



Note on the relationship between pension assets and liabilities

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1. Introduction

1.1 Terms of reference and background

The genesis for this report was the Myners' report on Institutional investment¹. The working party was given the following terms of reference:

“To address and make recommendations to the Myners/Sandler Steering Group on the contents of a briefing document for trustees and sponsors on the relationship between pension fund assets and liabilities.”

Consistent with the Myners' report we have aimed to provide the key decision makers with the expertise and information to carry out their responsibilities effectively. In particular, we focus on information which will help trustees to understand the profile of their liabilities. It has been prepared by a Working Party set up by the actuarial profession's Myners/Sandler Steering Group although responsibility for the Working Party subsequently passed to the Pensions Board. One member of the Working Party (John Hill) was unable to agree the final report and produced a separate submission. This is published as a *Submission on the relationship between pension assets and liabilities* and is being presented to the same SIAS meeting on 6 May 2003.

While preparing this report the working party was acutely aware of the adverse publicity that pension schemes are currently facing and the financial pressure many of them are under. The working party also noted the changing nature of regulation and therefore the recommendations of this report are not dependent on specific regulations, but rely on financial principles.

1.2 Overview of approach

The over-riding objective has been to provide greater transparency to trustees and sponsors about the relationship between assets and liabilities. We strongly believe that this is in the public interest.

Asset values are frequently quoted and, for liquid instruments, the price provides an unambiguous value. Ideally the “mark-to-market” present value, or cost, of the liabilities should be available at all times, or a good approximation to this. In recognition of the

¹ Paul Myners, Institutional Investment in the United Kingdom, HM Treasury, March 2001

practical difficulties in providing this figure at frequent intervals we have developed the concept of a **Liability Benchmark Portfolio (LBP)**. The relationship between the assets and the liabilities is demonstrated by considering the assets relative to the LBP.

Consistent with the legal framework in the UK where pensions are (currently) provided on a voluntary basis, albeit subject to statutory constraints, we do not advocate compulsion. In particular the LBP approach does not represent another funding standard for Trustees to consider, nor does it aim to dictate the investment strategy to be followed by pension schemes. The LBP represents the asset allocation that maintains the scheme's current solvency level as economic conditions change. As such the LBP approach provides important information on the risks within a pension fund that should be taken into account when key decisions are made.

1.3 Structure of the report

The key findings of the working party are summarised in the next section: the main body of the report expands on these points.

The section “Pension Values” sets out some basic financial principles that apply to pension schemes. From these principles the ideas of the report follow. The conclusion lists the benefits of the LBP approach and relates these back to the Myners report. A set of questions is also given that sponsors and trustees can direct at their advisors. The discussion prompted by these questions, and the answers, should facilitate greater understanding and lead to improved decision making on issues relating to the relationships between assets and liabilities.

In appendix A we have set out an example of what a briefing note to Trustees and Sponsors could look like.

2. Summary

2.1 Value of pensions

All Trustees should have a firm appreciation that the cost (or present value) of a scheme's liability for future pensions cannot be reduced without reducing the amount (or likelihood of payment) of the pensions to members. In particular, this applies to the process of deciding investment strategy.

2.2 Liabilities

When considering the relationship between assets and liabilities, Trustees should (in most cases) focus on the accrued liabilities that represent the pension promises made to the members to date. These represent the entitlement that members have in the event that they leave the scheme or the scheme is immediately terminated.

Schemes facing wind-up with insufficient assets to meet the liabilities should give particular consideration to the priority orders applying to different beneficiaries, both in the application of their own trust deeds and rules and in the application of the MFR priorities.

2.3 Definition of “The Liability Benchmark Portfolio” (LBP)

We define the Liability Benchmark Portfolio (LBP) to be the portfolio of assets such that, in the absence of future contributions, benefit accrual or random fluctuations around demographic assumptions, the scheme maintains its current solvency level (the ratio of assets to liabilities) as economic conditions change.

The solvency level should be measured using the accrued liabilities, and the cost of these liabilities should be determined using bond yields of suitable duration with appropriate inflation – linked properties where appropriate. No subjective additions should be made to the yields. The solvency level will therefore typically correspond to the liabilities on the Defined Accrued Benefit method (DABM) as advocated by McLeish & Stewart² (and the discontinuance funding level).

For a scheme with a solvency level greater than 100% the LBP will typically be a scaled version of the portfolio that either,

- (1) tracks as closely as possible the cost of accrued benefit obligations through the purchase of insurance policies (“buy out”), or,
- (2) represents the investment strategy which would be adopted to closely match the liabilities in the absence of further support from the sponsor.

For a scheme where the solvency level is below 100% the LBP should take account of the priorities between beneficiaries of the scheme on winding-up.

The LBP involves accurate specification of the:

- (1) mix between fixed income and index linked securities
- (2) duration of index-linked and fixed interest bond holdings.

² McLeish DJD & Stewart, C M J.I.A 114 338-424

To identify the LBP account should be taken of the term structure of the nominal and real yield curves and the embedded options in the liabilities, for example caps and floors within the rules on pension increases.

For public sector schemes where the continued support of the sponsoring employer(s) is, for all practical purposes, assured it should be regarded as best practice in funding to identify the Liability Benchmark Portfolio and to monitor and measure the performance of the chosen strategy relative to this portfolio.

Trustees and sponsors should be aware of the residual economic and demographic risks that a scheme faces even if it invests its assets in the LBP. The limitations of the LBP can be mitigated by regular re-estimation, for most schemes we recommend annual reviews would be appropriate.

2.4 Use of the Liability Benchmark Portfolio (LBP)

Regular monitoring of the *relative* value of the LBP and the assets provides up-to-date information on the relationship between the assets and liabilities in the scheme.

Information on the performance of the LBP should be provided at the same frequency as asset performance is reported on. The performance of the assets should be considered relative to the LBP and not in isolation.

