose out) if rates go the way they are expected to (or not!).

**Managing the gap with undated assets and liabilities**

We have described a scenario of liquidity management where the maturity date of both assets and liabilities is known with certainty. A large part of retail and commercial banking operations revolves around assets that do not have an explicit maturity date however. These include current account overdrafts and credit card balances. They also include drawn and undrawn lines of credit. The volume of these is a function of general economic conditions, and can be difficult to predict. Banks will need to be familiar with their clients’ behaviour and their requirements over time to be able to assess when and for how long these assets will be utilised.

Undated assets are balanced on the other side by non-dated liabilities, such as non-interest-bearing liabilities (NIBLs), which include cheque accounts and instant-access deposit accounts. The latter frequently attract very low rates of interest, and are usually included in the NIBL total. Undated liabilities are treated in different ways by banks; the most common treatment places these funds in the shortest time bucket, the overnight to one-week bucket. However, this means the firm’s gap and liquidity profile can be highly volatile and unpredictable, which places greater strain on ALM management. For this reason some bank’s take the opposite approach and place these funds in the longest-dated bucket, the greater-than-12-month bucket. A third approach is to split the total undated liabilities into a “core” balance and an “unstable” balance, and place the first in the long-dated bucket and the second in the shortest dated bucket. The amount recognised as the core balance will need to be analysed over time, to make sure that it is accurate.
Managing liquidity

Managing liquidity gaps and the liquidity process is a continuous, dynamic one because the ALM profile of a bank changes on a daily basis. Liquidity management is the term used to describe this continuous process of raising and laying off funds, depending on whether one is long or short cash that day.

The basic premise is a simple one: the bank must be “squared off” by the end of each day, which means that the net cash position is zero. Thus, liquidity management is both very short-term, as well as projected over the long term, because every position put on today creates a funding requirement in the future on its maturity date. The ALM desk must be aware of their future funding or excess cash positions and act accordingly, whether this means raising funds now or hedging forward interest-rate risk.

The basic case: the funding gap

A funding requirement is dealt on the day it occurs. The decision on how it will be treated will factor the term that is put on, as well as allowing for any new assets put on that day. As funding is arranged, the gap at that day will be zero. The next day there will be a new funding requirement or surplus, depending on the net position of the book.

This is illustrated in Figure 5.5 on page 222. Starting from a flat position on the first day \(t_0\) we observe a gap (the dotted line) on \(t_1\), which is closed by putting on funding to match the asset maturity. The amount of funding to raise, and the term to run it to, will take into account the future gap as well as that day’s banking activities. So at \(t_2\) we observe a funding excess, which is then laid off. We see at \(t_3\) that the assets invested in run beyond the maturity of the liabilities at \(t_2\), so we have a funding requirement again at \(t_3\). The decision on the term and amount will be based on the market view of the ALM desk. A matched book approach may well be taken where the desk does not have a strong view, or if its view is at odds with market consensus.
There are also external factors to take into account. For instance, the availability of funds in the market may be limited, due to both macro-level issues and to the bank’s own ability to raise funds. The former might be during times of market correction or recession (a “credit crunch”), while the latter includes the bank’s credit lines with market counterparties. Also some funds will have been raised in the capital markets and this cash will cover part of the funding requirement. In addition, the ALM desk must consider the cost of the funds it is borrowing; if, for example, it thought that interest rates in the short term, and for short-term periods, were going to fall, it might cover the gap with only short-term funds so it can then refinance at the expected lower rates. The opposite might be done if the desk thought rates would rise in the near future.

Running a liquidity gap over time, beyond customer requirements, would reflect a particular view of the ALM desk. So maintaining a consistently underfunded position suggests that interest rates are expected to decline, at which longer-term funds can be taken at cost. Maintaining an over-funded gap would imply that the bank thinks rates will be rising, and so longer-term funds are locked in now at lower interest rates. Even if the net position is dictated by customer requirements (for example, customers placing more on deposit than they take out in loans), the bank can still manage the resultant gap in the wholesale market.
Excess liabilities generally is a rare scenario in a bank and it is not, under most circumstances, a desirable position to be in. This is because the bank will have target return on capital ratios to achieve, and this requires that funds be put to work, so to speak, by acquiring assets. In the case of equity capital it is imperative that these funds are properly employed. The exact structure of the asset book will depend on the bank’s view on interest rates and the yield curve generally. The shape of the yield curve and expectations on this will also influence the structure and tenor of the asset book. The common practice is to spread assets across the term structure, with varying maturities. There will also be investments made with a forward start date, to lock in rates in the forward curve now. Equally, some investments will be made for very short periods so that if interest rates rise, when the funds are reinvested they will benefit from the higher rates.

