eNews from GAD

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ACTUARIAL ANALYSIS — FOR THE PUBLIC SECTOR — FROM THE PUBLIC SECTOR

GAD

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GAD

GOVERNMENT ACTUARY'S DEPARTMENT

Hawthorn, London W13

A very warm welcome to the latest edition of **e-News from GAD**.

This is a time of much change at GAD. There continue to be many changes in UK public service pensions and state pensions, as well as a programme of reform for UK public bodies and there has been an increase in requests from different parts of the UK government with ongoing developments in areas such as long-term care, strategic risk and modelling.

I am delighted to announce that GAD has been appointed as Scheme Actuary to the Principal Civil Service Pension Scheme (PCSPS) with effect from 1 April. Further details of this appointment are provided in the News section on page 2.

GAD's status as a shared service supplier of actuarial services within Government means that commissions for our services do not require ministerial approval as consultancy spend. Further details are available on the Government's Buying Solutions website.

A lot of our work is often 'behind the scenes', such as the input we provide to the UK population projections and our role with the Asset Protection Scheme. It is therefore very gratifying to receive comments from them championing the support provided.

The articles in this edition touch on a number of these diverse areas of our work.

We very much value your feedback on eNews, either to your usual GAD contact or to our central email address enquiries@gad.gov.uk. As always, previous issues of e-News are available on our website **www.gad.gov.uk**.

TREVOR LLANWARNE GOVERNMENT ACTUARY

NEWS FROM GAD

PCSPS Scheme Actuary appointment

We are delighted to announce that GAD has been appointed as Scheme Actuary to the Principal Civil Service Pension Scheme (PCSPS) with effect from 1 April. A dedicated team has been set up to advise PCSPS with Sandra Bell as Chief Actuary supported by James Pepler as Deputy Chief Actuary. There will be a gradual transition of projects from the previous Scheme Actuary, with clients kept informed of the transition arrangements.

Expanding Research & Technical team

Sophie Dennett has transferred to our Research and Technical team, increasing the team's capacity to undertake a greater range of activities.

Chief Actuary appointment

Aidan Smith has been appointed Chief Actuary of the Coal pensions and funded schemes team having previously been Deputy Chief Actuary of this team. Congratulations to Aidan and we wish him success in his new role.

Marathon achievements

GAD actuaries Aidan Smith and Matt Gurden completed the 32nd London Marathon on 22 April in impressive times of 3 hours 49 minutes and 4 hours 1 minute respectively. Very well done to both of them!

DEVELOPMENTS

Auto-enrolment—revised staging dates

In January the Government published a revised auto-enrolment timetable for employers, followed in March by a consultation on the staging arrangements for employers from 1 April 2014 and the phasing of contributions. There is no change for employers with 250 or more employees. Employers will need to be aware of their duties under the legislation and the knock-on implications for existing schemes if relevant.

UK public service pensions—scheme reform

On 9 March 2012 sponsoring departments for the NHS Pension Scheme, the Principal Civil Service Pension Scheme and the Teachers' Pension Scheme published Proposed Final Agreements for new schemes to be introduced from 2015, based on the Heads of Agreement of 20 December. The majority of unions have agreed to take these Proposed Final Agreements to their Executives. Discussions for other public service pension schemes are ongoing.

UK public sector staff transfers

The UK government has agreed to retain the Fair Deal policy and access to public service pension schemes for transferring staff, on the basis that proposed scheme designs are agreed. Guidance on the operation of the future Fair Deal policy will be developed, in conjunction with key stakeholders.

Solvency II—New directive proposed

A new directive proposed by the European Commission making extensive changes to the Solvency II project for insurance regulation is expected to be put to the European Parliament's plenary vote in September. Meanwhile, several countries outside the EU are pressing ahead with the implementation of their own risk-based supervisory regimes.

Changes to UK State Pension

In the March Budget the UK government announced two changes to State Pensions. It will commit to ensuring the State Pension age is increased in future to take into account increases in longevity and will publish proposals in July. It will also, in the next Parliament, reform the State Pension into a (contribution based) single tier pension for future pensioners, set at a level above the means tested standard Guarantee Credit. The move to a single tier pension is likely to impact current contracting-out arrangements.

