

London Borough of Bromley Pension Fund

Investment strategy review

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17 January 2012

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1. Introduction

Background

The Pensions Investment Sub-Committee (“the Pensions ISC”) of the London Borough of Bromley Pension Fund (“the Fund”) has asked Barnett Waddingham LLP to carry out a review of the Fund’s investment strategy.

In light of the results of the actuarial valuation as at 31 March 2010, this report considers the extent to which the current investment strategy remains appropriate, having regard for the level of investment risk inherent in the strategy and consistency with the Fund’s investment objectives. In addition, we will also consider ways in which the investment strategy could be fine-tuned with the aim of improving the overall risk/return characteristics of the investment arrangements.

The report is addressed to the Pensions ISC and is based on the specific circumstances of the Fund. The analysis and conclusions in this report are unlikely to be appropriate elsewhere. Barnett Waddingham LLP does not accept liability to any third parties in respect of the contents of this report.

Investment strategy review process

The review of investment strategy as set out in this report covers the following stages:

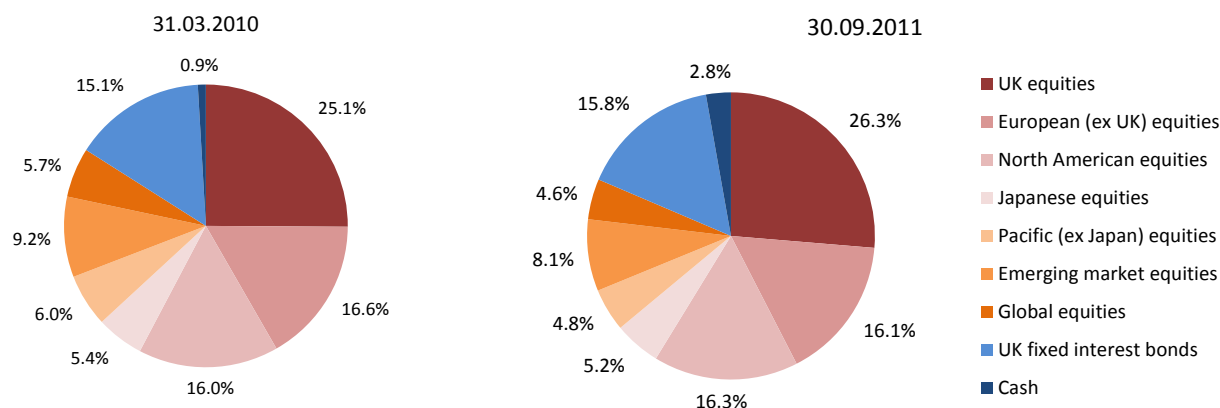
- Consideration of the current status of the Fund from both an asset and liability perspective (**section 2**);
- Identification of key objectives (**section 3**);
- Analysis of the Fund’s cashflow profile to include a consideration of the expected evolution of the Fund (**section 4**);
- Examination of the Fund’s asset allocation in light of the cashflow analysis, focussing on the high level split between “growth” seeking assets (such as equities) and “protection” assets (such as bonds) (**section 5**);
- Consideration of the Fund’s overall mandate structure (**section 6**) followed by a consideration of the exact structure of the growth (**section 7**) and protection (**section 8**) assets having regard for all asset classes appropriate for the Fund.
- **Section 9** summaries the proposals raised throughout the report.

Having agreed any changes to the Fund’s investment strategy as a result of the above considerations, the next phase will involve an assessment of appropriate management styles and vehicles that are best able to fulfil the agreed portfolio mandates to implement the agreed investment strategy.

2. Current position

Asset allocation

The following pie charts set out the Fund's asset allocation as at 31 March 2010 (i.e. the actuarial valuation date) and as at 30 September 2011.



Source: Baillie Gifford and Fidelity.

As at the valuation date, the Fund held 84% of its investments in “growth” seeking assets and 16% in “protection” assets, which is broadly in line with the 80%:20% benchmark allocation as recorded in the Fund’s Statement of Investment Principles. More recently the actual allocation has moved closer to the benchmark allocation with corresponding figures of 81% and 19% respectively as at 30 September 2011.

We refer to the “protection” portfolio as that which invests in bonds and other asset types that are designed to broadly match fluctuations in the value placed on the Fund’s liabilities and hence provide some protection against changes in the funding position. Other assets which are held with the objective of achieving long term returns (i.e. equities) are referred to as the “growth” portfolio.

The Fund’s current high allocation to growth assets, relative to protection assets, is consistent with the Fund being open to new entrants as well as cashflow positive, which allows the Fund to adopt a higher risk long term perspective to investment in real assets (i.e. such as equities, property etc).

The level of investment risk and the accompanying expected investment return is taken into account by the Fund Actuary in establishing the funding plan for the Fund.

Section five of this report considers the continuing appropriateness of the current growth/protection split in light of the valuation results.

Funding and liability position

The actuarial valuation as at 31 March 2007 showed that the assets of the Fund represented 81% of the liabilities of the Fund. The Total Required Contribution Rate was certified as 24.3% of payroll which assumed that the past service funding level would be restored over a period of 12 years.

The actuarial valuation as at 31 March 2010 has since showed that the funding level has increased to 84%, primarily as a result of the change in Government legislation to link pension increases to the Consumer Price Index ("CPI") rather than the Retail Price Index ("RPI").

Whilst the spread between CPI and RPI has not been consistent historically, CPI has, on average, been c.0.7% lower than RPI over the last 13 years or so. Therefore, the change in the inflation measure has meant that the Fund's liabilities are now inflated by what has historically been a lower measure.

The Total Required Contribution Rate has since been certified as 23.0% of payroll with the same deficit recovery period (of 12 years) as before.

3. Objectives

Current stated investment objectives

The aims of the Fund as set out in the funding strategy statement are:

- To ensure that sufficient resources are available to meet all liabilities as they fall due;
- To achieve this with as stable as possible employer contributions at the minimum level agreed by the Actuary;
- To maximise the returns from investments within reasonable risk parameters.

Funding strategy sets investment return targets

The Fund has a very strong employer covenant, being funded substantially by tax-raising local authorities. The Pensions ISC can therefore adopt a long-term view without undue concern about the ability of its sponsors to meet their liabilities.

Although the Fund is maturing slowly, cashflow is positive and is not expected to be materially negative for the foreseeable future. Therefore, we do not believe there is a need to plan for the forced selling of investments to meet pension liabilities at this time. This also lends itself to a long-term view. However, this position will need to be monitored with regards to the Government's announcements on changes to the Local Government Pension Scheme ("LGPS") as well as member opt out risk. The ongoing restructuring of public bodies may also lead to a declining active membership as staffing levels are reduced.

As the Fund has a deficit of assets against liabilities, this may lead to a desire by the Pensions ISC to use the Fund's assets to maximise expected returns, thus reducing the shortfall. This would suggest a higher risk strategy in an attempt to generate returns, but this is moderated by the realisation that such a strategy can also lead to significant falls in asset values in the short term.

Further considerations in generating required returns

It could be argued that it is ultimately the local taxpayer who feels the result of unstable employer rates (e.g. either through the Council Tax or through service levels). Therefore, another very important consideration is the need for relative stability of investment returns given that employee rates are fixed by statute. This can be achieved by investments that are inherently more stable, such as bonds. However, it is also aided by diversification (so that the ups and downs on particular investments do not arise together).

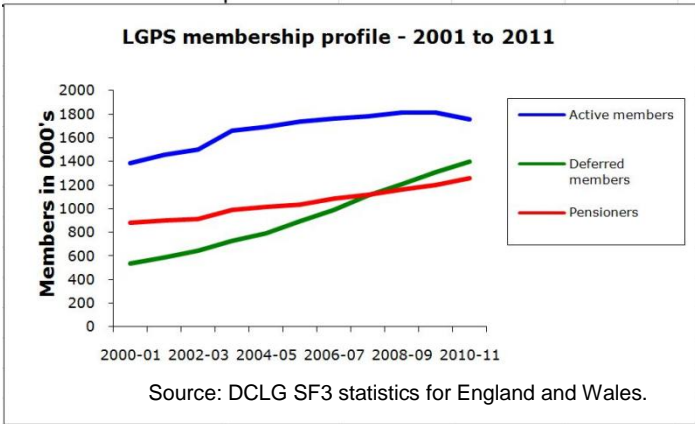
This leads to an investment objective centred around achieving a relatively stable return above the rate of inflation (i.e. real return) over the long term, so as to minimise and stabilise the level of contributions

required to be paid into the Fund by employer bodies in respect of both past and future service liabilities.

Changing profile of the LGPS

Against a backdrop of local authority cuts, the number of contributing members to the LGPS has begun to decline for the first time in recent history as demonstrated by the blue line in the graph below.

Based on SF3 forms submitted to the Department for Communities and Local Government (“DCLG”) by Administering Authorities in England and Wales, it has been estimated that the average LGPS fund could be in negative cashflow in the next four to five years. This contrasts to a 10 to 15 year period being forecast just two to three years ago.



Once income from contributions and investments proves no longer sufficient to meet outgoings, the difference must be met from asset sales. As assets become a source for making pension payments, funds will be increasingly averse to investment strategies that put capital at risk and will move from higher risk, return-seeking investments, such as equities, to those of lower risk which better match liabilities (e.g. bonds).

The implications of this is that as disinvestments are made over the long term and the Fund moves into negative cashflow territory, larger disinvestments can have a big impact on the performance of the remaining assets, particularly if made during periods of high volatility in the market. The stability of returns from the Fund’s investment strategy will therefore become more of an important issue in the future.

“Report on maturing pension fund issues” dated 5 December 2011

Having said this, the Barnett Waddingham Public Sector Consulting Team have calculated that if the active membership of the Bromley Fund was to remain stable at current levels then the Fund would be projected to be a net investor for at least the next 10 years. This suggests that the Pensions ISC can continue to invest in the context of a long term horizon and that cashflow considerations should not pose a significant constraint in developing a long term investment strategy at the current time - the stability consideration mentioned above will become more of an issue in future investment strategy reviews.

The next section of the report takes a more detailed look at the characteristics of the Fund’s cashflows.

4. Cashflow analysis

Nominal benefit payments and contributions

We have been provided with expected future benefit payments by the Barnett Waddingham Public Sector Consulting Team. The payments are based upon the assumptions adopted for the valuation as at 31 March 2010.

Fig. 1 sets out the expected benefit payments in respect of past service, determined on the funding basis as at 31 March 2010. As can be seen from the chart, the Fund is currently making payments of around £23m each year, but the payments have yet to reach a peak (in absolute terms) and in 29 years' time, the Fund is expected to be making benefit payments of the order of £61m each year.

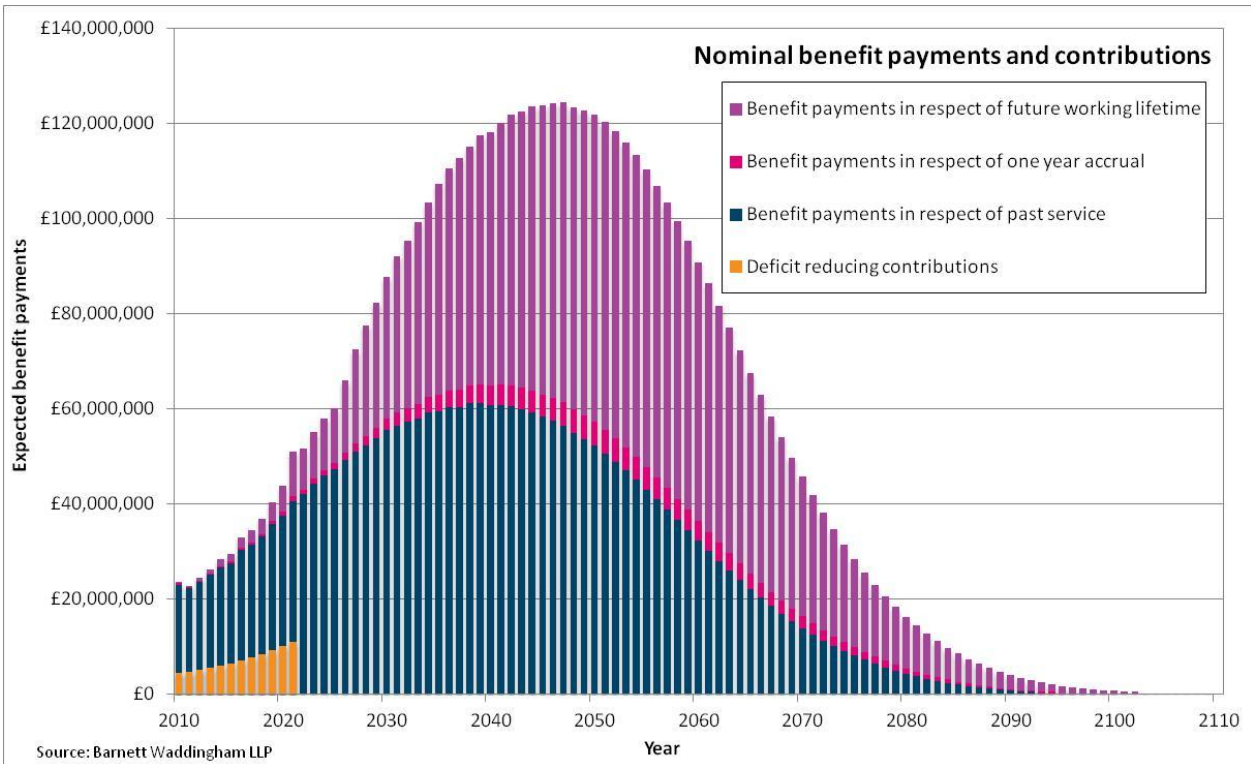
On top of these we have added the expected benefit payments in respect of one year's future accrual for current active members of the Fund and also for accrual over the current active members' total expected future working lifetime. As can be seen, the future accrual shifts the peak of the cashflows in nominal terms back to around 2047 where total payments of the order of £124m are expected. This chart does not take into account the introduction of new entrants into the Fund and can therefore be thought of as the payment profile if the Fund were to have closed to new entrants as at 31 March 2010.