The basic case: illustration

The basic case is illustrated in Table 5.2, in two scenarios. In the first scenario, the longest-dated gap is $-130$, so the bank puts on funding for $+130$ to match this tenor of three periods. The gap at period $t_2$ is $-410$, so this is matched with a 2-period tenor funding position of $+280$. This leaves a gap of $-180$ at period $t_1$, which is then funded with a 1-period loan. The net position is zero at each period (“squared off”), and the book has been funded with three bullet fixed-term loans. The position is not a matched book as such, although there is now no liquidity risk exposure.

In the second case, the gap is increasing from period 1 to period 2. The first period is funded with a three-period and a two-period borrowing of $+50$ and $+200$ respectively. The gap at $t_2$ needs to be funded with a position that is not needed now. The bank can cover this with a forward-start loan of $+390$ at $t_1$ or can wait and act at $t_2$. If it does the latter it may still wish to hedge the interest-rate exposure.

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8 The firm’s capital will be invested in risk-free assets such as government T-bills or, in some cases, bank CDs. It will not be lent out in normal banking operations because the ALM desk will not want to put capital in a credit-risk investment.

9 We look at the mechanics of this, using different derivative instruments, in chapters 13, 14 and 15.
The liquidity ratio

The *liquidity ratio* is the ratio of assets to liabilities. It is a short-term ratio, usually calculated for the money market term only; that is, up to one year. Under most circumstances, and certainly under a positive yield curve environment, it would be expected to be above 1.00; however, this is less common at the very short end because the average tenor of assets is often greater than the average tenor of liabilities. So in the one-month to three-
month period, and perhaps out to six months, the ratio may well be less than one. This reflects the fact that short-term borrowing is used to fund longer-term assets.

A ratio of below one is inefficient from an RoE point of view. It represents an opportunity cost of return foregone. To manage it, banks may invest more funds in the very short term, but this also presents its own problems because the return on these assets may not be sufficient. This is especially true in a positive yield curve environment. This is one scenario where a matched book approach will be prudent, because the bank should be able to lock in a bid–offer spread in the very short end of the yield curve. A more risky approach would be to lend in the short term and fund these in the long term, but this would create problems because the term premium in the yield curve will make borrowing in the long term expensive relative to the return on short-dated assets (unless we have an inverted yield curve). There is also the liquidity risk associated with the more frequent rolling over of assets compared to liabilities. We see then, that maintaining the liquidity ratio carries something of a cost for banks.

**CASE STUDY 5.1 Hypothetical derivatives trading house ALM policy and profile**

We conclude this introduction to the basic concept of ALM with a look at the ALM policy and profile of a hypothetical securities and derivatives trading house, which we will call XYZ Securities Limited. The business is a financial institution based in London, with a number of business lines in FX, equity, and credit derivatives trading and market-making. We outline the various firm-wide policies on ALM, cash management, liquidity and investment that have been formalised at XYZ Securities.

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10 In addition, the bank will be able to raise funds at Libid, or at worst at Li-mid, while it should be able to lend at Libor in interbank credit quality assets. Li-mid is an unofficial term and refers to the mid-rate between Libid and Libor.
XYZ Securities Limited

Funding and ALM

This note outlines the approach to managing the asset–liability profile that is generated by the funding requirements of XYZ Securities Limited (“XYZ”). The principal source of funding is the parent bank. Funds are also taken from a variety of external sources (prime brokerage, bank lines, TRS and repo lines, a repo conduit and an ABCP programme). The overall management of the ALM profile is centralised within XYZ Treasury desk.

The key objective of the Treasury desk is to undertake prudent management of XYZ’s funding requirement, with regard to liquidity management, interest-rate management (gap profile) and funding diversification. This process includes management information and reporting. The primary deliverable of the Treasury desk is the ALM report. This is presented in Table 5.3 on page 233.

ALM report

The ALM profile of all combined XYZ business lines is shown in Table 5.3. The report comprises the following segments:

- the ALM report;
- asset liquidity profile;
- liabilities.

We consider each part next.

ALM report

This report summarises the total funding requirement of each of XYZ’s business lines. The business lines are: FX, interest-rate and credit derivatives market-making; equity derivatives proprietary trading, asset management and equity brokerage. The funding is profiled against the asset profile to produce the firm-wide ALM profile. Liability represents the funding taken by each business line. They are set out in accordance with the maturity term structure of each constituent loan of the total funding requirement. The maturity buckets used are:
The asset pool is distributed along the same maturity buckets in accordance with certain assumptions. These assumptions are concerned with the expected turnover of assets in each business, and the time estimated to liquidate the business under enforced conditions. Underneath the ALM profile is the gap profile (see Figure 5.6 on page 233). Gap is defined as the difference between assets and liabilities per maturity bucket; it shows how the liability profile differs from the asset profile. It is also a snapshot that reflects where the forward funding requirement lies at the time of the snapshot.

**Asset liquidity profile**
This report is a detailed breakdown of the funding requirement of each business line. Assets and liabilities are split according to desk within each business line, set out by maturity profile.