Reinsurers seeking additional risk information following 2011 catastrophes

Many reinsurers are seeking additional risk information and controls following Lloyd's of London worst loss in one year for catastrophe claims in its 324 year history. Total insured catastrophe losses for 2011 are estimated at over $110 bn. They included floods in Australia, the New Zealand earthquake, and the Japanese earthquake and tsunami in the first quarter, and the Thai floods during the summer. However, global reinsurance rates do not appear to have hardened noticeably.

UK official statistics published on funded and unfunded pension obligations

The UK Office for National Statistics (ONS) has published official statistics on the total obligations of UK pension providers, the first EU country to do so. The statistics include private sector pensions, workplace pensions for which the government is responsible and state pensions, estimating total obligations of £7.1 trillion.

Queries on any of the above can be discussed with your usual GAD contact or our Technical Director, Colin Wilson.

Asset liability modelling (ALM) is a risk management tool used for funded pension schemes, insurance companies and social security arrangements. It takes a holistic view of an investor's risks. Investors who have clear commitments, such as to make pension payments, are unlikely to achieve optimal results if they consider asset management decisions in isolation from their liabilities. Only by understanding and measuring risks are they able to make informed decisions.

The aim of ALM

Traditionally asset management decisions have been based on analysis of risk and reward in terms of investment performance. ALM provides a comprehensive approach for the analysis of risk and reward, reflecting risks associated with assets and liabilities together. This helps investors understand both their risks as a whole and how the assets and liabilities may evolve over time, including the interactions between them and common dependencies. As such, ALM can provide valuable insights into how funding levels may develop and also inform decisions relating to benefit design.

Ultimately, an organisation's policy decisions will depend on its objectives and those of its stakeholders, together with their associated risk appetites. However, an understanding of both asset and liability risks can help an organisation formulate and develop appropriate and consistent policies on investment, funding and benefit design.

Providing a holistic view of risks

ALM involves projecting an investor's assets and liabilities into the future under a variety of different scenarios. In many cases ALM involves the use of stochastic economic models which incorporate assumptions about the statistical properties of key variables affecting asset and liability values, such as the returns from different asset classes and future price and earnings inflation. Stochastic economic models produce thousands of different future economic scenarios. These are used by an ALM to project thousands of different asset and liability scenarios, providing a wide range of possible outcomes for how an investor's assets and liabilities may evolve over time.

The large number of scenarios means an investor can assess the likelihood of different outcomes. For example, for a defined benefit pension scheme, ALM can illustrate the range of likely future funding level outcomes, that is, how the ratio of assets to liabilities is expected to change over time.

The graph below shows the average expected path of the funding level (the darkest line). The lightest lines show the range that the funding level is expected to fall between in 9 out of 10 outcomes, with the intermediate lines showing the range that it is expected to fall between in half of all outcomes.

Chris Bull

'Only by understanding and measuring risks are organisations able to make informed decisions.'

ALM also allows investors to assess the likelihood of poor outcomes occurring. For example, a defined benefit pension scheme may wish to consider the likelihood of:
> the scheme's assets only being sufficient to pay 80% of benefits payable
> the sponsor's contributions needing to rise by over 20%.

By quantifying risk in this way, stakeholders are better able to understand the unique risks that the scheme might face and to consider whether they are taking too much risk, or too little.

Once an organisation's existing risks are understood, the impact of alternative policies can be investigated to identify ways in which expected outcomes can be improved or worst case scenarios can be mitigated. This often means reviewing the investment strategy, perhaps to include an additional asset class or to change the proportion invested in more risky 'return-seeking' assets.