This is in contrast to the analysis produced by the Public Sector Consulting Team in the Report on Maturing Pension Fund Liabilities, dated 5 December 2011 which the Fund had open membership. For this reason, there will be material differences to the future liability figures in the reports.

Given the structure of the Fund's benefits, all the cashflows are considered real in nature and have been projected forward using the full implied inflation curve, derived from the difference in yield between the fixed interest and inflation-linked gilt curves.

Also presented in Fig. 1 are example deficit reduction contributions based upon a 12 year recovery period. These are based upon projected total future salaries for the current active members and a deficit reduction contribution rate as set out in the Actuarial Valuation Report, dated 24 March 2011. Additional deficit reducing contributions would also be payable on the salaries of any new members joining the Fund over the next 12 years, although these are unlikely to have a significant impact.

Fig. 1



Cashflow information provided by the Barnett Waddingham Public Sector Consulting Team, as at 31 March 2010. Full gilt-implied inflation curve used to project benefit payments.

Discounted benefit payments including future accrual

Of course, money invested by the Fund now in order to pay these future benefits will earn investment returns in the intervening period. By discounting the cashflows at an assumed investment return, we are able to find their present value and get an idea of how much assets need to be held in order to meet the future payments.

Fig. 2 presents benefit payments discounted at investment returns consistent with those used to value the liabilities on the proposed final valuation basis. For comparison, we have also presented the

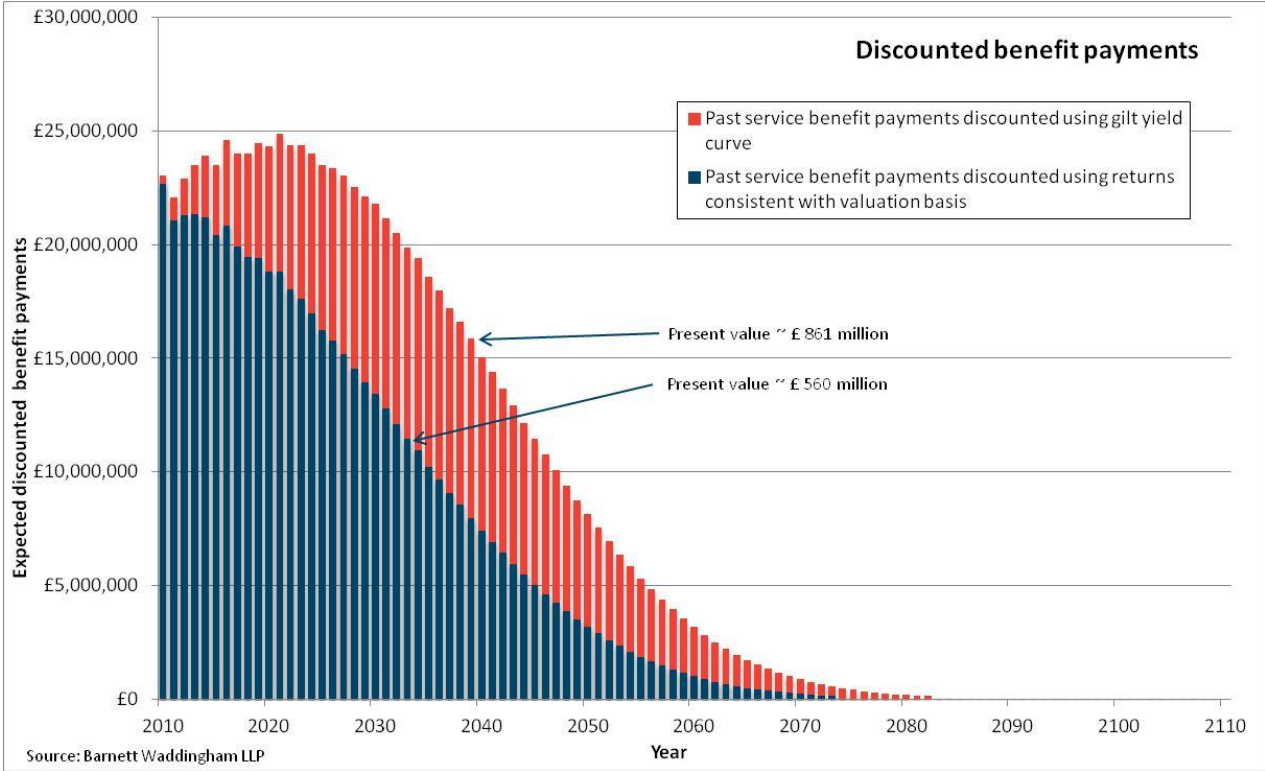
cashflows on a pure gilts basis. That is, discounted at the implied returns available on “minimum-risk” government bonds.

As can be seen from the relative size of the discounted expected benefit payments, discounting at a rate consistent with the valuation basis places a much lower present value on the payments and hence indicates a lower level of assets needed to be held at this time to meet the benefit payments as they become due. Indeed, the present value placed on the liabilities on the “minimum-risk” gilts basis is of the order of £861m compared to a present value on the basis broadly consistent with the valuation basis of £560m. It should be noted that the liability valuation of £560m (discounted using a return consistent with the valuation basis) differs slightly from the Actuarial Valuation owing to different calculation methodologies.

The consequence of allowing for the anticipated greater investment returns in future on the funding valuation basis is that the higher returns must be generated by “risky” investments such as equities and property which display volatile returns and do not match the characteristics of the liabilities and as such we will expect to see volatility in the funding level going forward.

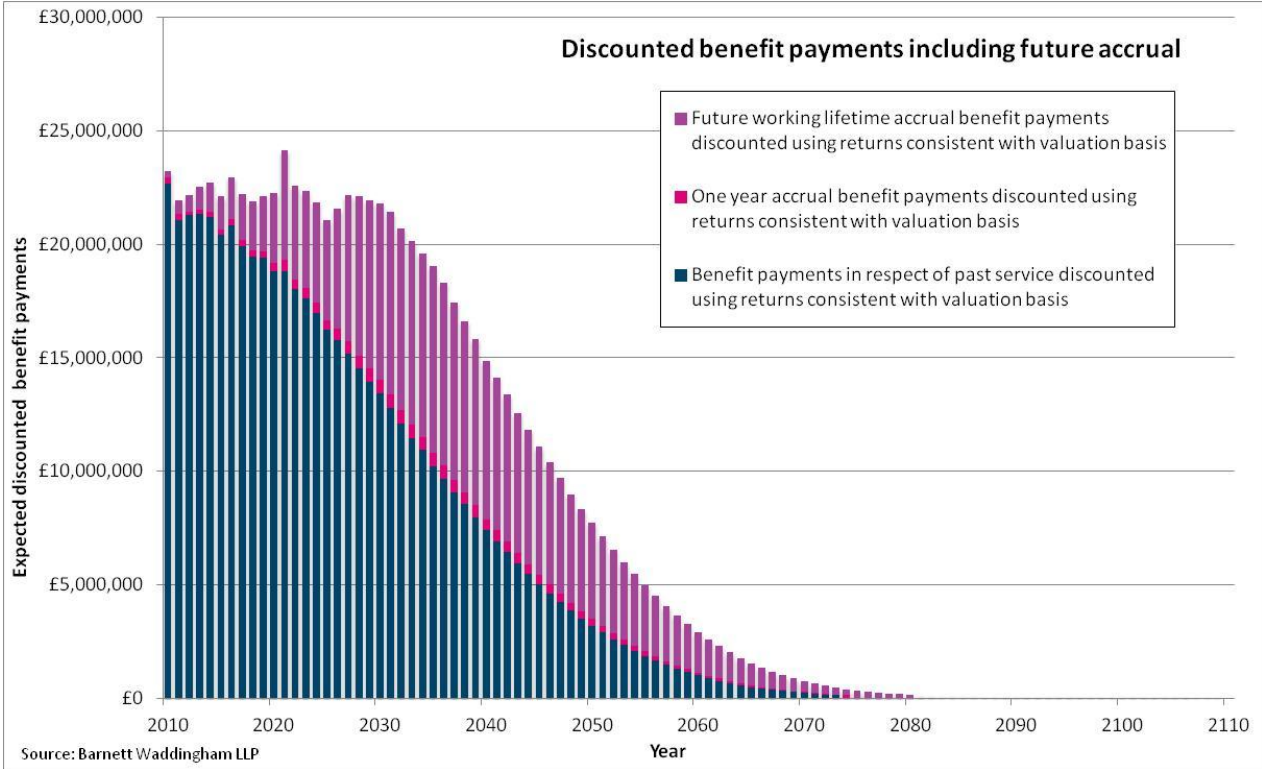
Given the strength of the employer covenant (i.e. the expected ability of the employer to make the necessary contributions in future) this can be considered as an acceptable risk to take going forward and it is certainly true that, in the long-term, such investments are expected to provide excess return over safer investments such as gilts. As mentioned in Section 2, the fact that the Fund is still open to new members and has a very long-term investment horizon lends itself to an investment strategy with a high allocation to growth-seeking assets and we believe this will hold for the foreseeable future, assuming the Fund continues in its current form.

Fig. 2



In addition to the past service benefit payments we have also considered discounted benefit payments in respect of future accrual for the current active membership over one year and over the members' expected future working lifetimes. Fig. 3 gives a clear picture of how the benefit payments begin to level off in present value terms and only start to reduce as more and more of the current active membership retires. If new active members to the Fund were also to be considered we would expect to see this levelling of discounted benefit payments to continue over a longer period into the future.

Fig. 3

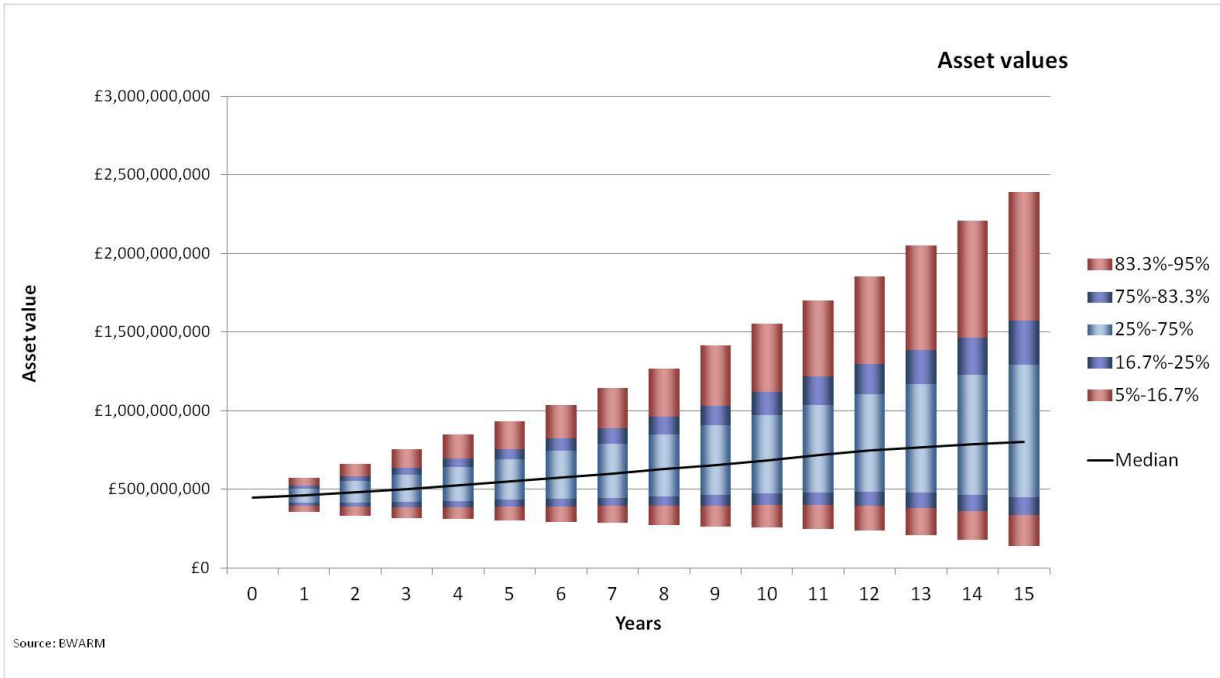


Projected asset values and funding position: current asset allocation

Fig. 4 describes the riskiness of the current asset and manager allocation benchmark (as presented in the Fund’s Statement of Investment Principles) to the future asset value. Using our in-house asset return model, we have analysed the outlook for the projected asset value over the next fifteen years, taking into account the expected deficit reducing contributions. The model is stochastic in nature, meaning at each future year we present a distribution of possible values.