**Liabilities**
This is the detailed liability profile breakdown of all the business lines. Funding is split into term structure of liabilities. A separate table is given for each business line. There is also a detailed breakdown of use of funds from each source of funds.

**Aims and objectives**
Historically, the funding of XYZ business was concentrated overwhelmingly on a very short-term basis. This reflected primarily the short-term trading nature of XYZ’s assets, which meant that the asset profile was effectively changing on a high frequency. Over time, XYZ’s business evolved into dealing in more longer-term

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11 The percentage breakdown that reflects senior management assumptions of the maturity profile of assets is an input into the ALM report.
asset classes and as a consequence XYZ moved to funding in the longer-term to more adequately match its asset profile. The Treasury objective is based on the following reasoning:

- to match asset profile with liability profile and to minimise forward gap;
- to term out the funding away from the very short-dated tenors used hitherto;
- to construct an ALM profile that recognises the differing requirements of individual business lines. For example, the market-making businesses are expected to have a more flexible liquidity profile than the asset management business. Hence, the liability profile of the former will be concentrated along the short end of the funding term structure when compared to the latter;
- to even out the liability profile such that no one maturity bucket contains more than 20% of the total funding requirement. This will be treated as a funding limit.

A 20% gap limit will apply to the overall XYZ funding requirement.

**Application of cost of funds**

The effect of terming out funding is to produce a cost of funds that is not explicitly observable without calculation. That is, the cost of funds must be determined as a pooled or weighted-average cost of funds (WAC). XYZ uses a simplified version of this calculation that is essentially the interest charged on each loan as a proportion of the total borrowing, or, put another way, the daily interest payable on all loans divided by the total notional amount. This is standard market practice and is used, for example, at a number of European investment banks. Treasury applies the WAC interest rate to each business line.
XYZ Securities Limited

Funding and ALM: enhanced procedures
As XYZ increases in size and complexity, it becomes necessary to implement a more sophisticated ALM approach. This is described below.

ALM report
The ALM report summarises the total funding requirement of each of XYZ’s business lines. The funding is profiled against the asset profile to produce the firm-wide ALM profile. Liability represents the funding taken by each business line. They are set out in accordance with the maturity term structure of each constituent loan of the total funding requirement. The asset pool is distributed along the same maturity buckets in accordance with certain assumptions. These assumptions are concerned with the expected turnover of assets in each business, and the time estimated to liquidate the business under enforced conditions. Underneath the ALM profile is shown the gap profile. Gap is defined as the difference between assets and liabilities per maturity bucket; it shows how the liability profile differs from the asset profile. It is also a snapshot that reflects where the forward funding requirement lies at the time of the snapshot.

Aims and objectives
The aims and objectives remain the same as described on pages 227-8.

Modifications and updates
The new ALM policy includes the following improvements:

• the ALM profile of XYZ has been structured in line with market good practice, with more accurate matching of liabilities to assets; it now resembles a banking ALM profile more accurately;
• the overnight funding profile of XYZ, which represented significant liquidity risk, has now been transformed such that
overnight funding now represents 13% of overall funding, compared with over 40% at the start of the new policy; • the 20% gap limit has been formalised and put in place, and now is a formal limit that is observed by Treasury; • there is regular weekly reporting of ALM and funding for XYZ (see Table 5.3 and Figure 5.6); • greater diversity in funding sources has been achieved, with bank lines in place for XYZ access to unsecured, un-guaranteed funding, secured funding using repo and total return swaps, a repo conduit and an asset-backed CP programme.

The Treasury desk will continue to observe and implement market best practice with regard to ALM and funding policy.

**Funding cost allocation**
The major change in policy is now a move from a WAC-funding cost allocation to each of the business lines to a Treasury “pool” funding method. In this approach, all funding, both overnight and term loans, is placed in a central Treasury pool. These funds are lent out, on an overnight basis, to the various business lines in accordance with their funding requirement. This removes interest-rate risk hedging considerations from the business lines and places them with Treasury. All business lines receive the same funding rate, the overnight Libor rate, so no business line has a funding cost advantage over another.

Treasury moves from being a cost-centre to a profit-centre, with any savings it makes in structuring the funding, below that of Libor-flat at which it lends funds, being retained within it.

**Interest-rate hedge**
Under the new funding regime, all interest-rate risk exposure generated when putting on term loans is hedged within the Treasury book. The policy is as follows:

• Treasury has an interest-rate exposure limit of USD30,000 total interest-rate risk, measured as present value of a basis point (PVBP, or “DV01”), for all time buckets greater than 30 days.
• This exposure is generated by the use of term loans. Exposure is offset by lending funds in matching terms, running the liquidity book of CP, CDs, sovereign bonds and FRNs.
• Remaining DV01 is hedged using Eurodollar, Bund and short-sterling futures contracts.