ALM can help stakeholders visualise how outcomes may differ between investment strategies and so help them choose a strategy appropriate to their needs. For example, the graph below shows how the range of funding level outcomes changes in response to a change in the investment strategy.
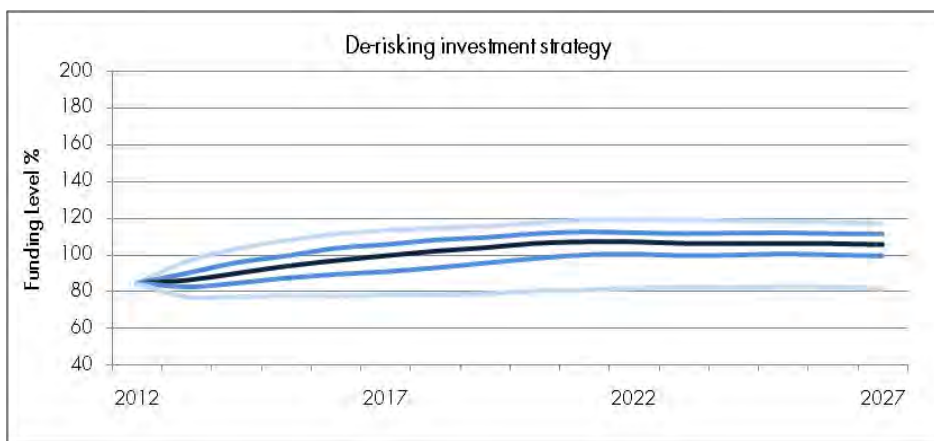
Compared to the previous graph, this shows how the change in the investment strategy narrows the expected range of likely outcome, and reduces the average expected path of the funding level. More significantly, it reduces the likelihood of poor outcomes, that is, the risk of large deficits emerging.

Similarly ALM can be used if a scheme is being redesigned to help identify how a change in benefits, such as providing fixed rather than inflation-linked benefits, will alter the risks of the scheme and what this may mean for the appropriate investment strategy.

Who else uses ALM?

ALM is not only used by defined benefit pension schemes and defined contribution pension funds but also social security arrangements and insurance companies. It can additionally be used to assess government financial liabilities, such as government guarantees.

The focus of ALM will depend on the dominant risks faced by the entity and the environment it operates within. For example, social security arrangements are likely to focus on longer-term time horizons analysing the sufficiency of current contribution rates and potential impacts on intergenerational equity, whereas insurance companies may place greater focus on liquidity risks.

Limitations of ALM

ALM can provide valuable insight into the risks that an investor is exposed to and how different policies may affect the range of likely future outcomes. However, any model is only as good as the assumptions underlying it and no model, however good, can predict the future. As such, ALM should not be seen as a perfect solution, rather as a useful tool to help make informed decisions.

How GAD can help

GAD has carried out a number of ALM studies helping stakeholders understand the risks they are exposed to, in turn helping them to formulate and quantify their objectives and set their risk appetites. For example, in many cases the scheme sponsor and the trustees have agreed a change in investment strategy to improve the likelihood of meeting their joint objectives.

GAD has also worked on a number of bespoke stochastic models, to help illustrate the risks faced by unique organisations. This has included working with the Pension Protection Fund on ongoing development of their Long Term Risk Model to quantify the risks it faces, given its levy charges, investment strategy and compensation policies.

For further information about Asset Liability Modelling and its applications, please contact Chris Bull.

'ALM can help stakeholders visualise how outcomes may differ between investment strategies.'

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The latest population projections for the United Kingdom and its constituent countries were published by the Office for National Statistics (ONS) on 26 October 2011. These show that the UK population is projected to increase by 10.9 million over the next 25 years from 62.3 million at mid-2010 to 73.2 million at mid-2035. The population of England is projected to increase the greatest, at 19% by 2035, with the population of Scotland increasing the least (10% by 2035).

The projections also indicate that life expectancy[1] at age 65 is projected to increase by about 3 years over the next 25 years for both men and women, with life expectancy of a man aged 65 in 2035 projected to be 24 years compared to the 21 years projected for a man aged 65 in 2010. (The corresponding figures for women are 26.6 years in 2035 and 23.7 in 2010.)

Population projections are provided for 100 years into the future. However as projections become increasingly uncertain the further they are carried forward, greater focus is placed on the 25-year projections to 2035. Variant projections are also produced to provide an indication of the uncertainty in the projections.