Asset allocation should start from the LBP. The risk of any particular asset allocation decision can be measured relative to investing in the LBP.

Risks should be measured in the short to medium term relative to the Liability Benchmark Portfolio. The risk position of a pension scheme should be monitored regularly and reviewed when the LBP is reviewed (and at least annually).

2.5 Measures of Risk

Risk can be demonstrated by deterministic sensitivity testing, scenario testing, Asset-Liability projections, or the “cost of protection”.

When making projections to demonstrate risk these should be made over a period consistent with the timeframe over which Trustees would normally re-assess the asset allocation. For most schemes this implies a maximum of three years.

Risk needs to be monitored as financial conditions change. We recommend that the Trustees (and sponsors) receive updates on the risk position whenever the LBP is reviewed and at least annually.

2.6 Defined Contribution schemes

The LBP approach can be applied to DC schemes. However the investment strategy for an individual should take account of their complete financial position and the individual's risk tolerances.

2.7 Assets

Only the monies already held in the scheme should be considered for the purpose of setting the LBP: no account should be taken of future contribution commitments to the scheme from the sponsor whether this is for regular contributions or to make good a shortfall.

Maturing pension schemes and greater focus on risk management is likely to lead to an increased demand for bonds. If Trustees wanted to move a significant proportion of current pension scheme assets into bonds then the current bond market could be insufficient to meet demand. However this analysis overlooks the dynamic nature of capital markets whose primary function is to equate supply with demand.

2.8 Interaction of the roles of the asset and liability consultants

Ongoing monitoring of the agreed investment plan is the role of the asset consultant. However the liability consultant needs to be aware of the output of that process and to be ready to provoke an investment review if the arrangement does not seem to be working as expected or they are aware of any significant changes on the liability side.

3. Pension Values

3.1 Guaranteed liabilities do not depend on the investment strategy

Pensions payments are just a series of cashflows. Provided appropriate market yields exist and reliable demographic assumptions can be made, these cashflows can be discounted to give the present value (PV), or cost, of the pension payments. In this report we shall use the term “**cost**” to refer to this present value of the liabilities. The cost can be evaluated when the liabilities are well defined in advance of the benefits actually being paid.

If the pension is to be paid with certainty – i.e. there is no credit risk attaching to the pension promise – the cost of the pension liability is not affected by the investment strategy. Therefore investment strategies should not be selected on the basis that investment in particular classes of assets reduces the burden of pension provision.

The cost of pension liabilities can only be reduced if the amount of benefit paid to scheme members (or the likelihood of payment) is reduced. An investment policy that increased the risk of pensions not being paid would, in the absence of some counteracting diminution of benefits, imply that the investment policy was counter to the interests of scheme members.

The fact that equity investment in particular does not reduce the cost of pension liabilities (except to the extent that it reduces the value of the benefit to members by reducing the security of the benefit) may appear to be counter-intuitive. Trustees should ensure that they receive professional advice and adequate training to enable them to understand this issue fully.

At a simple level it should be made clear that equity investment can either result in higher or lower contributions depending upon the unknown course of future returns. However, expressing this as increasing (or decreasing) the cost of schemes can be highly misleading. Simpler equivalent statements such as “equities may (or may not) return more than bonds” are likely to create less confusion and are recommended in place of references to cost.

3.2 Contributions and accruing benefits

The Trustees should clearly distinguish between the value of accruing benefits and the contributions recommended by the actuary. The contributions paid into the scheme may differ from the value of the benefits accruing. When the contributions are below the value of the benefits the Trustees should understand the implications for both the contribution burden on the sponsoring employer (if any) and the security of the pension promises to the members.

4. Liabilities

4.1 Use the accrued liabilities

For assessing the relationship between the assets and liabilities we recommend that liabilities considered should be the benefits due on discontinuance of the scheme, the accrued liabilities. This is also the measure of the liabilities under the Defined Accrued Benefit Method (DABM) as advocated by Stewart & McLeish .

The accrued liabilities for this purpose will make allowance for future revaluation of benefits, both in deferment and in payment, in accordance with the provisions of the scheme. No allowance would be made for the effect on the benefits, assuming the scheme continues in full force, of future salary increases. Nor would it be appropriate to allow for forfeiture of benefits on withdrawal with less than two years' service other than in accordance with normal expectations of turnover during the following two years.

Other assumptions should be best estimates. Making adjustments to elements of the basis to allow for approximate changes in other assumptions (e.g. reducing the discount rate to allow for improving mortality) is discouraged as this will distort the duration of the liabilities.

The provision to be made for early retirement should be consistent with the definition of the liabilities, in particular it should not be assumed that members will all continue in the scheme until normal retirement and even where early payment is on financially neutral terms, it may be necessary for allowance to be made for it in the demographic assumptions in order to avoid distorting the duration of the liabilities.

4.2 Allowing for higher liabilities

It is common for Trustees to focus on definitions of liabilities other than the "accrued liabilities", for example liabilities allowing for future salary escalation. However such a definition of liabilities does not represent the promises made to date. We recommend any analysis based on higher benefit levels should be in addition to, not instead of, the analysis based on the accrued liabilities.

4.3 Schemes facing wind-up

Where a scheme faces wind-up and the assets are insufficient to meet the value of the accrued benefits the Trustees should give careful consideration to the order of priorities between beneficiaries on a wind-up.

5. The Liability Benchmark Portfolio (LBP)

5.1 Identifying the Liability benchmark Portfolio (LBP)

To compare the assets and liabilities we need to accurately assess the cost (or equivalently the present value) of the liabilities. This assessment should demonstrate how the value of the liabilities changes with economic conditions. To do this we use the Liability Benchmark Portfolio (LBP) which is a proxy for the accrued liabilities.