The interest-rate exposure is monitored daily and subject to dynamic hedging as term loans are replaced.

**Cash management**
Cash management at XYZ is undertaken by the Treasury desk. Its aim is to undertake prudent management of XYZ’s funding requirement, with regard to liquidity management, interest-rate management (gap profile and gap risk) and funding diversification. It is also responsible for producing management information and ALM reporting. The Treasury desk carries out its responsibilities working in conjunction with the middle office and back office. The back office reports each day’s funding requirement, and the funding itself is carried out by Treasury in accordance with its view. The middle office reports the funding allocated to each line of business as part of regular p&l reporting.

The objective of ALM policy is to apply market-standard guidelines to the XYZ business and to follow prudent market practice. It is also to make the whole funding process more transparent with regard to management reporting and to centralise funding into one desk within the group.

**ALM and funding report**
The firm-wide ALM report is shown in Table 5.3 and Figure 5.6. From Table 5.6 we observe the following:

• the “gap” is defined as the absolute value of the assets and liabilities added together, which, because liabilities are reported as negative numbers, is essentially assets minus liabilities;
• the funding within each time bucket is reported as a percent of total funding. This is a key control measure, as prudent ALM policy suggests that the liability profile should be humped in shape (“the ALM Smile”), so that each bucket should not hold more than approximately 15–20% of the total funding;
• the next control value is the “gap as percent of total gap”. This is noted to prevent an excessive forward gap developing in one time bucket;
• the key control measure is the gap as percent of total funding, which at XYZ is set at a 20% limit. We see that on this date there was no breach of this limit in any of the time buckets;
• the report also lists cumulative assets and liabilities, as well as the “net gap”, which is the sum of the two cumulative values for each time bucket.

We observe that the ALM profile at XYZ follows roughly the ALM Smile shape that is recommended as the ideal profile over the term structure, and accepted good business practice.

<table>
<thead>
<tr>
<th></th>
<th>o/n</th>
<th>o/n–1</th>
<th>1w–1m</th>
<th>1m–3m</th>
<th>3m–6m</th>
<th>6m–12m</th>
<th>12m+</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Assets</td>
<td>481</td>
<td>4,104</td>
<td>5,325</td>
<td>6,954</td>
<td>4,478</td>
<td>3,845</td>
<td>4,128</td>
<td>29,315</td>
</tr>
<tr>
<td>Liabilities</td>
<td>−3,947</td>
<td>−844</td>
<td>−5,107</td>
<td>−7,579</td>
<td>−5,053</td>
<td>−3,799</td>
<td>−2,986</td>
<td>(29,315)</td>
</tr>
<tr>
<td>Gap</td>
<td>3,466</td>
<td>3,260</td>
<td>218</td>
<td>625</td>
<td>575</td>
<td>46</td>
<td>1,142</td>
<td>9,332</td>
</tr>
<tr>
<td>Percent of total funding</td>
<td>13%</td>
<td>3%</td>
<td>17%</td>
<td>26%</td>
<td>17%</td>
<td>13%</td>
<td>10%</td>
<td>100%</td>
</tr>
<tr>
<td>Gap as % of total gap</td>
<td>37%</td>
<td>35%</td>
<td>2%</td>
<td>7%</td>
<td>6%</td>
<td>0%</td>
<td>12%</td>
<td>100%</td>
</tr>
<tr>
<td>Gap as % of total funding</td>
<td>12%</td>
<td>11%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>0%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Gap limit</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Limit breach</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cumulative assets</td>
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<td>4,585</td>
<td>9,910</td>
<td>16,864</td>
<td>21,342</td>
<td>25,187</td>
<td>29,315</td>
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<td>Cumulative liabilities</td>
<td>−3,947</td>
<td>−4,791</td>
<td>−9,898</td>
<td>−1,747</td>
<td>−22,530</td>
<td>−26,329</td>
<td>−29,315</td>
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</tr>
<tr>
<td>Net gap</td>
<td>−3,466</td>
<td>−206</td>
<td>12</td>
<td>−613</td>
<td>−1,188</td>
<td>−1,142</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3 XYZ Securities Limited ALM report and profile
Figure 5.6 XYZ Securities Limited gap profile

The firm-wide funding report is shown in Figure 5.7. This is reported in graphical form to observe adherence to funding limits and indicate breaches. Unlike the ALM report, which is produced by Treasury (a front-office function), the funding report is produced by the bank’s Middle Office, which is a control function. Figure 5.8 shows the breakdown by business line.

Figure 5.7 XYZ Securities Limited funding usage and limit report
XYZ Treasury follows the ALM policy previously described to and approved by senior management. One strand of the ALM discipline is the regular reporting of the firm’s ALM profile, by means of the ALM report. This is produced by Treasury using data recorded by itself as well as data from Middle Office (MO).