How are the population projections used?

Estimates of the future population of the UK and constituent countries are used across government departments for a variety of national planning purposes. They are also used as the base for other official projections such as local authority level, household and labour force projections.

Most users are interested in short-term projections, for example, the projected numbers of children over the next 5-10 years to plan school building projects. However, some users are also interested in long-term projections, for example, the Department for Work and Pensions (DWP) and GAD, for projecting contribution income to and benefit expenditure from the National Insurance Fund.

How is the population expected to change?

As in most developed nations, the population of the UK is projected to age over time with the median age of the population (the age at which 50% of the population lies above and 50% below) projected to rise from 39.7 years in 2010 to 42.2 years by 2035.

Figure 1 below shows the estimated age structure of the UK population in mid-2010, together with the projected age structure of the population in mid-2035.

Figure 1: Estimated and projected UK population mid-2010 and mid-2035
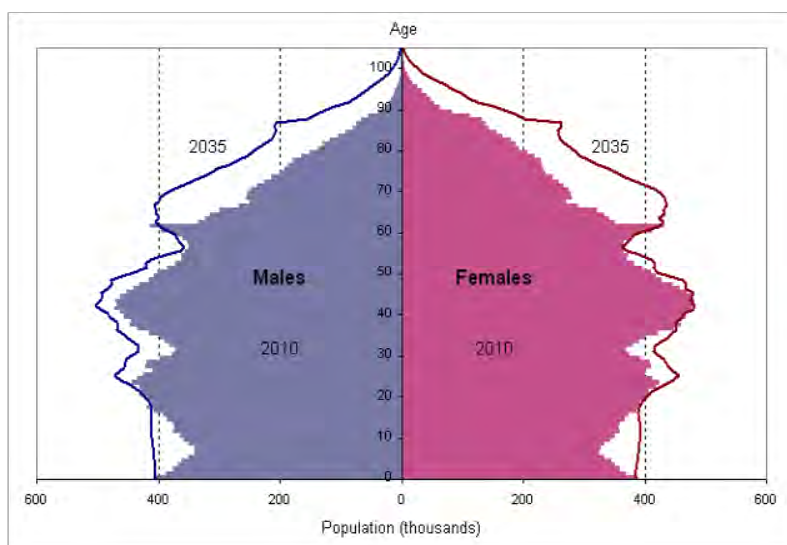
This chart shows that the UK population is projected to increase at almost every age and highlights the significant increase in the population at older ages.

[1] This is cohort life expectancy, which allows for future changes in actual and projected mortality as a person ages through time.

Adrian Gallop

' Life expectancy at age 65 is projected to increase by about 3 years over the next 25 years.'

Between mid-2010 and mid-2035 the population of children aged under 16 is projected to increase from 11.6 million to 13.0 million, the working age population is projected to increase from 38.5 million to 44.7 million and the pensioner population (those at state pension age and above, as currently legislated) is projected to increase from 12.2 million to 15.6 million. The number aged 85 and over is projected to increase significantly over the same period from 1.4 million to nearly 3.5 million. This change in age structure will have an effect on the proportion of dependants in the population.

How are the population projections derived?

The method for producing projections is relatively simple. For each age the starting population plus the net inward migrants less the number of deaths produces the number in the population aged one year older at the end of the year. This is known as the 'cohort component method', with projections made for successive years running from one mid-year to the next.

For example:

| Population aged 45 in mid-2010 | + | Net inward migrants aged 45 in mid-2010 | - | Deaths aged 45 in mid-2010 | = | Population aged 46 in mid-2011 |

In the projections, age is defined as complete years at the last birthday. The total population for each year also includes the number of survivors of those projected to be born during the year.

Whilst the methodology is relatively straightforward, deriving assumptions for future fertility, mortality and migration is much less so.

Assumptions

In determining the assumptions judged to be most appropriate, the ONS and the devolved administrations consider the statistical and other evidence available and take advice from a group of demographic experts. They also consult key users of the projections in each country.