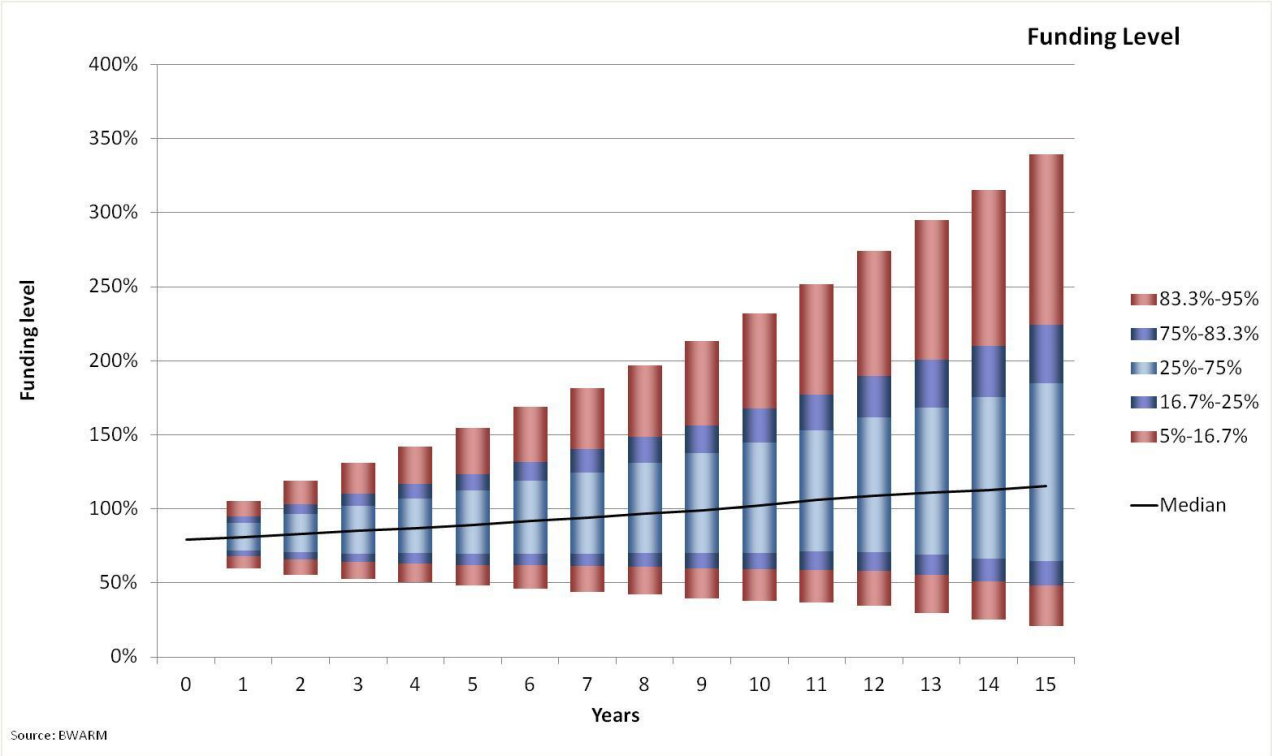
Due to the volatile nature of the assets held, we can see that the uncertainty in future value increases considerably with time. The median value is expected to grow over time, reflecting the fact that the majority of the assets are held in equities which are expected to offer strong long-term returns. However, based on the model, in fifteen years' time, the value of assets is expected to have a 90% chance of being anywhere between £142m and £2.4bn.

Fig. 4



Taking these asset projections into consideration alongside the liabilities, we can also project forward the funding level of the Fund on a basis broadly consistent with that used for the valuation. As Fig. 5 shows, the median funding level is expected to rise towards the fully funded level as time progresses but with significant uncertainty developing over time. In 15 years' time the median funding level is 115% but the inter-quartile range (the 25% chance range either side of the median) covers funding levels of between 65% and 185% funded.

Fig. 5



5. Growth/protection split

Growth versus protection

The Fund currently employs two investment managers who operate balanced portfolios with benchmarks based on a broad 80:20 equity:bond split (i.e. growth:protection split).

The key advantage of retaining a higher allocation to growth assets would be that these assets are typically expected to give a higher return over the longer term than protection assets. However there are two key disadvantages of having a higher allocation to growth assets:

- Volatility of asset values (growth assets can suffer substantial falls in value in a short period);
- Mismatch with the funding basis – the liability values are measured with reference to gilt yields and market-implied future rates of inflation. Growth assets such as equities do not have any direct link to the liability values assessed in this way (unlike index-linked gilts which have a direct link to both).

Both of these factors can lead to more volatility in funding levels. Alternatively if the Fund invests in bonds then the level of volatility in the funding position will be reduced, albeit with lower future investment return expectations.

Consistency with funding strategy

When considering the investment strategy for the Fund it is important to consider the interaction with the funding valuation. In particular, to the extent that the valuation assumptions imply that investment risk will be taken by the Fund, the Pensions ISC will need to consider the most suitable method of achieving the required returns.

Section 4.5 of the Actuarial Valuation report as at 31 March 2010 shows that the Actuary has assumed the following expected future investment returns in respect of the different assets:

Investment return assumption	% per annum	Real % per annum
Equities/absolute return funds	7.5	4.0
Gilts	4.5	1.0
Bonds	5.6	2.1

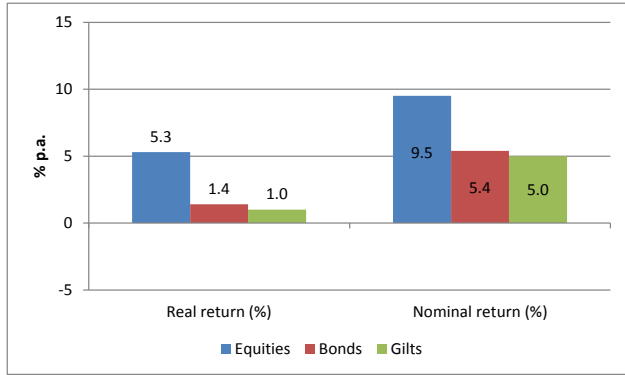
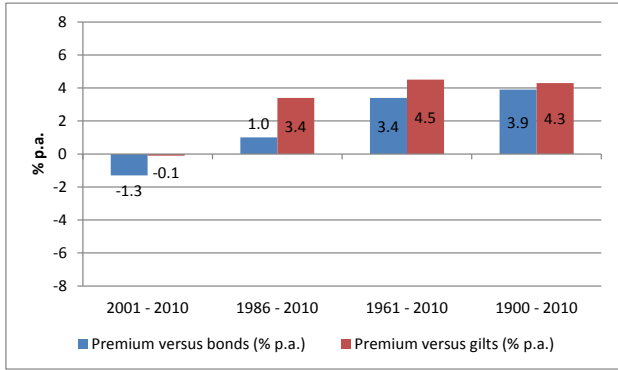
This suggests that those liabilities backed by the Fund's growth portfolio have been discounted at a rate of gilts + 3.0% per annum. With 84% of the Fund's assets invested in equities (i.e. growth assets) at the valuation date and the remaining assets held within the protection portfolio, we estimate that this leads to a total Fund discount rate in the order of 7% p.a. (3¹/₂% p.a. in real terms).

Growth:protection allocation recommendation

Figures from Elroy Dimson, Paul Marsh and Mike Staunton of the London Business School, in association with Credit Suisse, show that global real equity returns have averaged 5.5% p.a. over more than the last century.

In terms of the UK market, the graph on the left below plots the annualised premium achieved by equities relative to bonds and to gilts, measured over the last decade, quarter-century, half-century and the last 111 years. It shows that since 1900, equities have returned 3.9% p.a. above bonds and 4.3% p.a. above gilts.

The graph on the right shows that the annualised real return on UK equities was 5.3% compared to a real return of 1.4% by bonds and 1% by gilts over the last 111 years, the longest period over which UK data is available.



Source: Elroy Dimson, Paul Marsh and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2011

This analysis shows that the investment return of gilts + 3% p.a. assumed to be earned on the Fund's growth assets is not unreasonable. Furthermore, we believe that an allocation broadly in the range of 70 - 100% in growth assets with the balance in protection assets would have the potential to give the required annualised outperformance.

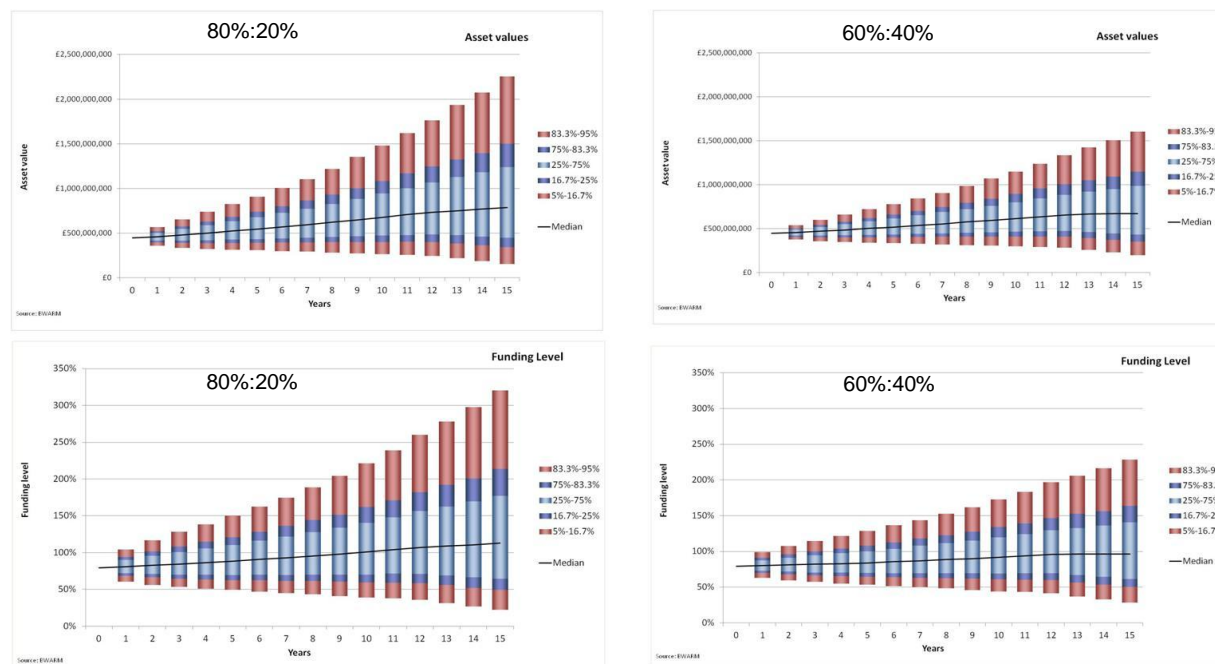
We therefore confirm that the 80%:20% growth:protection allocation currently adopted by the Fund remains appropriate at this time.

5.2 Asset allocation analysis

Effect on projected assets and funding position

Fig.6 below shows how the projected asset value (top two graphs) and funding level (bottom two graphs) would fare over the next fifteen years if a 60%:40% growth:protection allocation was adopted rather than the current 80%:20% allocation, keeping all other assumptions constant as per the valuation basis. It should be noted that the results of these projections can only ever be as good as the assumptions upon which they are based. Whilst our in-house asset risk model employs future economic assumptions based upon past performance and expert forecasts regarding the likely structure of future returns, it is nonetheless only a model, and clearly, future economic conditions can never be fully predicted. If the Pensions ISC wished to investigate further any alternative strategies, we would be pleased to produce the relevant modelling analysis.

Fig. 6



The graphs above highlight, at a high level, that a growth allocation of just 60% is unlikely to be sufficient for the Fund to achieve a fully funded level on the valuation basis before the end of the recovery period of 12 years.

6. Overall mandate structure

6.1 Active versus passive management

The Fund's current active manager bias

The Fund currently employs two investment managers, Baillie Gifford and Fidelity, to manage 'balanced' mandates which invest in a range of equities and bonds.

Baillie Gifford were appointed in December 1999 with the investment objective to outperform their composite benchmark by 1.0 – 1.5% per annum over rolling three year periods. Fidelity were appointed in April 1998 with the investment objective to outperform their composite benchmark by 1.9% per annum over rolling three year periods. Therefore, the Fund is exposed to the fortunes of active management.

This section of the report considers the merits of splitting these balanced mandates into explicit growth and protection mandates. This could involve structuring the Fund's assets using a core/satellite management approach, including the use of both passive and active management as discussed further below.

Merits of passive management

The relative merits of a passive approach (compared to active management) are:

- There is minimal risk of significantly underperforming the chosen index. As index-tracking is more mechanistic and less judgemental than active management, it is reasonable to place a higher degree of reliance on an index-tracking manager achieving its target (i.e. that it tracks the index);
- Investment management fees are significantly lower than for active management because there is no need for expensive research resources. In addition, very little turnover of individual stocks is required so that transaction costs are lower than for active management;
- Relatively less of the Pensions ISC's time will be required in monitoring an index-tracking manager compared to an active manager. As a corollary to this, the chances of the Pension ISC needing to replace an incumbent index-tracking manager are lower owing to the higher probability of the index-tracking manager achieving its target. This is advantageous given that costs are incurred in monitoring and switching between investment managers.

Against this, the main disadvantage of passive management is the potential added value foregone if a successful active manager can be identified. A successful active manager offers the potential to produce

material outperformance, which could be somewhat higher than the saving in fees from passive management.

Genuine active managers can add value

However, active management can offer more than just the prospect of outperformance. It may also provide a diversification of other investment risks relative to the Fund's liabilities. In particular, active managers' relative performance shows a low correlation to equity market returns – in simple terms, active managers do not always outperform when equity markets are rising and underperform when they are falling. The ability to identify successful active managers is still the crucial requirement but if this can be satisfied, an actively managed portfolio can be preferable in risk/return terms to a passively managed portfolio.