The LBP is the portfolio of assets such that, in the absence of future contributions, benefit accrual or random fluctuations around demographic assumptions, the scheme maintains its current solvency level as economic conditions change. The solvency level should be measured using the accrued liabilities, and the cost of these liabilities should be determined using bond yields of suitable duration. No subjective additions should be made to the yields.

For a scheme with a solvency level greater than 100% the LBP will be a proportion of the portfolio that either,

- (1) tracks as closely as possible the cost accrued benefit obligations through the purchase of insurance policies (“buy out”), or,
- (2) represents the strategy adopted to closely match the liabilities in the absence of further support from the sponsor.

In practice portfolios (1) and (2) are likely to be very similar consisting of high quality bonds.

For a scheme where the solvency level was below 100% the LBP should take account of the priorities on winding-up. In these circumstances the LBP should minimise the risk that the percentage of liabilities covered would reduce with changes in market conditions.

For a scheme paying LPI pensions the Liability Benchmark Portfolio will typically consist of holdings of index linked and fixed income gilts of appropriate duration. To identify the LBP account should be taken of the term structure of the nominal and real yield curves and the embedded options in the liabilities, for example caps and floors on inflation increases.

5.2 More Sophisticated portfolios

The Trustees should consider the degree of accuracy appropriate in identifying the Liability Benchmark Portfolio. Trustees should consider whether to take account of the incidence of cash flows in the LBP. Fixed income and index-linked derivative securities as well as traditional bonds may be appropriate in a more sophisticated LBP. In most instances, however, a portfolio identified entirely in terms of gilts with appropriate duration is likely to be adequate for practical applications.

Where a more accurate assessment of the value of the liabilities than that provided by the LBP, for example allowing for recent transitions between benefit categories, is readily available at different dates then this could be used in place of the LBP. For most schemes additional sophistication is unnecessary to understand the relationship between the assets and the liabilities. It is sufficient to review the LBP at regular intervals.

5.3 Credit and the LBP

The Trustees may also consider defining a Liability Benchmark Portfolio in terms of non-gilt fixed income and index-linked securities, including the use of Swaps. This may be particularly appropriate if the Trustees view the buyout of the liabilities as likely and the relevant annuity prices reflect yields on these instruments. However, in general we would caution against Trustees viewing bonds of lower credit quality as adequate for the Liability Benchmark Portfolio. The higher interest rates available on lower credit quality bonds should not be recognised unless a consistent allowance is made for the associated risks.

5.4 Public sector schemes

Even for public sector schemes where the continued support of the sponsoring employer(s) is, for all practical purposes, assured it should be regarded as best practice to identify the Liability Benchmark Portfolio and to monitor and measure the performance of the chosen strategy relative to this portfolio. For example, investing in line with the LBP minimises the scope for disruption to the finances of the sponsoring public sector institution. Potentially significant intergenerational transfers of risk are also avoided.

5.5 Limitations of the LBP

The rate of change of the LBP as economic conditions change is an approximation to the rate of change in the value of the liabilities. The LBP can not capture all the risks of the liabilities as the market for some risks is poorly developed and so appropriate investments can not be bought. The accuracy with which the LBP approximates the accrued liabilities will also change with the demographics of the scheme.

Where the impact of demographic uncertainty is small relative to the size of the economic influences, the rate of change of the LBP will provide a good approximation to the rate of change of the liabilities on a day-to-day basis. Conversely, if the scheme has small numbers of members this approximation may deteriorate more rapidly, in which case, the LBP would have to be reviewed more frequently.

Trustees and sponsors should be aware of the residual economic and demographic risks that a scheme faces even if it invests its assets in the LBP. The limitations of the LBP can be mitigated by regular re-estimation.

5.6 Timescales for re-calculation of the LBP

The frequency with which the LBP is re-estimated will need to balance the benefits from improved risk management that accurate identification of the LBP allows against the additional cost of calculation. The scheme data required for the calculation of the LBP will usually be consistent with the information required for FRS17 calculations.

We recommend that an annual review of the LBP is appropriate for most schemes, but small schemes might require more frequent review. The LBP would need reviewing in the event of significant demographic or economic changes.

5.7 Different measures of the liabilities

We are aware that there are several measures of pension scheme liabilities, (“ongoing” basis, MFR, discontinuance etc etc). We have deliberately aimed not to introduce another valuation methodology. Instead the LBP represents an “invest-able” portfolio that, if held, minimises the risk of the solvency level of the scheme changing. The use of the accrued liabilities

should be consistent with existing measures of “discontinuance” liabilities, based on best estimates of demographic assumptions and without any subjective margins added to the interest rates.

6. Use of the Liability Benchmark Portfolio (LBP)

6.1 Understanding the relationships between assets and liabilities

The relative performance of the scheme's assets and the Liability Benchmark Portfolio (LBP) demonstrates the relationship between the assets and the liabilities. The LBP also provides a benchmark against which the risk of an asset allocation decision can be assessed. The LBP can provide a reference point for Trustees and sponsors to frame objectives for the scheme.

6.2 Monitoring assets and asset allocation

Regular monitoring of the relative value of the LBP and the assets provides up-to-date information on the relationship between the assets and liabilities in the scheme. The volatility of the actual asset performance relative to that of the LBP provides a retrospective view of the risk taken in the asset allocation decision. If assets are invested in the LBP this will reduce the investment risk faced by the scheme compared to holding other assets.

Information on the performance of the LBP should be provided at the same frequency as asset performance is reported on. The performance of the assets should be considered relative to the LBP and not in isolation.

Asset allocation should start from the LBP. The risk of any particular asset allocation decision can be measured relative to investing in the LBP. Different approaches to measuring the risk are discussed in the next section.