**ALM procedures**

The ALM report for XYZ Securities Limited is sent to senior management. The liabilities side of the report is determined by the actual liability profile of all XYZ loans, from overnight to one-year maturity and beyond. The asset side of the report is determined by senior management breakdown of the liquidation profile of all XYZ assets, and input as the “asset-liquidation input”. The basis for this breakdown is senior management opinion on the length of time it would take to liquidate the trading book of each business in an enforced “fire sale” situation.13

The process of assigning liquidation maturity buckets is based on the subjective view of senior management. For each business line, senior management ask the question, “What reasonable time

---

13 The liquidity duration of the asset pool is unrelated to the actual duration of the assets themselves.
period would it take to liquidate positions if it were decided to close
down the business?" The answer to this question is a function of the
secondary market trading liquidity of the assets in question.\(^\text{14}\)
Hence, for frequently traded assets such as Eurobonds, we assume
that one week would be sufficient time to trade out of all assets. For
business lines with illiquid assets, such as some part of the asset
management book, a longer time period (specifically in this case, in
excess of one year) is noted. Management allocate this estimated
time period in the same time buckets as we have established for the
liabilities.

We assume that assets equal liabilities.
The procedure for compiling the report is as follows:

- Treasury compiles its own funding report, independent of MO,
  from its own record of overnight and term funding for XYZ.
The procedure for creating this document is documented internally;
- the Treasury report is used to populate the “Liabilities” segment
  on the ALM report. This segment lists the current funding profile (liabilities) of XYZ by business line;
- senior management will instruct any change to the asset
  liquidation breakdown, otherwise these values are retained;
- the “asset liquidity profile” segment is linked directly to the
  asset liquidation segment (for the asset side) and liabilities input
  segment (for the liability side).

The ALM graph is automatically updated when the input tabs are populated.

The Treasury liquidity book
Following conventional banking business practice, XYZ Treasury
maintains a liquidity book of T-bills, CDs, sovereign bonds and
bank FRNs. The firm’s capital as well as a proportion of long-term
cash is held in the liquidity book.

In the next case study we set out the firm’s policy for
maintaining the FRN book.

\(^{14}\) In practice, other factors (such as whether the market was aware that this was an enforced sale
or not) would also influence this timing but cannot be factored into any estimation.
CASE STUDY 5.2  XYZ Securities liquidity book: FRN portfolio

Banks maintain a pool of low-risk FRNs issued by other banks and building societies as part of their reserve and liquidity requirements. This well-established practice is favoured because of low capital requirements against these assets and because it enables institutions that are funded at sub-Libor to hold Libor-plus floating-rate assets with funding locked in.

The XYZ Treasury desk is able to secure sub-Libor funding via its commercial paper vehicle. Within the parent group funding limit of USD30 billion, Treasury maintains a low-risk portfolio of bank and building society assets to employ spare capacity by holding a low-risk, locked-in funding portfolio of bank and building society FRNs.

Objectives of the business activity
To maintain a portfolio of short- to medium-dated bank and building society FRNs, all rated A or better, and held to maturity. These will be FRNs paying a spread over three-month Libor, and denominated in USD, EUR or GBP.

Bonds are funded in their own currency by means of three-month CP issued from the CP conduit, funded at sub-Libor. There is no gap funding risk.

Motivation behind the business
A portfolio of bank and building society FRNs enables XYZ Securities Ltd to:

- earn a low-risk but material return over locked-in funding;
- utilise spare capacity in funding availability.

Bonds will be purchased at par or below par so there is no capital loss if held to maturity.

Building society paper carries particular value relative to their credit rating. There has never been a default in the history of the building society movement (traditionally building societies merge or are taken over if in any financial difficulty) and this implies that
their financial risk warrants stronger than the A-rating they receive. In effect, we would carry bank risk (AA-rated) for A-rated return.

**Booking procedure**
The FRN book is held in a separate trading book within the Treasury book, in order to ring-fence the match-funded positions. The booking procedure is shown in Figure 5.9.

**Figure 5.9** FRN book: schematic of booking cash flows
Expected return
Assume that the portfolio stands at USD350 million. A sample of the securities held in the book is shown in Table 5.4, all funded using 3-month CP issuance. This eliminates gap funding risk as the bonds all pay quarterly coupon.