The main assumptions are used to produce the 'principal projection'. 'Higher' and 'lower' assumptions are also set for each of the three key variables. Variant population projections are produced for each of the higher and lower assumptions and combinations of these. This gives users an indication of the uncertainty in the projections and the likely effects of future experience differing from the principal assumptions.

The table below provides details of the principal, high and low assumptions for fertility, mortality improvements and migration.

Assumptions adopted for the 2010-based population projections

	Lower assumption	Principal assumption	Higher assumption
Fertility rate [1]	1.64	1.84	2.04
Long-term rate of mortality-improvement [2]	0.0% pa	1.2% pa	2.4% pa
Net migration [3]	140,000	200,000	260,000

[1] Long-term average number of children per woman.
[2] Age specific rates of mortality improvement are derived for the first year of the projections (2010) from past trends. These are assumed to converge over time to a long-term rate of improvement in 2035 and remain at that level. Those born between 1924 and 1939 are assumed to converge to higher rates of improvement in 2035 (peaking at 2.5% for those born in 1931 and 1932) and to retain these higher rates of improvement throughout their lifetimes.
[3] Annual net inflow from 2016-17 onwards

GAD's role

GAD produced the population projections until 2006, when responsibility was transferred to the ONS. GAD retains a key role in advising ONS on the mortality assumptions used in the projections as well as contributing to the consultation process. GAD is also a key user of the population projections in its social security work and in advising occupational pension schemes.

Further information on the 2010-based projections is available at http://www.ons.gov.uk/ons/taxonomy/index.html?nscl=Population+Projections

'The methodology is relatively straightforward, deriving assumptions … is much less so.'

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At the height of the global financial crisis the UK government stepped in to lend support to Britain's banks. One key measure was the establishment of the Asset Protection Scheme, to be operated by the Asset Protection Agency (APA), an executive agency of HM Treasury. GAD has been closely involved with the Asset Protection Agency since shortly after its foundation.

In January 2009, some months into the credit crisis, the UK's banking system remained in difficulty. Northern Rock had been nationalised the previous year and, following the collapse of Lehman Brothers, the government had injected billions of pounds into the UK's banks. The Bank of England was soon to lower interest rates to an unprecedented 0.5% per year and implement extraordinary policy measures, including the injection of £100 billion of stimulus into the UK economy through its programme of Quantitative Easing.

In response to this continuing uncertainty, the Asset Protection Scheme (APS) was created to provide additional support to UK banks without nationalisation or further immediate capital injections.

Ian Sharpe

What is the Asset Protection Scheme?

The Asset Protection Scheme acts much like an insurance policy. A participating bank pays fees to the government in exchange for protection against higher than expected losses on a fixed portfolio of assets. The first part of any loss on the portfolio falls to the bank but losses above a fixed limit are shared between the bank and the government.

The objective was to encourage lending between institutions, increasing market confidence in the banking system and reducing the likelihood that further government support would be needed.

The APA's operation of the APS involves overseeing and challenging the bank's management of the asset portfolio, verifying losses on assets in the portfolio and forecasting future losses in the portfolio.

What protection is provided?

Participation in the APS was open to any UK bank with eligible assets in excess of £25 billion. Lloyds Banking Group (LBG) and the Royal Bank of Scotland (RBS) initially signalled their intention to participate in the scheme. Subsequently, LBG withdrew, choosing instead to raise additional capital through the financial markets. LBG paid an exit fee of £2.5 billion to reflect the implicit protection received from the APS in the intervening period.

RBS entered a portfolio of £286 billion of assets into the APS. This portfolio included assets in a range of classes and currencies including residential mortgages, personal loans, corporate and small-to-medium enterprise lending, leveraged finance, commercial real estate, structured finance and derivatives.