The question is how to weigh the effectively guaranteed advantages of passive management against the potentially significant, but uncertain, scope for added value offered by active management. Academic research favours an approach of adopting a low cost passive core alongside unconstrained active equity mandates (as considered further in this report). In particular, such research concludes that passive management is rational but where active management is utilised, outperformance is more consistently achievable where the manager takes significant active positions away from the index (e.g. in the case with unconstrained equity mandates). Further commentary on this research can be found in our article for the Financial Times as found in Appendix 1.

6.2 Core/satellite management structure

Definition and rationale

A core/satellite management structure usually consists of an element of a scheme's assets being invested with a lower risk 'core' manager and the remainder being invested with a higher risk 'satellite' manager.

This could lead to the use of a passive manager in respect of the core portfolio and an active manager for the satellite portfolio.

From a governance perspective, we believe the Pensions ISC should consider the merits of putting in place a passive core/active satellite structure. The rationale for this fits in with the proposed consideration by the Pensions ISC of the use of alternative assets which is discussed further in the report (perhaps through the use of a target return mandate) - given that such an investment would be expected to lead to greater governance requirements, the aim would be to use a passive core/active satellite structure to balance the added complexity associated with alternative assets with reduced governance in other parts of the Fund's investment strategy.

Merits of passive core/active satellite structure

The key advantages are:

- If the active manager does underperform, the effect at a total Fund level will be lower than for a single active manager or two active managers as is currently the case;
- The passive manager would not be taking any tactical decisions and hence there would be no overlaps in decision making;
- Lower management fees by the passive manager is likely to lead to lower overall costs.

The key disadvantages are:

- If the active manager underperforms, such a structure would not prevent overall underperformance, it merely dampens it.
- Similarly, there would be a dampening effect if the active manager outperforms.

Allocation of assets

The split between active and passive management in a core/satellite management structure would be driven by the overall target level of outperformance which the Pensions ISC require. For example, if overall outperformance of 1% p.a. was desired, then the Pensions ISC would need to feel confident that the active manager could target 2% p.a. outperformance if the Fund's assets were split 50%:50% between active and

passive management (i.e. given that the passive manager would be targeting benchmark index returns and therefore zero outperformance).

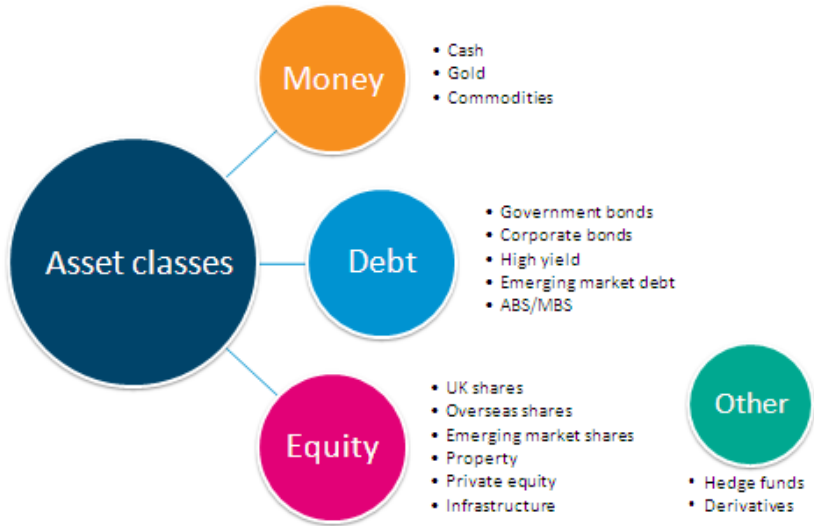
Summary

If the Pensions ISC decides to implement a core/satellite structure then decisions will need to be made in respect of two key issues, namely:

- The passive/active split;
- Whether the active manager should be given a global equity and/or a multi-asset mandate.

The following section of the report considers further the appropriateness of different mandates for the Fund.

In September 2010, a seminar for Bromley members was organised by Barnett Waddingham, at which a session was held on simplifying the ever expanding cornucopia of asset classes available to institutional pension fund investors. The presentation focussed on sources of return and questioned what it is that is actually owned through each investment, leading to an investment universe that can be split into three broad categories as demonstrated across. The next section of this report is written with this categorisation in mind.



7. Growth portfolio structure

7.1 Regional equity exposure

Definition of growth portfolio



The role of the growth portfolio is to invest in assets that are expected to outperform less risky assets such as gilts, which are a closer match to the Fund's underlying liabilities. Examples of growth assets include shares, property, private equity and infrastructure. The common theme amongst each of these assets is that investing in them provides the investor with some form of ownership, whether it be part of a company, property or a bridge for example. On the basis that this ownership characteristic provides investors with the opportunity to obtain a stake in future profits or appreciation in value, it is possible to categorise shares, property, private equity and infrastructure all as a form of 'equity'.

In the context of pension scheme investing, a large portion of the growth portfolio is typically invested in shares, a term that is often used interchangeably with equities. The remainder of the growth portfolio can include investment in commodities, private equity and infrastructure and thus these assets are referred to as 'alternatives'. Hedge funds are also included under the alternatives category, although we would argue that they do not represent an asset class in their own right – investment in hedge funds simply provides an investor with exposure to a range of investment strategies (which can include the use of derivatives) aimed at generating returns from assets within the equity, debt or money category.

Any investment in growth assets implies a departure from the protection portfolio in pursuit of higher expected returns. Consequently, we believe the growth portfolio should be structured in such a way so as to generate the highest return for a given level of risk, and to provide appropriate diversification.

The Fund's growth assets are currently entirely invested in global equities as set out in the following table:

Equity region	31 March 2010 (%)	30 September 2011 (%)
UK	30	32
Europe (ex UK)	20	20
North America	19	20
Pacific Basin (inc Japan)	13	12
Emerging Markets	11	10
Global	7	6
Total	100	100

Source: Baillie Gifford and Fidelity

UK pension funds have increased the proportion of their overseas equity holdings

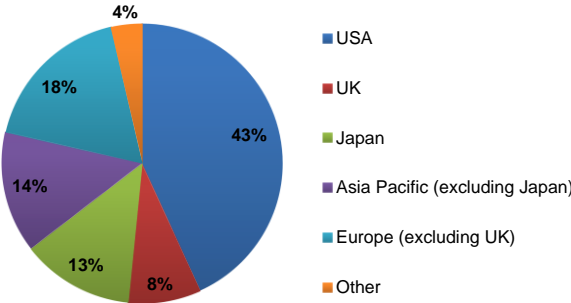
Historically UK pension schemes have tended to favour UK equities versus overseas markets due to the fact that their pension scheme liabilities were denominated in sterling. In addition, UK equities may have been expected to have a closer correlation with UK inflation and salary growth, both of which will affect the value of the liabilities. It is now debateable as to what extent the argument that UK equities provide a better hedge than overseas equities against UK price and wage inflation remains valid as the UK equity market contains significant numbers of large multinational companies whose overseas earnings make up a significant part of their overall earnings.

There is an increasing trend for UK pension schemes to look to increase their exposure to overseas equities so as to reduce reliance on UK equity markets. This diversification is expected to slightly reduce the year-on-year variability of equity returns. Although equity markets around the world have become more correlated (moving more closely in line with each other) as overseas investment becomes more accessible to investors, diversification benefits do still exist.

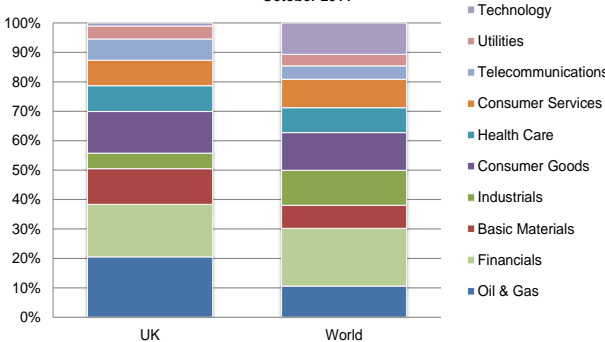
UK equity markets are highly concentrated

The chart on the left below illustrates how the size of the UK market compares relative to world equity markets. In particular, the UK equity market currently makes up less than 10% of the world's equity markets by value.

Relative size of equity markets in FTSE All-World Index October 2011



FTSE World - Sector Breakdown October 2011



Source: FTSE, Barnett Waddingham LLP

In addition, the UK market has a greater concentration of risk in certain stocks than world markets as a whole. For example, the largest 10 UK stocks make up about 40% of the FTSE All-Share (nearly half of which are oil and gas producers) and this concentration is not mirrored in other major markets. In the US and Japanese equity markets, for example, the largest 10 stocks make up less than 25% of their respective total domestic market value. The result of this is that the UK market is more reliant on certain industry sectors compared to the world as a whole, as shown in the chart on the right-hand side above.

There are two main features of this chart to highlight: firstly, there is a high concentration of Financial and Oil & Gas sector companies in the UK market, with these two sectors accounting for around 40% of the UK market compared to 30% of global markets. The turmoil in the financial sector meant that a number of banks saw their value fall and so the financials bias has been lessened to some extent in recent times. Secondly, the UK market has a much smaller exposure to Industrials and Technology than the average across the world, with the latter sector contributing less than 1% to the UK total.

This point on concentration is considered further in a client briefing note which we produced recently that looks at the 'hidden' exposures within equity (and bond) indices, as set out in Appendix 2. We have found the note to lead to some interesting discussions from those not aware of the concentrations present in the markets in which they were investing and hence the associated investment risk to which they were being exposed.

Equity allocation and growth portfolio recommendation

We are comfortable that the current allocation between the different equity regions is suitably diversified. However, we would favour global unconstrained mandates which give the manager the freedom to move between regional markets in response to the ever changing global picture. The case for unconstrained mandates is further strengthened by concerns over the potential financial sector fallout from a Euro default. A manager able to avoid financial stocks would be expected to have an advantage over a manager compelled to hold these stocks as a result of sticking close to market benchmarks.

Passive equity recommendation

In order to counteract the increased costs and governance requirements associated with adding an unconstrained global equity mandate to the investment strategy, the Pensions ISC may wish to adopt a low cost passive core mandate to sit alongside the unconstrained active equity mandate (as discussed in section 6). The article in Appendix 1 gives weight to this type of approach.

Currency hedging

By investing a large proportion of the Fund's assets overseas, the Fund is exposed to currency risk. Over the very long term, the impact of this currency exposure on asset returns is expected to be neutral, but it can lead to additional volatility in the shorter term. Indeed, we expect that currency volatility will be a significant factor in equity returns over the short to medium term – we have seen the Swiss National Bank take action to weaken the Swiss Franc in recent times and protectionist policies are being considered across the world.

As the Fund is a long term investor with strong backing from the Council and is able to smooth short term funding volatility within the actuarial funding methodology, we do not believe there is strong reason for the Fund to consider a currency hedged policy on its actively managed equities, thus avoiding the monetary and governance costs associated with implementing such a hedge.

However, if the Pensions ISC decides to introduce a passively managed equity allocation as part of a core/satellite structure, then the use of pooled currency hedged investment vehicles should be considered. Empirical evidence shows that it is possible to gain a large proportion of the hedging benefits without the need to hedge currency exposure fully. We would be pleased to discuss the analysis behind an appropriate hedging level, if required.

Emerging market equity exposure

Emerging markets can deliver high returns due to their anticipated rapid pace of industrialisation but can be risky due to low liquidity, lack of reliable information and potential political instability. In addition, transaction costs associated with emerging market equities are typically higher than for developed market equities.

Currently, 10% of the Fund's equity portfolio is specifically allocated to emerging markets solely through Baillie Gifford's 9.5% benchmark allocation. This is broadly in line with the exposure to all emerging countries (i.e. including both advanced and secondary emerging markets) within the FTSE All-World Index, which was 11.4% as at the end of November 2011. The Fund will also be able to obtain some exposure to emerging markets through its developed market equity holdings (i.e. through developed market companies that conduct a large part of their business in emerging market economies).

Emerging markets continue to be characterised as having a range of different risk and return profiles, with countries at different stages of economic and equity market development, thus leading to a much more heterogeneous investment universe than in the developed equity markets. As a result, local risk factors and hence country allocation tend to be the key contributors to emerging market equity performance.

An unconstrained global equity manager would be able to invest in emerging market companies on a tactical basis (i.e. by taking advantage of mis-pricing and undervaluation in these regions) and **we**

therefore recommend that such an allocation is achieved through an unconstrained global equity mandate.

Frontier market equity exposure

Frontier markets refer to a set of pre-emerging markets around the world, representing about half of one percent of total global equity market capitalisation. While emerging market economies have been open to investors for about 20 years, frontier markets have only been a distinct asset class for about the last six years.

The markets are not widely held (largely because institutional investors' knowledge about them is limited) but they have a strong potential growth story and solid demographic trends. However, they are significantly less liquid and highly exposed to moves in investor risk aversion. There are, in many cases, regulatory and transparency concerns, as well as custody and trade settlement obstacles. An upshot is that the smaller countries may carry a higher risk premium. However, the relative newness of the market means there is little empirical evidence to support a belief that frontier markets can provide an alternative long-term expected risk premium, as has been empirically evidenced for developed and emerging equity investment.