<table>
<thead>
<tr>
<th>Currency</th>
<th>Bond</th>
<th>Maturity</th>
<th>Offer price</th>
<th>Spread 3-m Libor</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>USD</td>
<td>Kaupthing Bank</td>
<td>Feb-07</td>
<td>100.15</td>
<td>12.9</td>
<td>A2</td>
</tr>
<tr>
<td>USD</td>
<td>Bradford &amp; Bingley</td>
<td>Dec-07</td>
<td>99.935</td>
<td>16.7</td>
<td>A1</td>
</tr>
<tr>
<td>USD</td>
<td>NIB Capital Bank</td>
<td>Mar-08</td>
<td>99.94</td>
<td>9.0</td>
<td>AA3 / AA–</td>
</tr>
<tr>
<td>EUR</td>
<td>HBOS</td>
<td>Jan-09</td>
<td>99.835</td>
<td>9.9</td>
<td>AA2 / AA</td>
</tr>
<tr>
<td>EUR</td>
<td>ANZ</td>
<td>Sep-09</td>
<td>100.03</td>
<td>11.4</td>
<td>AA3 / AA–</td>
</tr>
<tr>
<td>EUR</td>
<td>Alliance &amp; Leicester</td>
<td>Sep-09</td>
<td>99.81</td>
<td>14.0</td>
<td>A1 / A+</td>
</tr>
<tr>
<td>EUR</td>
<td>ABN Amro</td>
<td>Sep-11</td>
<td>99.75</td>
<td>13.4</td>
<td>Aa3 / AA–</td>
</tr>
<tr>
<td>GBP</td>
<td>Anglo Irish Bank</td>
<td>Dec-06</td>
<td>99.96</td>
<td>10.3</td>
<td>A2</td>
</tr>
<tr>
<td>GBP</td>
<td>Bradford &amp; Bingley</td>
<td>Dec-06</td>
<td>99.925</td>
<td>13.4</td>
<td>A1</td>
</tr>
<tr>
<td>GBP</td>
<td>MacQuarie Bank</td>
<td>Feb-07</td>
<td>99.95</td>
<td>12.6</td>
<td>A2</td>
</tr>
<tr>
<td>GBP</td>
<td>Anglo Irish Bank</td>
<td>Mar-07</td>
<td>100.02</td>
<td>14.0</td>
<td>A2</td>
</tr>
<tr>
<td>GBP</td>
<td>Fin Danish</td>
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<td>14.7</td>
<td>A1</td>
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<tr>
<td>GBP</td>
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<td>Feb-09</td>
<td>99.725</td>
<td>19.5</td>
<td>A1</td>
</tr>
</tbody>
</table>

Table 5.4 Assumed XYZ Securities Ltd FRN book
(yields represent market rates as at September 2004)

For a $350 million portfolio earning an average spread of 12 basis points, the net P&L (assuming L-2 basis points funding cost) would be approximately an average net gain of $490,000 per annum.

Capital and taxation issues
There are no taxation issues in the name of XYZ Securities, which is a UK-incorporated legal entity. The capital implications are that the securities are all 20% risk-weighted under Basel I.
Sovereign bond portfolio for interest-rate hedging

Using XYZ Securities again as our hypothetical bank, we now consider a bond portfolio maintained for ALM hedging purposes by XYZ Treasury. The Treasury desk maintains a liquidity book of US Treasury, German Bund and UK gilts. This is also used to facilitate a repo business, as well as reduce the quantity of interest-rate futures needed as part of the interest-rate exposure hedge.

Description of the product/business activity

XYZ Treasury is required to fund a large size of the firm-wide funding requirement in term loans, as part of prudent ALM. The resulting DV01 exposure is managed using Eurodollar futures. It has also established a US government bond portfolio as a lower cost means of managing the DV01 risk. The objective is to manage the DV01 exposure of the Treasury book by buying very short-dated Treasury notes and strips, which sets up an income stream that is diversified from other sources and that represents zero credit risk. This is achieved by:

- establishing a portfolio of very short-dated US Treasuries and Treasury strips on the balance sheet (maximum maturity recommended 1–1.5 years, majority in three- to six-months);
- placing the composition of the book as:
  - 200m, 3-m
  - 300m, 6-m
  - 50m, 1-year;
- having the average maturity of portfolio at around the six-month tenor;
- funding these in Treasury repo, under the standard GMRA legal agreement;15
- holding Treasury securities and Treasury strips to maturity to generate a steady income stream. With ultra-short-dated strips, this also benefits from the pull-to-par effect on mark-to-market.

All funding is locked into maturity, thus there is no gap risk.

15 See Chapter 12 on repo.
Objectives of the business
The sovereign bond book is business that:

- allows XYZ to undertake cheaper hedging of its interest-rate risk (DV01), complementing the standard arrangement using Eurodollar, Euribor and short sterling futures;
- establishes a risk-free portfolio that generates a funding gain for XYZ;
- enables XYZ to use a AAA risk-free portfolio for use in setting up total-return swaps (TRSs) and repo lines with market counterparties.

The benefits to XYZ of holding such a portfolio include:

- earning the spread between yield and funding cost; a bonus that is not available when using Eurodollar futures for DV01 hedging, which do not earn any income. XYZ also saves on the commission and margin costs associated with maintaining Eurodollar futures positions;
- using the business to set up dealing relationships with bank counterparties that could then be used as sources of additional funding if required, adding to the diversity of funding (required as part of the Treasury remit);
- assisting Treasury in undertaking ALM objectives through lower cost hedging of DV01 risk, compared to futures, which impose a cost on the book.