6.3 Objectives and time horizons

Trustees are strongly advised to avoid adopting strategies aimed at achieving objectives defined in terms of a long term horizon without ensuring that the risks being taken in the short to medium term relative to the Liability Benchmark Portfolio are acceptable. Trustees should consider carefully the sequence of events that might arise (including a rapid decline in the financial strength of the sponsoring employer) in the event that a strategy defined in terms of a long term objective led in the shorter term to a situation of substantial deficit.

It is prudent for Trustees to bear in mind that the ability of a private sector sponsor to support a scheme could deteriorate extremely rapidly. In adopting any chosen investment policy we recommend that the Trustees should bear in mind that they may need to reduce risk at short notice and move towards an asset allocation consistent with the LBP.

In our view it is essential for Trustees to measure the risks that they are taking in the short to medium term relative to the Liability Benchmark Portfolio and to monitor this position frequently.

7. Measures of Risk

7.1 Measure risk against the LBP

A duty of the actuary/investment advisor is to provide advice on the risks faced by adopting a specific investment strategy, in particular the risk that the assets will be insufficient to meet the cost of securing the liabilities. The Liability Benchmark Portfolio (LBP) has been designed as a reference portfolio that shows how the value of the liabilities changes with economic conditions. Investment risk should be measured by how the value of the assets changes relative to the LBP.

While recognising that measuring risk relative to the LBP is not theoretically ideal (because of the approximations in the LBP) this approach does enable simple and reliable risk reporting. Advisors should warn Trustees and sponsors that the accuracy of the LBP as a proxy for the liabilities will depend on the sophistication of the LBP used.

7.2 Risk Measures

There are numerous ways of demonstrating the risk. Below we have identified different ways of communicating the risk faced.

- **Deterministic Sensitivity** tests are carried out by varying individual economic and demographic parameters while keeping all other assumptions constant (for example changing only the interest rate or the mortality projections). This demonstrates the sensitivity of the LBP and assets to the chosen parameters and hence the risk the scheme faces. A more sophisticated approach would enable interest rates to be varied at different terms to identify duration risks.
- **Scenario testing** considers the consequences of pre-determined changes in economic conditions. These scenarios can be created to demonstrate the effect of different economic conditions on the scheme. Alternatively scenarios can also be selected from historic data. However exclusive use of historical data will almost inevitably understate risk (for example there has been no recent deflation in the UK), and provides a limited data set. Scenario testing can also allow for correlations between asset classes and the financial position of the sponsoring company.
- **Asset-Liability modelling** shows the impact on assets and the LBP by projecting them forward in different scenarios generated by an underlying stochastic model. The results are often summarised using percentiles and are highly sensitive to the risk premia assumed in the model and the time-horizon considered. Different time horizons may be considered. However Trustees should always ensure that they are comfortable with the risks being taken in the short term. An advantage of considering a shorter horizon, say 1 year is that the risk premium assumed has less impact on the results.
- The **cost of protecting** the assets so that their value does not fall below the value of the LBP can be presented alongside any other risk measure used (this can also be thought of as “portfolio insurance” relative to the LBP). This cost is calculated by pricing the options needed to ensure that the value of the asset portfolio does not fall below the LBP. While this is a useful way of ranking and assessing the relative risks of different asset portfolios the measure is a theoretical cost as it may not be possible that options could be purchased at the calculated prices in the required quantities.

The cost of protection provides a single coherent value that allows different investment strategies to be ranked, avoiding over-reliance on probabilistic measures that can be misleading. It also provides rigour in relating the risk back to market prices. We recommend that this risk measure is always shown.

7.3 Projection Time Frame

Projections to demonstrate the risk should be made over a period consistent with the time frame over which Trustees would normally re-assess the asset allocation. For most schemes this would imply a maximum of three years.

7.4 Risk review

Risk needs to be monitored as financial conditions change. We recommend that the Trustees (and sponsors) receive updates on the risk position whenever the LBP is reviewed and at least annually.

8. Defined Contribution Schemes

8.1 Investment risk in a defined contribution scheme

A defined contribution (DC) scheme often runs no asset/liability risk as the assets are usually invested as requested by the trustees or members and the liabilities are defined by the value of the investments. This means that DC schemes are savings vehicles where the link to the amount of pension that will be secured at retirement has been broken. Arguably this is a major flaw in DC schemes as the members are aiming to build up retirement benefits that will help replace earnings.

This approach also highlights that the transfer of risk to the member associated with a DC scheme is often overstated. Where a DC scheme provides the option to invest in deferred annuity contracts or investments of similar nature, the members can elect to pass the investment and mortality risk to the annuity provider. Arguably such an approach involves less risk than a DB scheme, as the risk of default would probably be lower. Most DC schemes do not offer deferred annuity investment options but do enable members to invest in (long) bonds. Here the members are left with the mortality risk and some re-investment risk. This is a comparable position to the sponsor of a DB scheme who invests as per the LBP.

In practice a key difference between a DB scheme and a DC scheme invested in the LBP is that the contributions typically paid into a DC scheme will not be sufficient to secure the levels of benefit typically provided by DB schemes to those who remain in them to retirement. This reduction in provision is often lost or confused with different divisions of risk between DB and DC. The use of the LBP could usefully highlight these issues.

8.2 The LBP concept in a DC context

In a DC context the LBP can be interpreted as the portfolio that minimises the risk of the pension that could be secured by the accrued fund falling as economic conditions change. This would imply the LBP consisted of deferred annuity contracts or long dated fixed and index-linked gilts.

We would caution Trustees against the use of a standard investment strategy that involves high investment risks. The risk of the standard strategy should be assessed against the relevant LBP.

8.3 Caution in using the LBP approach in DC schemes

However the LBP approach may not be appropriate for any given member as individuals should consider their assets and liabilities (or commitments) in aggregate, for instance in the context of private non-pension savings. This may take on increasing importance in the UK with changes to more flexible tax rules on lifetime build-up of funds³. Individuals can also have different risk preferences that could justify different investment strategies.