The Fund currently has no strategic allocation to frontier markets. Whilst we are not advocating the introduction of such a strategic allocation to the Fund's investment strategy, we recommend that, if desired, it could be achieved through a global unconstrained mandate which is actively managed and where the manager would be better placed to take advantage of early valuation opportunities prior to frontier countries moving along the market development curve.

7.2 Alternative investments: Property

Current alternative exposure



There is no generally agreed definition of what constitutes an “alternative” asset class. For the purposes of this report we shall use this term to refer to any asset other than developed market, listed equities, bonds, or cash. By this definition, the Fund currently does not have an allocation to alternative assets within the growth portfolio.

This section of the report considers how investment in alternative assets could help to reduce the correlation of the Fund’s assets with its equity holdings.

Advantages of property as a Fund investment

Currently, the Fund has no strategic allocation to property. However, its inclusion into the investment strategy could introduce the following benefits to the Fund:

- Low correlations to other asset classes, such as equities and bonds, make property a powerful diversifier in a mixed asset portfolio;
- Over the long term, the cashflows from property may hedge against inflation (given upward only rent reviews);

Commercial property can offer stable, bond-like income from contractual leases.

Disadvantages of property as a Fund investment

In terms of the Fund’s current assets, it is likely that any investment in traditional property would be funded from the growth portfolio. Therefore, if property is positioned as a substitute for quoted equities, the disadvantages to the Fund of property investment would include:

- Increased illiquidity, given that properties are more difficult to buy or sell than equities (and other asset classes). The Pensions ISC would therefore be unable to disinvest quickly from such an investment should the need for instant access to cash arise;
 - Increased investment costs (owing to additional adviser fees);
 - Potential for the overall long-term expected return of the Fund to decrease;
 - Given that the Fund is not fully funded, it could slow the growth rate of the assets and require higher levels of future contributions.
-

Long lease property

Rather than considering an allocation to traditional property, the Pensions ISC may wish to consider the use of long lease property funds. Such funds aim to mitigate many of the risks and costs associated with traditional property by structuring the underlying investments so that they have much greater bond-like characteristics.

Investing in properties with longer contracted lease terms (e.g. 15 - 35 years) relative to the average UK lease terms leads to greater security of income. Furthermore, fully repairing and insuring leases mean that investors are not exposed to maintenance or capital expenditure and hence there is greater security of net income. For example, a long term fully repairing and insuring lease with a corporate tenant, where rent increases annually in line with RPI, can provide cashflows that are akin to those produced from an index-linked corporate bond but with a higher 'coupon' payment.

The market of index-linked corporate bonds is relatively small and so such an investment can provide the Fund with a more readily available source of long term, inflation-linked income.

It could be argued that the bond-like characteristics of long lease property could lead to any desired allocation being funded from the Fund's protection portfolio.

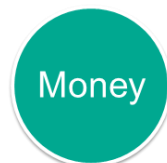
Property recommendation

Whilst we do not believe that an allocation to property by the Fund would be unreasonable, the added complexity relative to the current strategy would likely consume a greater proportion of the Pension ISC's governance budget (i.e. the amount of resources, in time, expertise and financial budget available to implement different mandates within the investment strategy), which may be better spent elsewhere on the strategy.

Therefore, if the Pensions ISC decides to add only one additional mandate to the current investment strategy, we would favour the introduction of a diversified growth mandate (as set out in section 7.4) before the introduction of property.

7.3 Alternative investments: Commodities

Investing in commodities



Commodities are defined as actual physical goods (e.g. oil, wheat, gold etc). The key difference between commodities and traditional pension scheme assets, such as equities and bonds, is that while commodities are investable assets, they yield no income. This places them in the 'money' category along with cash and gold.

Pension scheme investment in commodities is largely achieved through a commodities index future. This is an agreement to buy (or sell) a specified quantity of a basket of commodities at a future date, at a price agreed at the time of entering into the contract (i.e. the futures price). This is an important distinction from what is known as the spot price, which is the price paid today for delivery of the basket of commodities today.

Commodity returns tend to be highly skewed to the energy sector (and hence oil prices), which accounted for about 68% of the Goldman Sachs Commodity Index as at 30 September 2011. Supply and demand for raw materials is also a key driver behind performance. It should also be noted that investing in commodities would likely increase the Fund's US Dollar exposure given that commodities are largely denominated in this currency.

Merits of commodity investment

Commodities can provide returns with little correlation to equity markets (thus providing potential diversification benefits) and can also provide a good return in times of high inflation. However, performance can also be highly variable and the Pensions ISC would need to be comfortable with the possibility of significant losses as well as gains over the shorter term.

When introducing a new asset class to the Fund, such as this, we believe that there should be sound evidence to back the belief that the asset class would provide a long-term expected risk premium. There are mixed conclusions from academic literature as to whether such evidence exists for commodity investing.

For example, a paper entitled "Conditional risk premia and correlations in commodity futures markets" written by the EDHEC Risk and Asset Management Research Centre concluded that a commodity futures risk premium exists (with investors in commodity futures markets earning significant risk premia over the period 1979-2004). In contrast, in their paper entitled "What every investor should know about commodities", the Alternative Investment Research Centre of CASS Business School concluded that with the exception of energy, a consistently positive risk premium is lacking in commodity futures.

Nevertheless, both papers agree that the low correlations of commodities with equities and bonds means that a well-balanced commodity futures portfolio could offer worthwhile diversification. EDHEC go on to conclude that historic correlations with equity returns fell in periods of above average market volatility. This would be particularly important for pension schemes as they need the benefits of diversification most in periods of high market volatility.

Commodity recommendation

We favourably view investment in commodity futures on an active basis owing to the potential diversification benefits and inflation protection.

Care would need to be taken however in deciding on an appropriate index to use in order to assess performance – as we have seen above the Goldman Sachs Commodity Index has too great a concentration, in our view, to energy.

Whilst we believe that a strategic allocation by the Fund to an actively managed commodities mandate is not inappropriate, we believe there is no real need for such an appointment at present. In particular, the diversification benefits mentioned above are less essential for the Fund and Local Government Pension Schemes in general (as raised in the frontier market discussion).

However, the Fund could obtain exposure to commodities through a diversified alternatives mandate where the manager would make the call as to when commodity investment appears appropriate from a tactical point of view. Diversified alternative mandates are considered further in the section 7.4.

7.4 Alternative investments: Diversified fund allocation

Single “alternatives” mandate

If there is a desire to diversify the Fund's growth assets across other asset classes, **we would recommend that this is achieved by investing in a diversified growth fund rather than making explicit allocations to a number of different asset classes.**

These funds tend to invest actively across a wide range of assets and asset classes, including private equity and infrastructure. It is for this reason that we have not considered explicit allocations to such assets, although we would be happy to do so if required by the Pensions ISC. By holding a diverse range of asset classes, the expectation is that returns will then be less volatile than from equities alone.

Between 2006 and 2008, the Fund appointed Credit Agricole Asset Management (“CAAM”) on a multi-asset brief. However, the use of derivatives and arbitrage strategies (i.e. the exploitation of price differentials that exist as a result of market inefficiencies) was an integral part of CAAM's investment policy. Our proposal to invest in a diversified growth fund would be aimed at selecting those funds which provide exposure to a wider range of assets and in a less complex structure than the CAAM fund, as set out below.

Diversified growth funds

Such funds are a relatively new approach to investment for pension schemes although they have a longer history of use by private investors. The fund managers in the diversified growth space can invest in a wide range of asset classes including alternative assets as well as more traditional assets.

The key generic features of such an investment approach are:

- The fund manager selects the asset classes in which the fund will invest (e.g. equities, bonds, cash, property, alternative assets, other investment ideas).
- The asset class decision is likely to change over time as the fund manager's views change (e.g. the allocation to cash could vary from 0% to 40%).
- The fund manager selects the investment vehicles (usually pooled funds) by which to implement the asset class ideas (e.g. invest in a UK equity pooled fund or a UK equity fund that only invests in 'mid cap' companies).
- The pooled fund may be managed internally by the fund manager or managed externally by another fund management firm (e.g. Manager A might have an investment in the Manager B's Property

Fund).

- The fund manager may use derivatives to implement some of the investment ideas.

Rather than being tied to a benchmark allocation, most diversified growth funds have set themselves a performance objective to exceed the return from cash or inflation. These can seem more sensible to a pension fund, whose pension payments are linked to inflation. Typical performance objectives are RPI +5% p.a. or LIBOR +3% p.a.

The 'alternative' asset class description covers a wide spectrum that includes:

- High yield debt – corporate bonds that are not rated 'investment grade';
- Private equity – investing in shares of companies that are not quoted on public stock exchanges;
- Commodities – investing in oil, metals and agricultural commodities derivatives;
- Infrastructure – investing in equities or bonds of companies that are involved in infrastructure projects such as road or hospital construction which is backed by an expected steady income stream;
- Volatility – investing in derivatives that vary in value according to movements in market volatility;
- Hedge funds – covers a range of different investment strategies or ideas. Access to hedge funds can either be by investing in single investment strategy funds or investing in funds that invest in a range of hedge fund strategies.

We provided the Committee with a briefing paper on this concept in August 2011. Whilst a general definition of these funds is not easily expressed given the many different strategies they employ, one broad aim of most funds is to achieve equity-like returns in the longer-term but with reduced volatility. Appendix 3 provides a briefing sheet explaining the various types of diversified growth funds.

If the Pensions ISC wish to consider it further, we would suggest that a training session is arranged, ideally by a relevant fund manager, in order to enable the Pensions ISC to make an informed decision as to its appropriateness for the Fund.

7.5 Growth portfolio recommendation

Possible strategies

This section of the report identifies possible future growth portfolio strategies for the Fund as alluded to earlier. At this stage, we have focused on giving a broad overview of the options so that the Pensions ISC can form a view as to which aspects are worthy of more detailed consideration.

Key options

The following list sets out three key options for the Fund's future growth portfolio strategy:

- i. Maintain the existing equity-only strategy;
- ii. Adopt a core/satellite management structure, whereby a proportion of the growth assets are invested in a mixture of UK and overseas equities (for example, on a passive basis) and the remaining assets are invested in an actively managed unconstrained global equity mandate;
- iii. The core/satellite management structure could be extended to include a diversified growth mandate, either in place or in addition to the unconstrained global equity mandate.

i. Maintain the existing strategy

The existing strategy involves investing in equities within the UK, overseas and emerging markets.

The main advantage of this strategy is that it is relatively simple and therefore easy to understand and with relatively low governance requirements.

The main disadvantage of this strategy is that whilst it provides diversification across different equity regions, the Fund is still exposed to a significant element of investment risk given that in an increasingly globalised economy, equity markets in different countries and regions are becoming more correlated.

ii. Addition of unconstrained global equity mandate

Equity markets continue to face the dilemma over whether to focus on the poor macro economic backdrop, or the relatively strong micro position, with many companies reporting strong earnings.

The uncertainty within markets and the scope for different factors to drive different regional markets leads us to continue to favour unconstrained global mandates for actively managed portfolios as we see opportunities for these managers to add value. This is considered further in the FT article included in Appendix 1 as referred to earlier.

The Fund's exposure to each of the equity markets in the Fidelity portfolio is obtained through investment in

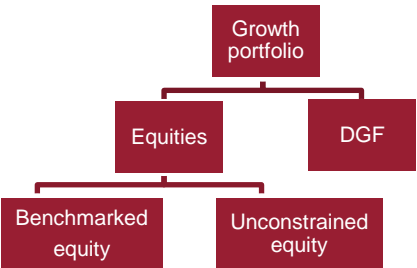
Fidelity's pooled regional equity funds. Therefore, the Pensions ISC could equally choose to retain a proportion of the Fund's Fidelity holdings when structuring the investment strategy around a core/satellite approach. Similarly, the Baillie Gifford portfolio could be incorporated into a core/satellite arrangement.

iii. Diversification within the growth portfolio

One path to reducing risk relative to the Fund's existing strategy would be to look at ways of diversifying the Fund's growth portfolio.

Exposure to a wider range of asset classes could be obtained through direct investments into asset classes such as property, commodities, etc. However, given the governance demands of monitoring a number of separate alternative managers, **we would recommend that the Pensions ISC considers appointing a diversified growth manager with the ability to invest across a range of asset classes on a tactical basis.**

Growth portfolio decision matrix



The following matrix sets out the main reasons for and against selecting the different strategies:

	alongside existing equity mandate		
	Existing strategy	Unconstrained global equity	Diversified growth fund
Reasons for	Simplicity	Access to tactical investing	Reduced equity risk
	Relatively lower cost	Belief in active asset allocation	Belief in active management
Reasons against	Volatile funding level	Exposed to manager skill	Higher active management risk
	Concentrated equity risk	Greater governance	Increased complexity

It should be noted that by adding additional mandates to the Fund's investment strategy, the governance requirements faced by the Pensions ISC will increase. However, it is possible to offset these increased governance responsibilities by utilising passive management for a core part of the Fund's assets.

8. Protection portfolio structure

Current bond exposure



Having focussed on the growth part of the portfolio, this section now considers the Fund's protection assets.

The Fund is currently exposed to fixed interest bonds (including government and corporate bonds) via both the Baillie Gifford and Fidelity portfolios.

Government bonds, corporate bonds and 'alternative' bonds such as high yield bonds, emerging market bonds and credit derivatives (e.g. asset back securities) are all categorised under the 'debt' category because by investing in them an investor is exposed to the debt of the bond issuer (i.e. bonds are simply a type of IOU issued by governments and corporations in order to borrow money). The investor will typically receive a cashflow profile consisting of regular coupon payments followed by a redemption payment at maturity of the bond.