Expected return
The fundamental gain is the removal of the requirement to hold Eurodollar futures. In a rising interest-rate environment, this will significantly reduce hedging costs.

Net profit in the first full year is upwards of $250,000–$280,000 funding gain on a £350 million average position (10–12 basis points on average per trade). This does not take into account any mark-to-market profit that is realised on Treasury bonds and strips.

Capital and taxation issues
Treasury securities are 0% risk-weighted under Basel I (and II), except where they create DV01 risk when the charge is 0.7%. However, if held for interest-rate risk hedging purposes (as is the case here), they may actually reduce overall capital requirements.
Chapter 5  Asset–liability management

Profitable risk-free trade examples observed on 1 July 2004

Below are examples of hypothetical funding trades that were observed on July 2004 that generated a risk-free funding gain, rates as at 1 July 2004 (data source: Bloomberg LP). This shows where value was obtained from holding a book of Treasuries in the first instance. The following positions all yielded funding profit:

- buy the 2% November 2004 Treasury at a yield of 1.597% and hold to maturity, and repo to maturity at a rate of 1.56%. This is a locked-in gain of 3.70 basis points for the term to maturity, on a position of USD150 million a profit of USD24,800;
- buy the 31 July 2004 strip at a yield of 1.568% and repo to maturity at 1.28%, a spread of 28.8 basis points at risk-free locked-in funding. On a position of USD200 million this represents positive p&l of USD48,000 – this is risk-free income,
- the ability to take advantage of special rates for stocks we are long in. On 1 July a position in 1% May 2005 Treasury could be funded cheaper than normal repo (“GC”) due to special status, by 7–8 basis points. So the gain on holding that stock would be around this amount for the term of the trade, as our funding cost in repo would be lower by this amount. It would be an objective of the Treasury desk to be aware of stocks expected to go special and act accordingly.

These opportunities are not frequent but they do occur, as shown above. As the book is primarily designed to hedge, trading is infrequent and only undertaken as opportunities arise.

Risks

There is no gap (funding) risk and no credit risk.

As the positions are held on a Trading book, and not the Banking book, they are marked-to-market. The desk expects volatility in short-dated government bonds to be lower than for the term loans they are hedging, but volatility is a risk exposure and there may be periods when the desk will experience mark-to-market losses.
CASE STUDY 5.3  XYZ Securities UK gilt portfolio

Commercial banks and building societies are natural holders of government bonds such as gilts, for the following reasons:

• for liquidity purposes, as gilts are the most liquid instruments in the UK market;
• as an instrument in which to invest the firm’s capital reserves;
• for income generation purposes, given the favourable funding costs of gilt repo and the zero credit and liquidity risk;
• to intermediate between gilt, stock loan and interbank markets in CDs;
• to benefit from being long in gilts that go “special” and can be funded at anything from 25 basis points to 2–3% cheaper than “general collateral” (GC) repo;
• to establish an asset pool that receives favourable capital treatment (0% risk-weighted under Basel I and Basel II).

The benefits to XYZ Securities Ltd of holding such a portfolio would include some of the above, as well as the following:

• earning the spread between yield and funding cost;
• using the business to set up dealing relationships with bank counterparties that could then be used as sources of additional funding if required, adding to the diversity of funding (required as part of the Treasury remit);
• assisting Treasury to undertake ALM objectives.

Business line
This is a UK government bond portfolio at XYZ Treasury. The objective is to maintain an income stream that is diversified from current sources and that is also relatively low risk, but stable. This is achieved by:

• establishing a portfolio of very short-dated gilts and gilt strips on the balance sheet (the maximum maturity recommended is one year, the majority in three- to six-months). The expected make-up of the book might be:
➤ 125m, 3-m
➤ 200m, 6-m
➤ 25m, 1-year
➤ average maturity of the portfolio in the first year would be around the six-month mark;

• funding these in gilt repo, under the GMRA agreement and also funding using TRS under ISDA if required;
• the repo funding margin for gilts in the wholesale market, which is often 0%. With zero or a very low margin or “haircut”, all positions will be virtually fully funded;
• holding gilts and gilt strips to maturity to generate a steady income stream. With ultra-short-dated strips, we also benefit from the pull-to-par effect.