³ Inland Revenue: Simplifying the taxation of pensions: increasing choice and flexibility for all. December 2002

9. Assets

9.1 What assets to consider

When considering the “assets” we recommend that only the monies already held in the scheme should be considered for setting the LBP. No account should be taken of future contributions commitments to the scheme from the sponsor whether this is for regular contributions or to make good a shortfall. This represents a prudent view and does not rely on money yet to be received from the sponsor (whose financial conditions could rapidly deteriorate).

9.2 Assets and liabilities

From the perspective of meeting liabilities, assets can be thought of in two distinct camps. They may be categorised as those that are most likely to be appropriate investments to meet Defined Benefit liabilities because they have more predictable cash flows and a greater certainty of return, and those which are higher risk assets with much less predictable cash flows, and are held in the hope/expectation that they will deliver higher returns.

A discussion of the different assets classes and derivatives is included in appendix B.

9.3 Supply and demand for bonds

Maturing pension schemes and greater focus on risk management is likely to lead to an increased demand for bonds. If a significant proportion of current pension scheme assets move into bonds then the gilt market will be insufficient to meet this demand. Many have commented on this apparent impossibility of accommodating the potential demand for bonds.

However capital markets are dynamic and exist to match demand and supply. By following the possible chain of events we can see how markets could respond.

Firstly demand for gilts increases and without a commensurate increase in supply prices rise and yields fall. If this happens in isolation then the credit spread of corporate bonds over gilts would increase. The higher reward to investors for the risk of holding corporate bonds would make them a more attractive asset class relative to gilts and this should lead to increased demand for corporate bonds and hence lower yields. The credit spread would then decrease until equilibrium was reached. Still the current gilt and corporate market may be insufficient to accommodate all the funds looking to invest in bonds. However the lower yields would make debt issuance more attractive for corporations and so provide an increased supply. Some of this supply may come from capital re-arrangement, for example corporations buying back equity and issuing debt. Additionally there is scope in the UK for companies to convert outstanding loans into trade-able bonds – currently UK companies hold far less of their overall debt portfolio in bond format than their US counterparts. Trends towards greater issuance of debt and equity buy backs have already been a feature of UK capital markets in recent years.

10. Interaction of asset and liability consultants

10.1 Interaction of the roles of the asset and liability consultants

Asset consulting and liability consulting to a pension fund need to be integrated, to the extent that there is often no clear boundary between the two. For a large fund this will usually be achieved by having separate asset and liability consulting teams each of which has substantial understanding of the role of the other. For a small fund with greater cost constraints, it may be achieved by using the same consulting team for both roles, conscious of Myners' recommendation that it is not necessarily best practice.

If the roles are separate the two teams may or may not come from two different firms, although there may be practical arguments why it is preferable to use the same firm. If the roles are combined then it is important that it is explicit that both roles are to be covered by the same consulting team.

Asset allocation should start from the concept of a Liability Benchmark Portfolio (LBP) which is defined as the portfolio of assets that maintains current solvency. Given the same information about a scheme different consultants would be expected to produce broadly similar LBPs. However there is still room for different views on the split between fixed and index-linked securities and the particular bonds to be held. In particular where the asset and the liability consultants do not interact significantly, there is the possibility that the LBP according to the asset consultant is different from that of the liability consultant. Any difference (caused, for example, by use of a different asset model, or different set of approximations) can lead to confusion. Furthermore, the risk of a particular investment strategy relative to the LBP will, of course, depend on the LBP used.

Even if the asset allocation is set equal to the LBP that corresponds most closely to the liabilities, there is likely to be mismatching risk (as discussed in the section on the limitations of the LBP). The extent of this should be assessed when determining the LBP.

There may be a further dichotomy between the theoretical LBP and what is practical in the event that the fund wishes to be invested in line with the LBP. In particular it may not be practical to invest in the precise portfolio of assets which the theoretical LBP indicates. The theoretical LBP may still be the appropriate portfolio against which the investment strategy risk is measured.

Issues such as appropriate management structures (including the relevance of active and/or passive investment management) and vehicles are for the asset consultant to advise on, although these may involve compromises that have to be communicated and understood.

Ongoing monitoring of the agreed investment plan is the role of the asset consultant. However the liability consultant needs to be aware of the output of that process and to be ready to provoke a review if the arrangement does not seem to be working as expected or they are aware of any significant changes on the liability side.

11. Conclusions

11.1 Benefits of the LBP approach

By adopting the approach outlined we believe that Trustees and sponsors will be provided with,

- a better understanding of the relationship between assets and liabilities,
- a system for measuring the asset performance relative to the scheme's liabilities,

A methodology for quantifying the risks in asset allocation decisions.

11.2 Myners and effective decision making

Effective decision making is the focus of the first of Myners' 10 principles. Transparent and timely information is not sufficient to deliver effective decision making in isolation. The information needs to be understood and applied to the scheme being considered. To help understand the importance of the information available and its impact a questioning approach is required from the key decision makers.

To help develop this questioning mindset we have set out below some questions that Trustees and their sponsors could ask their advisors. The list is far from comprehensive and will need to adapt for the circumstances of different schemes. However it does provide a starting point. The discussion around these points and the answers provided will help all parties move towards the goal of informed and effective decision making.

- What is the LBP for the scheme?
- What liabilities were taken into account in constructing the LBP?
- How is the LBP expected to change over the period until it is next reviewed?
- How does the contribution rate compare with the rate of accrual of the liabilities?
- What is the expected effect (including magnitude) of any difference between contributions and accrual on the value of the assets versus the LBP?
- How does the scheme's current asset allocation compare to the LBP?
- Where there are differences between the Scheme's allocation and the LBP, why do these exist? Where, for example, there is a large equity holding, what is the rationale for this position.
- Is performance of the current asset allocation measured relative to the LBP?
- What risks (including magnitude) are implied by the difference between the current asset allocation and the LBP?
- How do the risks implied by any difference between the current asset allocation and the LBP affect different classes of member?