The Fund's liabilities are index-linked and long-dated

The purpose of the protection portfolio is to invest in assets whose characteristics are broadly consistent with those of the Fund's liabilities. As such the investments should be chosen so as to be expected to move in value in line with changes in the value of the liabilities.

Investing in fixed interest and short-dated bonds, as is currently the case, represents an inefficient position for the Fund in the context of its index-linked and long-dated liabilities because:

- These 'protection' assets are expected to yield lower returns than the growth assets and are generally chosen for their matching properties; but
- The assets that have been chosen to move in line with the liabilities will not behave entirely in the required manner;
- Fixed interest government bonds are low risk assets offering low returns whereas the Fund's circumstances allow it to invest in higher return risk assets (e.g. corporate bonds) so as to meet the funding shortfall of the Fund.

It should be noted that the duration of the Fund's liabilities is likely to be longer still than any readily available long-dated index (i.e. such as the Over 15 Years index). As a result, the Fund would be exposed to a degree of interest rate risk (i.e. duration mismatch) in any case. There are various ways that this risk can be mitigated including the use of derivatives. However, we believe that addressing this issue would be an inefficient use of resources at this point given that there remains a significant exposure to growth-seeking assets. The investment risk of investing in equities for example, should be the Pension ISC's primary consideration as this will potentially

have the greatest impact on the future funding level from an investment perspective.

Inflation protection

The Government has changed the statutory minimum rates of indexation which apply to public sector pension schemes from being based on RPI to CPI. Historically, CPI inflation has been approximately 0.7% p.a. lower than RPI inflation. Additionally, changes in sampling methodology employed by the Office for National Statistics for determining inflation is likely to widen this difference further still.

The Fund's protection portfolio currently only contains fixed interest bonds and therefore does not provide any protection against rising inflation. For many institutional investors such as pension schemes, the most straightforward way of protecting against rising UK inflation is to purchase index-linked bonds. These provide payments linked to the level of RPI (albeit with a small time lag) which can be used to back the Fund's inflation-linked benefit promises. The market for index-linked corporate bonds is very small and therefore exposure to index-linked bonds is normally achieved via purchasing index-linked gilts. Currently, there is no competitive market for hedging CPI inflation and therefore we would advise that the best possible way to hedge inflation risk would be via existing RPI-linked instruments.

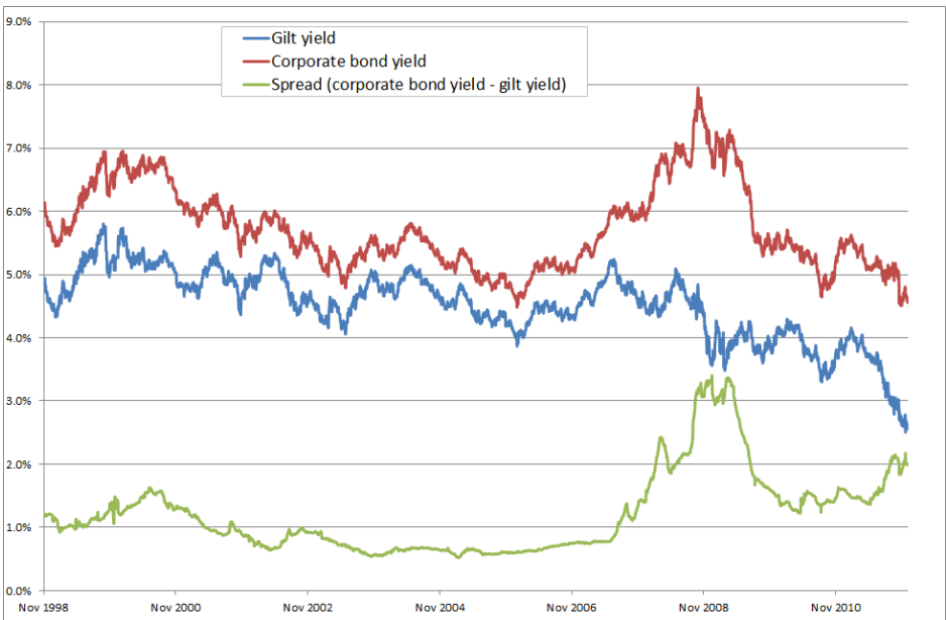
Corporate bond exposure

Investors who hold corporate bonds are rewarded by greater returns relative to investors who hold gilts. The diagram overleaf shows the credit spread (a measure of the additional returns awarded to corporate bond holders) over the past five years. The additional yield is rewarded as a result of increased credit risk, the higher risk of default by a corporate issuer, and reduced liquidity. For investment grade issuers, this has historically been above 0.50% p.a. and more recently has stayed above 1.0% p.a. with the gap widening to over 3% p.a. during the height of the credit crunch.

The Fund's long term investment horizon allows it to absorb the additional default risk and lower marketability of corporate bonds relative to government bonds. Indeed, if the corporate bonds are held to redemption (i.e. not sold prior to its maturity), then the lack of marketability no longer becomes an issue.

Active versus passive corporate bonds

In the current market climate there is a strong theoretical argument for the ability of an actively managed corporate bond portfolio to outperform a comparable passively managed portfolio. The increased uncertainty regarding potential defaults and recovery rates by corporate bond issuers has resulted in corporate bond spreads rising sharply in recent times (where the spread refers to the difference between the yield on corporate debt and the yield on government bonds of equivalent maturity owing to the higher default risk of corporate issuers). This is shown in the graph across.



Source: FTSE, iBoxx, Barnett Waddingham LLP.

In such a market there is a clear advantage to picking those bonds issued by companies who do not default rather than holding the index as a whole, which by definition will include those which will be downgraded and, in the extreme, default. In order to exploit this opportunity, a manager will need to dedicate significant resources to determining the likely credit worthiness of bond issuers, independently of any rating from the rating agencies. Rating agencies have often been criticised for being too slow to downgrade issuers, or indeed for downgrading issuers too readily, and so a flexible approach to official credit ratings may be an advantage. Put another way, a method which relies on credit ratings (such as passive management), may be relatively slow in making changes to the portfolio's constituents.

By following a passive approach, schemes would be holding the entire market of investment grade bonds, which is somewhat concentrated towards bond issuance from the financial sector. A further drawback of passive corporate bond investing is that bond indices are weighted by the amount of the total market capitalisation of each bond, which effectively means that the higher weightings are attached to more indebted companies. This

might appear counter-intuitive.

Protection portfolio recommendation

The liabilities of the Fund are entirely inflation-linked. However, the Fund's bond assets are entirely fixed interest in nature, broadly allocated equally between fixed interest government bonds and corporate bonds.

We would see no strong reason to alter this allocation between government and corporate debt, however, we would recommend that the fixed interest government gilts piece is replaced by investment in index-linked gilts so as to introduce some inflation protection into the Fund.

We remain comfortable with the corporate bond allocation being actively managed as is the case currently. This gives managers the freedom to express views about the relative attractiveness of short and long-term debt as well as giving freedom over which bonds to hold.

If starting from a blank sheet of paper, we would favour passive management of index-linked gilts on account of the limited size of the index-linked gilt market and hence the difficulty in adding value. Therefore, if the Pensions ISC decides to allocate a portion of the Fund's assets to a passive manager as part of the earlier core/satellite proposal, then that passive manager could be appointed for the management of index-linked gilts. **However, if a passive equity mandate is not added to the current investment strategy, we would not be averse to the index-linked gilt exposure being actively managed alongside other bond assets.**

9. Summary

Investment strategy proposals

The Pensions ISC should consider, in light of this report, the extent to which the Fund's current investment strategy should be altered. In particular, the Pensions ISC should focus their attention on the key proposals and discussion points raised in this report as follows:

Proposal		Section reference
Equity:bond split	<ul style="list-style-type: none"> – Maintain a strategy structured around an investment of 80% in growth type assets (i.e. equities) and 20% in protection type assets (i.e. bonds). – However, consider the separation of the current multi-asset briefs into explicit growth and protection mandates. 	5
Management structure	<ul style="list-style-type: none"> – Consider adopting a core/satellite management structure, including an assessment of the merits of active versus passive management and the extent to which single mandates could be added to the investment strategy having regard for the resulting governance implications. 	6
Growth portfolio	<ul style="list-style-type: none"> – Whilst we believe the Fund's current equity portfolio is suitably diversified, we would favour the use of an unconstrained global equity mandate, where the manager would be given the freedom to invest in different equity regions on a tactical basis rather than being constrained to benchmark allocations. – No separate strategic allocation to emerging market or frontier market equities to be considered given exposure within the above mandates. 	7.1
	<ul style="list-style-type: none"> – Adding complexity to the investment strategy as noted above leads us to believe that, whilst the introduction of property to the investment strategy is not unreasonable, there are other demands on the governance budget that should take precedence at the current time. 	7.2

	<ul style="list-style-type: none"> - An active approach to commodity investing is preferred, although no separate strategic allocation to commodities is proposed for the Fund at this time. Instead, consider exposure to commodities through a diversified growth fund. 	7.3
	<ul style="list-style-type: none"> - Introduce diversification away from the equity market within the growth portfolio via the use of a diversified growth mandate. 	7.4
Protection portfolio	<ul style="list-style-type: none"> - Maintain an equal weighting to government and corporate bonds within the protection portfolio. - Replace the fixed interest gilts exposure with index-linked gilts thus introducing an element of inflation protection into the Fund. 	8

We would be pleased to offer training to the Pensions ISC on any areas raised in this report to assist in the decision-making process.

Mandate allocation

Once the Pensions ISC has considered the extent to which it wishes to implement each of the above proposals, a firm recommendation can be provided with regards to the Fund's asset allocation. However, we believe that a 40%:60% core:satellite strategy as set out below represents an appropriate starting point to aid further discussion:

All allocations as a % of total Fund assets		
	80% growth	20% protection
Core: 40%	30%	10%
	- passive global equities	- passive index-linked gilts
Satellite: 60%	50%	10%
	<ul style="list-style-type: none"> - 40% allocated between an unconstrained equity mandate and the Fund's existing mandates - 10% diversified growth 	- active corporate bonds

Statement of investment principles

The LGPS (Management and Investment of Funds) (Amendment) Regulations 2009 requires administering authorities to produce a Statement of Investment Principles. Should any changes be made to the Fund's investment strategy, the Statement of Investment Principles will need to be reviewed and updated.

Ongoing review

The strategy should be kept under review going forward and in particular should be reviewed following any significant Fund or market events.

I look forward to discussing this report with the Pensions ISC.



Marcus Whitehead
Fellow of the Institute and Faculty of Actuaries
Partner, Barnett Waddingham LLP

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Appendix 1 Genuine active managers can add value – FTfm article

FINANCIAL TIMES

MONDAY JANUARY 11 2010

FTfm

Genuine active managers can add value

TALKING HEAD
MARCUS WHITEHEAD

Within the investment management industry there is the eternal question – does active management add value? To better inform the debate, I have reviewed the latest academic research in this area from both sides of the Atlantic and come to some interesting conclusions: passive is rational, closet indexing is not and unconstrained active may just be where the skill is.

The investment market rings with the Financial Services Authority's risk warning that past performance is not a guide to the future. Despite this there is a strong perception that in making decisions to hire and fire investment managers many pension schemes are strongly influenced by past performance – good or bad, and that this can lead to manager changes that add little to performance and in fact can be outright detrimental.

Research on decisions by more than 2,000 UK pension schemes over a 20-year period by Blake, Timmermann, Tonks and Wermers in 2009 suggests managers were typically fired having significantly underperformed a UK equity benchmark, managers were appointed

having recently outperformed the benchmark and that both the fired and hired investment managers produced returns broadly in line with the benchmark index after the change – that is they both performed in line with an index tracker.

A study by Goyal and Wahal in 2008 looked into similar hiring and firing decisions by US plan sponsors. It showed US equity managers were typically fired for poor performance and hired after significant outperformance. As in the UK, the outperforming manager, once appointed, typically produced returns broadly in line with the index. The fired manager proceeded to outperform the benchmark in the period after their removal.

This leaves us to conclude that pension schemes have failed to consistently

Have we found the Holy Grail – pick top performing managers with a high active share?

add value when changing investment managers. But can active equity managers add value for pension schemes in the first place?

Research into more than 700 pooled funds available to UK pension schemes over a 25-year period by Clare, Cuthbertson and Nitzsche in 2009 found there was little evidence the managers studied could outperform their benchmark index. They also studied “performance persistence”, – whether a manager outperforming in one period tended to outperform in the following period – again they found little evidence of persistence.

A further piece of research comes from the US by Busse, Goyal and Wahal, in 2008 where more than 4,000 US institutional equity funds were analysed over a 16-year period. They found no evidence of manager outperformance on average and also no evidence of performance persistence.

Therefore it seems rational for many UK pension schemes to select a passive manager, as the average equity manager has not exhibited skill and schemes have struggled to identify outperforming managers, despite being strongly influenced by past performance.

However, the academics seemed to bemoan the lack of depth in the data they had available, as they were working off little more than quarterly investment performance data. To dig deeper, we have to look to

retail investment funds and in the US, in particular, where these funds must disclose full portfolio holdings on a quarterly basis.