The chart below shows how losses are shared between RBS and the government. Any loss on the portfolio in excess of £60 billion will be split 90:10 between the government and RBS.
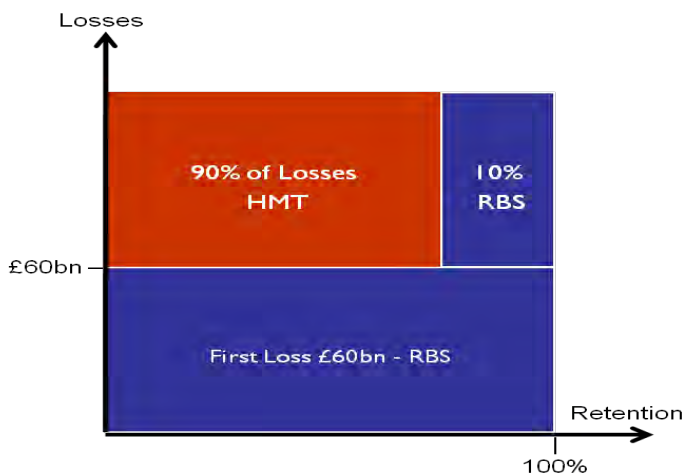
For example, if the portfolio suffered losses of £70 billion, the first £60 billion would fall wholly to RBS, but of the remaining £10 billion only £1 billion would fall to RBS and the other £9 billion would fall to the government.

'The Asset Protection Scheme acts much like an insurance policy.'

In exchange for this protection, RBS agreed to pay fees of £700 million in each of the first three years of its participation and £500 million in each subsequent year, subject to a minimum fee of £2.5 billion. RBS also meets the operating costs of the APA.

Monitoring the scheme

The Asset Protection Agency uses a Loss Forecasting Model to assess likely outcomes and how the outcome might be affected by different economic conditions. The Loss Forecasting Model is a mathematical model that estimates losses on APS assets using details of the assets in the APS, information about the economy and assumptions about how assets in the scheme might be expected to behave.

The principle underlying the Loss Forecasting Model is that the expected loss on an asset can be split into:

> the probability that a loss occurs, and
> the amount of the loss if it does.

These are considered separately for each of the asset classes in the APS portfolio and calibrated to the properties of the individual assets within those classes. Any one configuration of the Loss Forecasting Model produces one estimate of the outcome for the APS. To gain an insight into the range of possible outcomes, the APA also separately configures the Loss Forecasting Model to estimate outcomes in alternative economic scenarios.

What's the cost to the taxpayer?

The financial cost or benefit of the Asset Protection Scheme to the taxpayer cannot be known for certain until the scheme is concluded. However, it's important for the government to monitor and assess potential outcomes.

The Chancellor announced in the March 2010 Budget that 'the central expectation remains that there will be a net benefit to the taxpayer of at least £5 billion'. In addition to assessing the most likely outcomes, it is also necessary to place a value on the protection provided by the APS on HM Treasury's balance sheet. A valuation of the scheme must consider the full range and likelihood of possible outcomes, not only the most likely outcomes.

In HM Treasury's Annual Report and Accounts the APS is accounted for as a derivative. That is, the value of the APS depends on the behaviour of the underlying assets. The APA uses a mathematical model to calculate a 'fair value' estimate of the scheme. For a unique scheme like the APS, more than one approach is possible and the choice is a matter of judgement. As at 31 March 2011, the estimated fair value of the APS, net of fees, was a £0.1billion liability to HM Treasury.

GAD's support to the APA

GAD carried out a review of the Loss Forecasting Model for the APA to assess its fitness for purpose. This included providing comments on any limitations and recommending additional tests. In addition, updating, testing and expanding the Loss Forecasting Model has been the main work of a series of GAD staff seconded to the APA.

GAD was also commissioned by the APA to provide an external assessment of the suitability of the valuation methods used in order to assist the National Audit Office (NAO), as HM Treasury's auditors.

Bill Dickson, APA CEO commented, 'GAD provided constructive challenge, valuable advice and welcome assurance, which has been of benefit to the APA leadership team, HM Treasury and the NAO'.

The current position

Five years on from the start of the subprime mortgage crisis, the world economy remains troubled. However recent figures from the APA paint a brighter picture for the APS: losses on the portfolio were forecast to be £43 billion, well below the £60 billion level at which Government would need to pay out on the scheme.

'GAD provided constructive challenge, valuable advice and welcome assurance.'

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