11.3 Impact of the proposals

The intention of the Working Party has been to provide a method that will enable Trustees and sponsors to better understand the relationship between the assets and liabilities in their scheme. We are well aware that the future of DB schemes is currently under considerable threat. It is our hope that the transparency provided by the LBP approach will enable sponsors and Trustees to understand and compare directly the risks and costs of alternative methods of benefit provision. We urge actuaries to adopt and promote the recommendations made.

Finally it has been noted that existing guidance notes give scope for confusion. We recommend that they are reviewed to ensure that actuaries have clear guidance on setting discount rates. (For example see GN11⁴ paragraph 3.1.)

⁴ Institute and Faculty of Actuaries Guidance Note 11: Retirement Benefit Schemes – Transfer Values

Appendix A

Note on the relationship between pension assets and liabilities

Introduction

This note provides information to the Trustees and sponsor of the Scheme on the relationship between the assets and liabilities. This information is intended to help the Trustees and sponsor to run the Scheme in accordance with best practices.

Liabilities

- The Scheme assets exist to secure benefits for members. In the absence of further support from the sponsoring employer pension promises made to date should be honoured. Therefore, when considering the relationship between the assets and liabilities, it is consistent to view the liabilities of the Scheme as the accrued benefits that would currently be provided if support from the employer was withdrawn.
- Focusing on the Scheme's current accrued liabilities is consistent with the Scheme being an ongoing entity. If the scheme remains in existence then the accrued liability cashflows will converge to the benefit payments envisaged as they come into payment.

Cost of providing the liabilities

- It is a fundamental principle that the *cost* (or equivalently the present value) of the pension liabilities cannot be reduced by the choice of investment policy, unless the investment policy itself reduces the amount of benefits paid (or reduces the likelihood of payment). The Trustees should be aware of this where investment policies are adopted with a view to reducing the level of contributions paid into the Scheme.
- The Present Value (or cost) of the accrued liabilities as at 1st Jan 2003 was £175m.

Liability Benchmark Portfolio

We define the Liability Benchmark Portfolio (LBP) as the portfolio of assets that, in the absence of future contributions, benefit accrual or random fluctuations around the demographics would maintain the current solvency level as economic conditions change. Once the LBP has been identified it can be used as a proxy for the liabilities. The *relationship* between the assets and liabilities will be demonstrated by how the LBP changes over time *relative* to the assets actually held (including any effect of active portfolio management).

The LBP typically consists of fixed income and index linked gilts that are chosen taking account of the liabilities':

- duration,
- sensitivity to inflation, and
- incidence of cashflows.

Pensions in deferment are predominantly subject to Limited Price Indexation (LPI) revaluation in the period up to retirement while pensions in payment are predominantly subject to annual LPI increases in payment (the valuation report provides more details of the benefits). Taking account of the Scheme characteristics we calculate the following Liability Benchmark Portfolio and the relevant durations as at 1st Jan 2002.

LBP at 1 st Jan 2002		
Asset class	% age	Duration
IL gilts	70%	14.1yrs
FI gilts	30%	9.0 yrs

The Liability Benchmark Portfolio also provides a benchmark against which the risk of the current asset allocation strategy can be measured *relative to the Scheme's liabilities*.

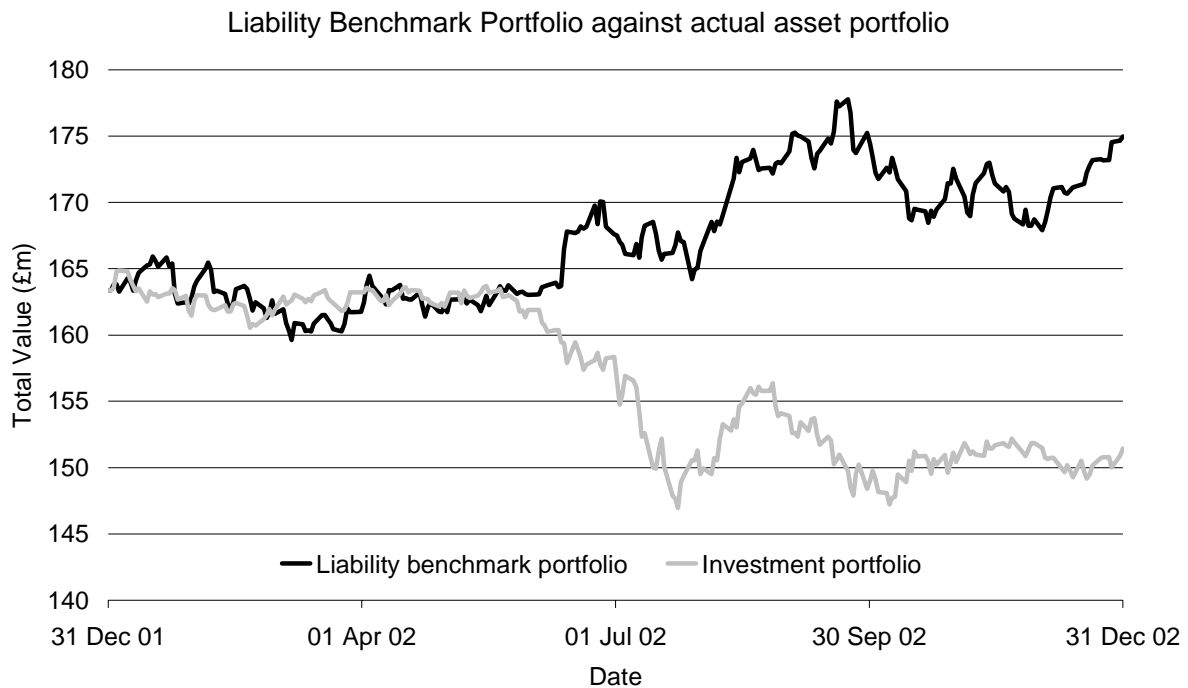
Actual Investment Policy; Previous Year

As at January 2001 the Scheme's investment strategy was as follows:

Asset class	% age
Equities	40%
ILG	35%
FI gilts	25%

A positive return relative to the Liability Benchmark Portfolio represents an improvement in the financial strength of the Scheme (in terms of its ability to meet benefit obligations without additional support from the sponsoring employer), and vice versa.