Research into US equity retail funds by Cremers and Petajisto in 2009 used data on more than 2,500 funds over a 24-year period. They analysed the concept of “active share”, which is the proportion of a manager's portfolio that does not overlap with the benchmark index. They define a closet indexer as a manager with an active share of less than 60 per cent. They found that managers with a high active share, the concentrated stock pickers, significantly outperformed the closet indexers. They also investigated past performance alongside a manager's active share, and found outperforming managers with a high active share showed strong performance persistence.

So have we found the Holy Grail – pick top performing managers with a high active share? As ever, there are lies, damn lies and statistics and one piece of research is not an irrefutable proof. However, for investors committed to active management, the message is clear that closet indexers should be avoided and the focus should be on genuine active managers.

Marcus Whitehead is a partner of Barnett Waddingham LLP

Appendix 2 Briefing sheet on concentrations within investment markets

What's lurking beneath the surface?

The current turmoil in sovereign debt markets has led investors, quite rightly, to review their holdings of Government debt. Global uncertainty has similarly meant that investors are reviewing their equity allocations at a regional level.

Against this backdrop, it is worth reminding ourselves of the "hidden" features of the markets we are investing in to ensure that these are not overlooked in these turbulent times.

Bonds

In our 2009 note "How corporate are your bonds?" we assessed the potential impact of bank nationalisations and record Government issuance on the corporate:sovereign split within bond markets. At the time the focus was on the changing expected return as the average credit quality of bonds issued increased.

Concerns now are surrounding sovereign risk and in particular the risk of a default within the Eurozone. Again we need to look below the surface to uncover the true exposures.

Bond indices are categorised by the currency of the bonds issued, rather than the domicile of the issuer. The key here is to look at the underlying constituents of the market. Trustees should not assume that their corporate bond exposure is entirely (or even majority) to UK based issuers. Taking as an example the iBoxx GBP Non-Gilts All Stocks Index, a commonly used benchmark for both active and passive corporate bond holdings, almost 60% of the market value of this index is issued by non-UK entities.

Within this non-UK component are bonds issued by overseas Governments, including the Governments of Spain and Italy, as well as supranational issuers (such as the European Investment Bank) and also foreign companies.

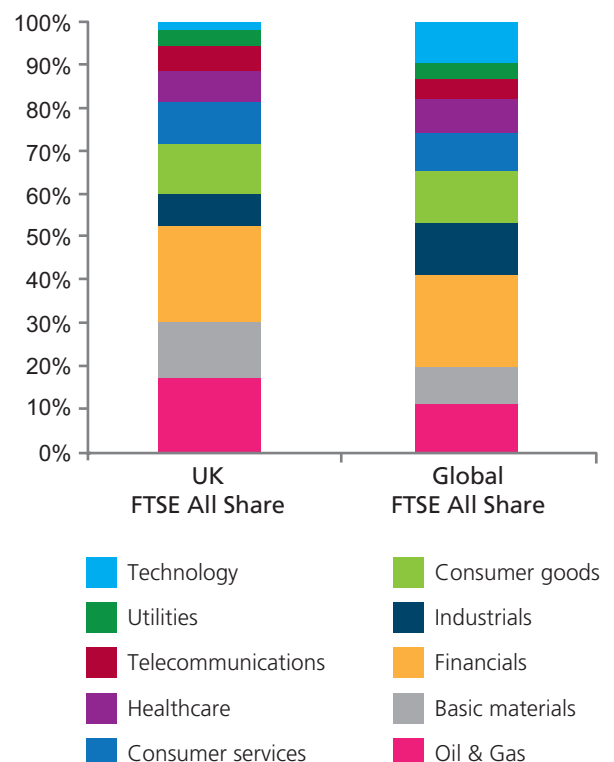
Looking at the market at this level of detail will reveal that corporate bond exposure is not entirely (or even majority) corporate. At the highest level of bond classification, only 60% of the above index is classified as being "corporate". The remainder are sovereign and sub-sovereign or collateralised (asset-backed) issues. If we take this a step further and classify bonds of those nationally owned banks, such as Lloyds Banking Group and the Royal Bank of Scotland, as being quasi-sovereign then the true level of "corporate" bonds within this index falls below 50%.

For passive pooled fund investors there is little choice for trustees in terms of which index to track. It is therefore to

active management that we must look in order to try to overcome some of these biases within benchmark indices. (Index data sourced from iBoxx as at 30 June 2011).

Equities

It is not just bond markets that have some potentially surprising characteristics. Equity markets, and in particular the most familiar, the UK market, have some quirks of their own. The UK equity market recently overtook Japan to be the second largest equity market by market capitalisation and as the majority of UK pension funds invest heavily in their home market, it warrants more detailed analysis.



Source: FTSE, 30 June 2011

The first step is to examine the companies themselves. The UK equity market is simply made up of companies that are listed in the UK. There is no requirement for them to conduct part (or indeed any) of their business within the UK.

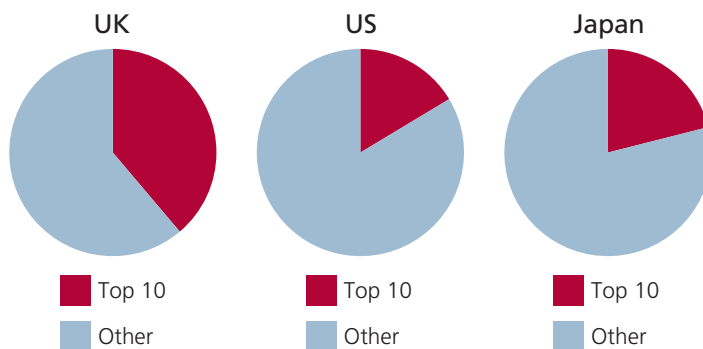
This leads to the typical UK equity investor finding themselves holding shares in companies such as Kazakhmys (a Kazakhstan based copper producer), Randgold Resources (an African focused gold mining company) and Antofagasta (a Chilean based copper mining company) alongside companies such as Tesco and Marks & Spencer. Indeed around two-thirds of earnings of companies within the FTSE All Share come from overseas.

This has both positive and negative effects. The most recent positive impact has been the continued performance of UK equities despite fairly lacklustre growth of the UK economy. As so much of the market relates to companies operating globally, the market is reasonably decoupled from the fortunes of the UK.

At a sector level the UK equity market, as represented by the FTSE All Share Index, is strongly biased towards Resources (30% of market capitalisation) and Financials (22% of market capitalisation). The concentration towards oil and gas as well as mining companies leads to a strong dependence between the UK equity market and the Chinese economy (due to their consumption of natural resources).

The Financials weighting means that the UK equity market remains heavily exposed to a rerun of the turmoil seen following the collapse of Lehman Brothers in 2008. This sector concentration is not replicated to the same extent on a global scale, as shown by the chart on the previous page.

Delving deeper still, beyond the sector level and starting to look at the proportion of the market made up by the largest companies, we again find that the UK equity market is significantly more concentrated than other global markets. As shown in the chart above, the ten largest stocks listed on the UK market make up about 40% of the total (and has recently been over 50%), compared to 15% and 20% for the US and Japan respectively. This means that investors in the UK market have greater exposure to specific company risks, highlighted by the impact of the 2010 fall in BP's share price.



Source: FTSE, 30 June 2011

Summary

Looking beneath the surface of markets reveals that underlying holdings may not always be what investors were expecting. The nature of bond and equity markets is such that it is not easy to devise categorisations that will be robust in all circumstances.

Trustees should be aware of the concentrations present in and features of the markets in which they are investing. This is particularly relevant for passive investors who do not deviate from the index; an active manager, free to deviate from the benchmark, may exhibit significantly different characteristics.

As always, the golden rule is to know and understand what you invest in.

Further information

If you would like to discuss these issues further please contact your usual Barnett Waddingham investment consultant.

Barnett Waddingham – JULY 2011

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Appendix 3 Briefing sheet on diversified growth funds

Target Return – Making sense of multi-asset investment funds

Target return – what’s in a name?

Since Barnett Waddingham first put a client into such a mandate in 2004 we have seen a rapid expansion in the number of multi-asset mandates. Unlike more traditional, market-benchmarked funds, the differences between funds with similar benchmarks can be significant. As the marketing teams of different fund managers compete to ensure that the correct words appear in the name of their fund, the marketplace has become confusing for trustees to navigate successfully. The range of approaches that is masked by similar names is immense, and can lead to very important differences between outwardly similar funds.

To assist trustees and scheme sponsors to understand the variety of approaches and the implications of each we split the universe into two main camps that we call “Absolute return” and “Diversified Growth”.

Absolute return

These funds have an explicit aim of capital protection alongside their return objective. The manager aims to exercise skill, changing the assets held in order to avoid capital losses. This may be achieved by, for example, selling out of equities if the manager believes markets will fall, or by holding derivatives which provide more explicit downside protection.

These funds typically exhibit a very high degree of manager risk in that the ability to achieve the targeted return whilst acting to protect on the downside relies on the manager correctly timing decisions. If market peaks are called too early then potential returns are foregone; if market peaks are called too late the downside protection objective is missed.

Diversified growth

These funds do not have an explicit capital protection objective, choosing instead to provide exposure to a broad range of different asset classes and markets. The rationale for this is that holding a broad array of assets will provide smoother returns than a more concentrated equity mandate.

Generally speaking the asset allocation of these funds is set by reference to a model. This may be as simple as allocating equal weights across, say, six different asset classes, or may involve the use of complex econometric models. There would

then be an element (which may be zero in some cases) of the application of judgement to override or endorse the output of the model.

Target return

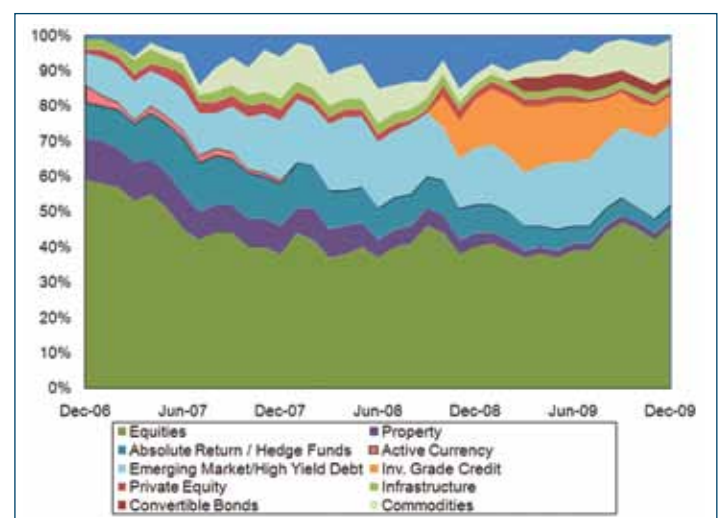
This is another term that frequently arises when discussing these styles of management and is a reference to the performance target-based nature of the mandate. For example funds may operate with a target return of 8% per annum, 3 month LIBOR (London Inter-Bank Offered Rate) +4% per annum, RPI + 5% per annum and so on.

We view this as a collective term covering both Absolute return and Diversified growth approaches.

How do I tell them apart?

Perhaps the best way to categorise a particular target return fund between absolute return and diversified growth is to consider the structure of the portfolio in the hypothetical situation that the manager has no strategy ideas. An absolute return manager faced with this uncertainty would retreat the portfolio into cash in order to protect the capital value; a diversified growth manager would hold a portfolio of diverse assets based on the central scenario of the particular model being followed.

The evolution of the asset mix within a typical target return fund



How do I tell them apart? *continued*

There are few funds that would be recognised as “pure” examples of these approaches, with the majority of funds sitting along the spectrum between these two extremes. In examining funds, the marketing inspired names must be ignored and the true characteristics of the funds recognised.

Trustees and scheme sponsors should ensure that they fully understand how their particular fund operates and the degree to which it falls into the two categories above; if the trustees invest in a diversified growth fund they should not be surprised to see periods of negative absolute performance, if the underlying asset classes were also producing negative performance. Such negative performance would however be cause for concern with an absolute return manager.

Advantages of a target return approach

The key advantage of these approaches is that the manager has control over the asset allocation for this part of the scheme’s assets. This allows the manager to make and act on decisions to adjust the allocation far more quickly than the typical pension scheme.

Contrast the situation of a target return manager, able to make intra-day changes to the strategy to that of a typical pension scheme with a schedule of quarterly (say) meetings. Even where the governance structure of a scheme is such that rapid decisions can be taken, investments which trade only on specified dealing dates e.g. weekly mean that decisions cannot be rapidly implemented.

The unconventional benchmarks that these funds follow offer a particularly attractive feature that has not generally been present in the world of active management. With these benchmarks trustees should never again hear that their manager has “successfully” lost 18% when the market was down 20%. That is not to say that target return managers will not have negative performance – they can and do – rather that they will not be able to hail this as “success”.

In a sense these approaches can be viewed as balanced funds mark II. The stated intention was that traditional balanced (or managed) funds would operate in this way, dynamically adjusting the asset allocation in line with the manager’s outlook for the world. This fell down though due to the use of a peer group benchmark resulting in sheep like behaviour. Knowing that they were being

measured against one another managers avoided large departures from their peers rather than make a conviction call and risk underperforming everyone else. The reward structure for the managers was asymmetric: performing significantly better than the average may lead to a few more clients, and hence fees, whereas significant underperformance could lead to significant outflows. Similarly, as a result of inertia, a small underperformance of the average was unlikely to result in change, even if this occurred frequently.

In short, the managers were incentivised to herd together for fear of falling behind. The use of alternative benchmarks in target return approaches seeks to avoid this problem.