**Market rates**

Table 5.5 on pages 245-6 shows income yields and funding rates as at 2 June 2004. This shows where value could be obtained from holding a book of gilts in the first instance. For example, all the following positions yielded funding profit:

• holding gilts and funds in general collateral (GC); depending on the specific stock and the term of funding arranged, a gain ranging from 15 to 50–60 basis points;
• holding strips to maturity; for example, a gain of approximately 35 basis points for Dec 04 Principal strip at 1w or 2w funding. Locked-in funding gain (buy 6-m strip and fund in 6-m) of 9 basis points for the Dec 04 strip – this is risk-free income;
• holding strips at 3-, 6- and 9-month maturities as longer-dated bills and holding to maturity. Funding will be locked in if available or rolled:
  ➤ for example, as at 2 June 2004, XYZ Securities Ltd purchased the Sep 04 coupon strip at 4.34% and funded in the one-week term at 4.15% (and ran the resultant funding gap risk – but this gilt had a strong pull-to-par effect. If funding is no longer profitable in the short dates, XYZ would have sold the gilt for a probable realised mark-to-market profit)
  ➤ coupon strips are bid for in repo by the main market-makers, thereby reducing liquidity risk in these products
taking advantage of special rates for stocks XYZ when long in. On 2 June 2004, a position in the 9.5% 2005 gilt was funded cheaper due to special status, from 35 basis points (down from 50 basis points the week before). The 6.75% 2004 gilt was being funded at 100 basis points cheaper than GC. So the gain on holding that stock would be significant, as our funding cost in repo would be very low. It would be an objective of the Treasury desk to be aware of stocks expected to go special and act accordingly.

Risks

The principal risk is funding roll-over (gap risk). Where possible XYZ Treasury will lock in funding with an expected holding period of positions, but will also look to take advantage of markets rates as appropriate and roll over funding. Gap risk will be managed in the normal way as part of overall Treasury operations. Gaps will be put on to reflect the interest-rate and yield curve view of the desk.

There is no credit risk.

The interest-rate risk and gap risk is managed as a standard banking ALM or cash book. The objective is to set up an income stream position at low risk, but if necessary DV01 risk would be managed where deemed necessary using 90-day sterling futures, overnight-index swap (OIS) or short-dated swaps. XYZ can also sell out of positions where it expects significant market movement (for example, a central bank base rate hike). The main objective, however, is to establish an income stream, in line with a view on short-term interest rates. Hedging would only be carried out when necessary for short-term periods (say, ahead of a data release or anticipated high volatility).

The interest-rate risk for longer-dated stocks is shown in Table 5.5 below, measured as DV01 (dollar-value of loss for a 1 basis point rise in yields). Longer-dated stocks expose XYZ Securities Ltd to greater interest-rate risk position when marking-to-market.
### Market rates

<table>
<thead>
<tr>
<th></th>
<th>GC rates 2 Jun</th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1w</td>
<td>4.15</td>
<td>4.10</td>
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<td>4.40</td>
<td>4.30</td>
<td></td>
</tr>
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<td>4.25</td>
<td>4.15</td>
<td>5m</td>
<td>4.43</td>
<td>4.33</td>
<td></td>
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<tr>
<td>3w</td>
<td>4.25</td>
<td>4.15</td>
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<td>4.50</td>
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<td>1m</td>
<td>4.15</td>
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<td>4.67</td>
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<tr>
<td>2m</td>
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<td>4.68</td>
<td></td>
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<tr>
<td>3m</td>
<td>4.32</td>
<td>4.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: HBOS screen*

### Gilt yields 2 Jun

<table>
<thead>
<tr>
<th></th>
<th>GRY%</th>
<th>DV01</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% Jun 04</td>
<td>5.05</td>
<td></td>
</tr>
<tr>
<td>6T Nov 04</td>
<td>4.33</td>
<td>0.00416</td>
</tr>
<tr>
<td>9H Apr 05</td>
<td>4.668</td>
<td>0.00817</td>
</tr>
<tr>
<td>8H Dec 05</td>
<td>4.818</td>
<td>0.014</td>
</tr>
<tr>
<td>7T Sep 06</td>
<td>4.945</td>
<td>0.02141</td>
</tr>
<tr>
<td>7H Dec 06</td>
<td>4.966</td>
<td>0.02364</td>
</tr>
</tbody>
</table>

*Special rates*

- 100 basis points
- 30 basis points cheaper than GC
- 25 basis points cheaper, down from 1.5%
- 10 basis points

*Sources: Butler Securities / KSBB screens.*

### Gilt strip yields 2 Jun

<table>
<thead>
<tr>
<th></th>
<th>GRY %</th>
<th>DV01</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Jun 04</td>
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<td></td>
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<tr>
<td>C Sep 04</td>
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<td>C Dec 04</td>
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<tr>
<td>C Mar 05</td>
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<td>0.00664</td>
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<tr>
<td>C Jun 05</td>
<td>4.744</td>
<td>0.00888</td>
</tr>
<tr>
<td>C Sep 05</td>
<td>4.829</td>
<td>0.01107</td>
</tr>
<tr>
<td>P Dec 05</td>
<td>4.85</td>
<td>0.01321</td>
</tr>
</tbody>
</table>

*Source: Bloomberg.*

**Table 5.5** Market rates as at 2 June 2004

---

**Bibliography**