The follow chart compares the actual performance of the assets over the year to 1st January 2003 relative to the Liability Benchmark Portfolio.



The quarterly performance figures were

	Q1 2002	Q2 2002	Q3 2002	Q4 2002

Asset returns relative to LBP	0.9%	-6.8%	-10.0%	2.2%
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Analysis of Risk Going Forward

We have recalculated the Liability Benchmark Portfolio for the Scheme as at 1st January 2003, allowing for the changed financial conditions and the change in the accrued liabilities (due to actual salary increases, new accrual and payment outflow). The LBP as at 1st July 2002 is:

Asset class	%age	Duration
IL gilts	74%	14.5yrs
FI gilts	26%	9.2 yrs

The Trustees are also considering the impact of increasing or decreasing the equity exposure as set out in the following strategies.

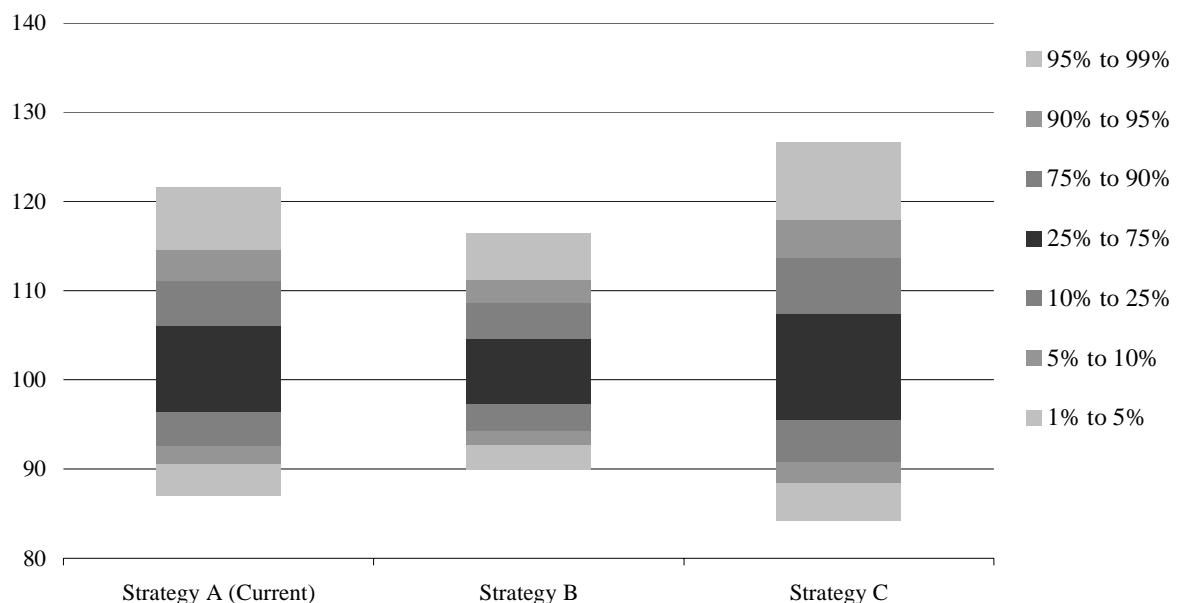
Asset class	Current, Strategy A	Strategy B	Strategy C
Equities	40%	30%	50%
ILG	35%	40%	30%
FI gilts	25%	30%	20%

Using our stochastic investment model we calculate the total risk of the current investment strategy relative to the Liability Benchmark Portfolio and the additional risk arising from the active investment management (if any) as:

strategy risk + additional contribution from manager risk

The chart below shows the projected distribution of returns after 12 months relative to the Liability Benchmark Portfolio assuming that the above investment strategy is adopted. As the scheme uses solely passive managers there is no additional “active” risk to be taken into account. In the event of active managers being employed then active risk should also be considered.

Prospective performance relative to the Liability benchmark Portfolio



The chart above shows the prospective risk of the different investment strategies over the next year relative to the LBP. The probability of a given strategy under or out performing the LBP is indicated by the different colours. The chart also marks the median return of each strategy relative to the LBP and the inter-quartile range. The probability of under performance of 5% and 10% relative to the LBP is summarised in the table below;

Investment strategy	Probability of underperformance		
	Strategy A (current)	Strategy B	Strategy C
underperforms LBP by 5%	19%	14%	23%
underperforms LBP by 10%	6%	2%	10%

These numbers give an indication of the risk of the different investment strategies. This risk can also be summarised by the theoretical “cost of protecting” the current level of solvency. This cost provides a method of ranking the risk of the different strategies. The cost is theoretical as the price charged for the options may differ from that use in the calculation above and they may not be available in the desired quantities.

Cost of protecting against underperformance relative to LBP			
	Strategy A (current)	Strategy B	Strategy C
Cost (as a % of assets)	3.6%	2.8%	4.5%

Note that these costs are assumed to be met from additional funds and are not taken from current scheme assets. If the assets were invested in line with the LBP there would be no cost of protecting the accrued solvency level.

Appendix B

Asset classes and derivatives

Bonds

Bonds are issues by Governments, quasi –governmental organisations and corporations. They offer a stream of coupon payments, either fixed or index-linked, and a return of principal at the maturity of the bond. Maturities of some bonds can go out to 50 years, although the majority of bonds in issue are very much shorter than this.