There are vast numbers of ways that different managers can choose in order to beat LIBOR by 4% per annum, say. This variety, coupled with the relentless upward direction of most if not all target return benchmarks, means that managers cannot sit back and copy the herd. If they did then they could still underperform their target significantly.

Disadvantages of a target return approach

The main disadvantage of these approaches is the same as the main advantage: the manager has significant freedom over the asset allocation. Under a traditional, market index based approach the trustees can be fairly sure the manager will not be too far away from his benchmark. (The question of whether the benchmark is of direct relevance to the liabilities of the scheme is a different matter!).

Summary

The diversification benefits of investing across multiple asset classes are as applicable today as they ever have been. Instead of monitoring a large number of managers – one per asset class – trustees can gain this exposure from a single manager. The use of this second generation of multi-asset funds has simplified the governance requirements for trustees wishing to diversify in this way. Unfortunately the inconsistent naming of such funds can cast a shadow of complexity over these approaches but we do not believe this should dissuade trustees from investing in these useful products.

If you would like to discuss these issues further please contact your usual Barnett Waddingham consultant.

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Barnett Waddingham - JUNE 2010

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Appendix 4 Asset risk modelling assumptions

The assumptions adopted are set out below. These assumptions are based on a combination of historical analysis, econometric estimation, macro-economic model simulation and judgement both by Barnett Waddingham and external sources. The assumptions are intended to represent "best estimates" and are based on passive implementation with no allowance for potential additional risk or return as a result of active management.

The output from the model is sensitive to the choice of assumptions and should therefore always be considered in the context of the assumptions that have been adopted. There is a significant difference between mean and median return assumptions, particularly for equities. This is expected and occurs as a result of the skewed return distributions which the asset classes are assumed to follow. The one year figures relate to the distributions of returns looking over each of the next 30 years in aggregate. The ten year figures relate to the next ten years.

	One year arithmetic mean return % p.a.	One year median return % p.a.	Ten year median return % p.a.	Mean thirty year annualised return % p.a.	One year standard deviation %
Growth Assets					
UK equities	9.7%	8.7%	8.2%	8.2%	18.1%
US equities	9.9%	9.1%	8.3%	8.4%	18.8%
European (ex UK) equities	10.3%	9.1%	8.2%	8.4%	20.9%
Japanese equities	10.0%	8.8%	8.2%	8.1%	20.9%
Asia Pacific (ex Japan) equities	10.7%	9.1%	8.2%	8.2%	23.8%
Emerging Market equities	12.5%	9.8%	8.8%	9.0%	28.9%
Commercial property	7.8%	5.8%	6.5%	6.7%	16.3%
Commodities	8.1%	6.8%	6.5%	6.7%	18.2%
High Yield Bonds	8.2%	6.8%	4.8%	6.8%	18.1%
Fund of Hedge Funds	8.4%	10.0%	7.3%	7.2%	16.0%
Target Return	7.6%	7.8%	7.2%	7.2%	8.4%
Cash	4.0%	4.1%	2.7%	4.0%	1.8%
Diversified Growth	8.2%	8.5%	7.4%	7.8%	10.2%
Bonds and Cash					
UK Fixed Interest Gilts (All Stocks)	4.7%	4.4%	3.1%	4.4%	6.8%
UK Fixed Interest Gilts (>15yr)	5.3%	4.6%	4.1%	4.8%	10.5%
UK Index Linked Gilts (All Stocks)	4.9%	4.5%	3.6%	4.3%	11.9%
UK Index Linked Gilts (>15yr)	5.4%	4.4%	3.3%	3.7%	19.1%
UK Corporates (All Stocks)	5.3%	5.1%	3.4%	5.1%	7.3%
UK Corporates (>15yr)	5.6%	5.4%	4.5%	5.4%	7.0%
UK AA Corporates (All Stocks)	5.3%	5.1%	3.5%	5.1%	7.2%
UK AA Corporates (>15yr)	5.6%	5.2%	4.2%	5.2%	8.9%
Inflation					
Inflation	3.8%	3.8%	3.5%	3.8%	1.7%

The table below sets out the correlation assumptions between asset classes used in our internal model, **bwarm**. Correlation refers to the extent to which one asset class behaves like another. To create a truly diversified portfolio, the correlations below help to understand how different assets move relative to the performance of others. The next page provides further guidance as to how the following correlation table should be used.

Correlations are not constant over time. The degree of co-movement between various asset classes will change over time and this effect is allowed for within **bwarm**. As such the table shows the arithmetic mean correlations between the various asset classes.

	UK equities	US equities	European (ex UK) equities	Japanese equities	Asia Pacific (ex Japan) equities	Emerging Market equities	Commercial property	Commodities	High Yield Bonds	Fund of Hedge Funds	Target Return	UK Fixed Interest Gilts (All Stocks)	UK Fixed Interest Gilts (>15yr)	UK Index Linked Gilts (All Stocks)	UK Index Linked Gilts (>15yr)	UK Corporates (All Stocks)	UK Corporates (>15yr)	UK AA Corporates (All Stocks)	UK AA Corporates (>15yr)	Inflation	Cash	Diversified Growth
UK equities	1.00	0.84	0.48	0.68	0.61	0.40	0.47	0.33	0.23	0.46	0.44	-0.02	-0.09	-0.02	-0.03	0.14	0.16	0.10	0.06	0.11	0.00	0.77
US equities	0.84	1.00	0.52	0.69	0.58	0.42	0.52	0.45	0.23	0.50	0.48	0.00	-0.09	-0.01	-0.03	0.15	0.18	0.12	0.07	0.13	0.01	0.12
European (ex UK) equities	0.48	0.52	1.00	0.49	0.42	0.66	0.51	0.35	0.31	0.52	0.50	-0.03	-0.18	-0.03	-0.07	0.08	0.10	0.05	-0.03	0.29	0.01	0.73
Japanese equities	0.68	0.69	0.49	1.00	0.68	0.53	0.51	0.51	0.18	0.58	0.56	-0.02	-0.12	-0.03	-0.05	0.10	0.12	0.07	0.03	0.08	0.00	0.77
Asia Pacific (ex Japan) equities	0.61	0.58	0.42	0.68	1.00	0.52	0.44	0.45	0.20	0.47	0.44	0.01	-0.05	-0.01	-0.02	0.14	0.17	0.10	0.08	0.09	0.00	0.72
Emerging Market equities	0.40	0.42	0.66	0.53	0.52	1.00	0.46	0.42	0.39	0.54	0.53	0.08	-0.02	0.02	-0.02	0.23	0.24	0.19	0.13	0.28	0.00	0.73
Commercial property	0.47	0.52	0.51	0.51	0.44	0.46	1.00	0.40	0.26	0.47	0.47	-0.04	-0.17	-0.01	-0.04	0.17	0.19	0.13	0.06	0.25	0.01	0.65
Commodities	0.33	0.45	0.35	0.51	0.45	0.42	0.40	1.00	0.16	0.39	0.38	0.05	-0.02	0.02	0.00	0.18	0.20	0.15	0.11	0.21	0.01	0.58
High Yield Bonds	0.23	0.23	0.31	0.18	0.20	0.39	0.26	0.16	1.00	0.12	0.10	0.45	0.32	0.19	0.11	0.69	0.70	0.65	0.58	0.53	0.17	0.48
Fund of Hedge Funds	0.46	0.50	0.52	0.58	0.47	0.54	0.47	0.39	0.12	1.00	0.98	-0.04	-0.10	-0.02	-0.02	0.13	0.17	0.09	0.07	0.05	0.00	0.68
Target Return	0.44	0.48	0.50	0.56	0.44	0.53	0.47	0.38	0.10	0.98	1.00	-0.04	-0.10	-0.02	-0.02	0.11	0.15	0.07	0.05	0.05	0.01	0.65
UK Fixed Interest Gilts (All Stocks)	-0.02	0.00	-0.03	-0.02	0.01	0.08	-0.04	0.05	0.45	-0.04	-0.04	1.00	0.93	0.34	0.28	0.86	0.83	0.90	0.92	0.37	0.38	0.23
UK Fixed Interest Gilts (>15yr)	-0.09	-0.09	-0.18	-0.12	-0.05	-0.02	-0.17	-0.02	0.32	-0.10	-0.10	0.93	1.00	0.33	0.30	0.76	0.76	0.81	0.88	0.24	0.26	0.09
UK Index Linked Gilts (All Stocks)	-0.02	-0.01	-0.03	-0.03	-0.01	0.02	-0.01	0.02	0.19	-0.02	-0.02	0.34	0.33	1.00	0.99	0.33	0.32	0.34	0.34	0.04	0.13	0.21
UK Index Linked Gilts (>15yr)	-0.03	-0.03	-0.07	-0.05	-0.02	-0.02	-0.04	0.00	0.11	-0.02	-0.02	0.28	0.30	0.99	1.00	0.26	0.26	0.27	0.29	-0.06	0.09	0.16
UK Corporates (All Stocks)	0.14	0.15	0.08	0.10	0.14	0.23	0.17	0.18	0.69	0.13	0.11	0.86	0.76	0.33	0.26	1.00	0.98	0.99	0.96	0.49	0.39	0.42
UK Corporates (>15yr)	0.16	0.18	0.10	0.12	0.17	0.24	0.19	0.20	0.70	0.17	0.15	0.83	0.76	0.32	0.26	0.98	1.00	0.98	0.96	0.47	0.30	0.44
UK AA Corporates (All Stocks)	0.10	0.12	0.05	0.07	0.10	0.19	0.13	0.15	0.65	0.09	0.07	0.90	0.81	0.34	0.27	0.99	0.98	1.00	0.98	0.48	0.38	0.37
UK AA Corporates (>15yr)	0.06	0.07	-0.03	0.03	0.08	0.13	0.06	0.11	0.58	0.07	0.05	0.92	0.88	0.34	0.29	0.96	0.96	0.98	1.00	0.38	0.29	0.31
Inflation	0.11	0.13	0.29	0.08	0.09	0.28	0.25	0.21	0.53	0.05	0.05	0.37	0.24	0.04	-0.06	0.49	0.47	0.48	0.38	1.00	0.29	0.31
Cash	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.17	0.00	0.01	0.38	0.26	0.13	0.09	0.39	0.30	0.38	0.29	0.29	1.00	0.09
Diversified Growth	0.77	0.80	0.73	0.77	0.72	0.73	0.65	0.58	0.48	0.68	0.65	0.23	0.09	0.21	0.16	0.42	0.44	0.37	0.31	0.31	0.09	1.00

Understanding correlation

Correlation values range from -1.00 to 1.00. A value of +1 is perfect correlation, and a value of -1 is negative correlation. For example, comparing two investments, A and B which have a correlation of 1 would mean that if investment A saw a return of 5%, investment B would also return 5%. If A and B had a -1 correlation, then a 5% gain from investment A would typically be accompanied by a 5% loss from investment B.

For the purposes of comparing asset classes, a correlation value between 0 and 0.5 is often viewed as a very weak correlation, which is a good starting point for seeking diversification. The farther from +1 correlation two investments are, the greater the diversification can potentially be gained from holding these two investments (i.e. a correlation of -0.5 provides more diversification than 0.1, and 0.1 provides more diversification than 0.5). Applying this theory to the table above, we can see that UK equities are most closely correlated to US equities, for example.

Limitations of asset-liability modelling

Asset-liability models are not intended to be predictive of the future. Unexpected events can and do happen in global markets and such uncertainty is impossible to accurately model. Asset-liability models are useful for considering relative risk levels between different strategies and to provide an illustration as to the likely magnitude of fluctuations during normal market conditions. In particular they help trustees and scheme sponsors to consider the interaction between the two halves of any pension scheme: the assets and the benefits promised.

By illustrating the ways in which assets and liabilities move relative to one another it is possible to provide an understanding of the factors which can lead to significant risk exposures, along with consideration of the degree of mitigation likely to be afforded by other strategies. The output of any model is only as good as the parameters that the model uses.

The parameters we have used are based on a combination of history and forward-looking econometric analysis and have been subjected to external scrutiny. Such assumptions clearly incorporate a degree of subjective judgement. The future is, of course, unknown, and if the world economy turns out to be different from that implied by the assumptions then the level of risk could turn out to be higher or lower than predicted by the model.

The scenarios of most interest are also the ones which are most difficult to model. These are the scenarios which incorporate large changes in asset values or yields. The difficulty in modelling such extreme events is that they occur infrequently over time; it is not possible to say for certain what level of loss is likely to occur one year in 100 as we have only one period of this length with which to estimate this risk. The level of risk based upon historic analysis is therefore likely to be lower than the true value.

It is important to bear in mind that a model which overestimates the level of risk can cause as many problems as one which underestimates risk as it can lead to missed opportunities and an overly cautious stance. In selecting assumptions therefore the emphasis is on illustrating the potential downside, without a focus on avoiding underestimation of risk swamping all other considerations.

By taking guidance from the past along with a pragmatic, reasoned view of possible future market movements, asset-liability models can provide helpful information to assist trustees in setting pension scheme investment strategies. Models cannot provide the single “best” or “right” answer, and cannot predict the future.

Appendix 5 Interpretation of model output

The long-term model within **bwarm** considers periods of 10, 20 or 30 years. The output charts show the evolution of the funding level, surplus/deficit, required contribution rate, as well as the assets and liabilities in isolation.

These charts all have the same structure and a similar interpretation. For each year bars similar to the one shown below are produced by ranking each of the 10,000 simulations from best to worst and plotting the percentiles. By comparing the output for several different strategies it is possible to consider the relative risk and return levels.