The certainty of receiving these coupons and return of principal is dependent upon the willingness and ability of the bond issuer to make good these payments. While defaults by sovereign countries do happen, government bonds issued by countries of high standing represent the lowest credit risk of any asset available. Credit ratings reflect the level of confidence in an issuer to make good the coupon and redemption payments on the due dates.

The market value of bonds at any time reflects the present value of future coupon payments and return of principal discounted at an interest rate that reflects both current interest rate levels and the credit strength of an issuer. All things being equal the lower the credit quality of the bond the higher the discount interest rate and hence the lower price put on the bond. Liquidity also plays an important role in the market value of a bond. Government issues, where a range of maturities is always available in size, trade at a premium to smaller less liquid issues even by supranationals of comparable credit quality. The ‘spread’ between yields on government debt and corporate debt is volatile, reflecting changing expectations of default risk on credit, as well as changes in liquidity preferences in different economic climates.

In terms of bonds’ abilities to meet projected cash needs in the future the following qualities can be noted;

- predictable income streams into the future
- known value at maturity
- future market value determined by movements in interest rates and credit quality

The majority of the return from a long-dated conventional bond investment is from the coupon payments rather than the capital value movement in a bond. (It is, however important to note that where bonds have been structured with zero coupons - or in the case of shorter dated maturities - this is not the case.) Hence bonds have always been seen as suitable investments to back insurance products such as annuities.

The sterling bond market is over £500 bn and has grown substantially in recent years through large issuance of corporate debt. Life companies are substantial investors in sterling bonds and may hold investments to maturity once bought. Hence availability and liquidity of the right bonds in the bond markets, corporate ones in particular, can be limited.

In addition there is very little index-linked issuance in the sterling market and next to no LPI issuance (i.e. bonds whose coupons are linked to inflation up to 5% per annum). Perfect matching of future cashflows using conventional bond investments at any one time is currently not possible.

A portfolio of bonds is likely to provide the greatest certainty of matching future cash requirements of any asset class.

It is important to distinguish here between corporate and government bonds. While all conventional bonds share the characteristics of greater predictability of cash flows than equities, the default risk on corporate bonds is related to the health of the corporation, in other words to the same factor which is the primary driver of return on the equivalent equity. Thus credit spreads tend to widen, and consequently corporate bond values to fall relative to Gilts, at the same time as equity prices come under pressure, albeit that the volatility of equity returns remains much higher. This is a concern even for funds which are matching coupon payments with fund liabilities, as significant defaults are likely to impair their ability to meet those liabilities.

Equities

Equities represent the risk capital of the firm, and holders of equity participate in both the upside (if any) and downside after all other commitments to employees, suppliers, customers, taxation authorities etc. and bondholders have been met. The shareholder participates in the success or failure of the company and as such returns cannot be guaranteed. In most companies shareholders receive an income stream in the form of dividends, which are at the discretion of the company board and which can fall as well as rise. By their nature they are difficult to predict for any individual company, particularly over the long term. The capital value of the shares at any time reflects investors' expectations regarding the future success of the enterprise and the future flow of dividend payments, and is entirely dependent on the price other investors ('the market') are prepared to pay. Companies which pay no dividends are still valued in the same way.

Whilst equities may provide the requisite level of cash flows in the future there is no guarantee that this will be the case. To compensate for this lack of certainty investors will demand higher expected returns from equities. However the risk means that equities can not offer any guarantees only the hope of higher returns. In terms of meeting future cash needs bonds can be seen as an asset class where it is much more straightforward to predict future cashflows than from a portfolio of equities. As such holding a portfolio of bonds greatly increases the certainty of matching future cashflows. In terms of meeting future cash needs of a pension scheme, equities are a poor matching vehicle with a wide range of potential outcomes. Corporate bonds rank ahead of equity in a default, and even sub-investment grade (or junk) corporate bonds offer more security than the equivalent company equity.

Other asset classes

Other pension asset classes – property, hedge funds, venture capital - can be thought of as variants of equity-type investments. To varying degrees they offer uncertain future streams of income and unknown future value. There is an expectation of higher absolute return than risk-free bonds. The matching ability against projected future cash needs is poor as there is a high degree of uncertainty about what those future cash flows will be. It is possible that some types of hedge fund can be structured to come closer to the desired matching characteristics than those of equities, but caution needs to be exercised here to ensure that the strategy and its risks are fully understood by Trustees.

Derivatives

The derivatives market can provide tailor-made solutions to match future cash needs. The Swaps market allows investors to exchange different series of cash flows to achieve the exposure they require. The most common type of Swap is where an investor exchanges the interest payments on a cash deposit in return for a series of fixed interest payments and redemption proceeds at the end of a specified term. This gives the investor the flexibility to turn the cash deposit into an asset that can either mirror the proceeds on a bond, or match a set of bespoke liability cash flows.

The Sterling swap market is around six times the size of the sterling bond market and hence offers the investor both enhanced liquidity and matching capability relative to conventional bonds. Swaps tend to be available for longer terms than more conventional assets, a significant benefit given the scarcity

of very long duration bonds, and can also be used to extend duration of a portfolio, for example as an overlay to a physical portfolio of corporate bonds.

Swaps are Over The Counter (OTC) instruments and as such counter-party risks need to be factored in the usual way. It is vital to address such counter-party risks in detail. Counter-party risks on a swap can be mitigated through collateralisation, whereby high quality assets such as cash or gilts are passed to the pension fund as collateral for any counter-party exposure which arises.

Appendix C

Authors of the report

The report was produced by a joint Institute/Faculty working party chaired by Cliff Speed. The authors of the report are:

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Note: John Hill was also a member of the working party but was unable to agree the final report. He produced a separate submission. This is published as a *Submission on the relationship between pension assets and liabilities* and is being presented to the same SIAS meeting on 6 May 2003.