GOVERNMENT ACTUARY'S DEPARTMENT

Actuarial Assumptions for Assessment of Broad Comparability

Background note on the differential between RPI / CPI and LPI

Introduction

1. A paper setting out the key actuarial assumptions used by the Government Actuary's Department (GAD) when assessing broad comparability between a public service pension scheme and another defined benefit pension scheme is available on GAD's website www.gad.gov.uk/services/Staff Transfers/. This includes assumptions for the long-term average differential between annual increases in the Retail Prices Index (RPI) with no upper limit and annual increases in the RPI with limits of 5% and 2.5% pa, as well as corresponding assumptions based on the Consumer Prices Index (CPI). These assumptions are important in measuring the relative value of pensions which are fully protected against changes in retail prices and pensions with limited price indexation (LPI) such as the minimum statutory increases required to be provided by occupational pension schemes.

2. The assumptions used by GAD are that unlimited RPI will exceed:

   - RPI with a cap of 5% pa (RPI LPI 5) by an average 0.65% pa
   - RPI with a cap of 2½% pa (RPI LPI 2.5) by an average of 1.4% pa.

   and that unlimited CPI will exceed:

   - CPI with a cap of 5% pa (CPI LPI 5) by an average 0.3% pa
   - CPI with a cap of 2½% pa (CPI LPI 2.5) by an average of 0.9% pa.

3. Following previous consultations, GAD considers that changes to the bases should be infrequent and gradual to maintain consistency of outcomes over time. The assumptions in this note replace those used prior to 31st August 2010. The previous assumption for RPI LPI 5 was that increases would average 0.75% pa below RPI.

4. The assumptions in this note do not include any allowance for differences in the treatment of negative inflation between the public service scheme and the pension scheme being assessed for broad comparability. (In the recent case of negative RPI inflation for the year to September 2009, a floor of zero was applied both for public service indexation and statutory LPI increases.)

Setting assumptions

5. Pensions by their nature are very long term. Rights accruing at present might give rise to benefit payments seventy or more years from now. These timescales mean that any assumption will be subject to a wide margin of uncertainty. Rarely has the world been static for even a few years, let alone several decades.

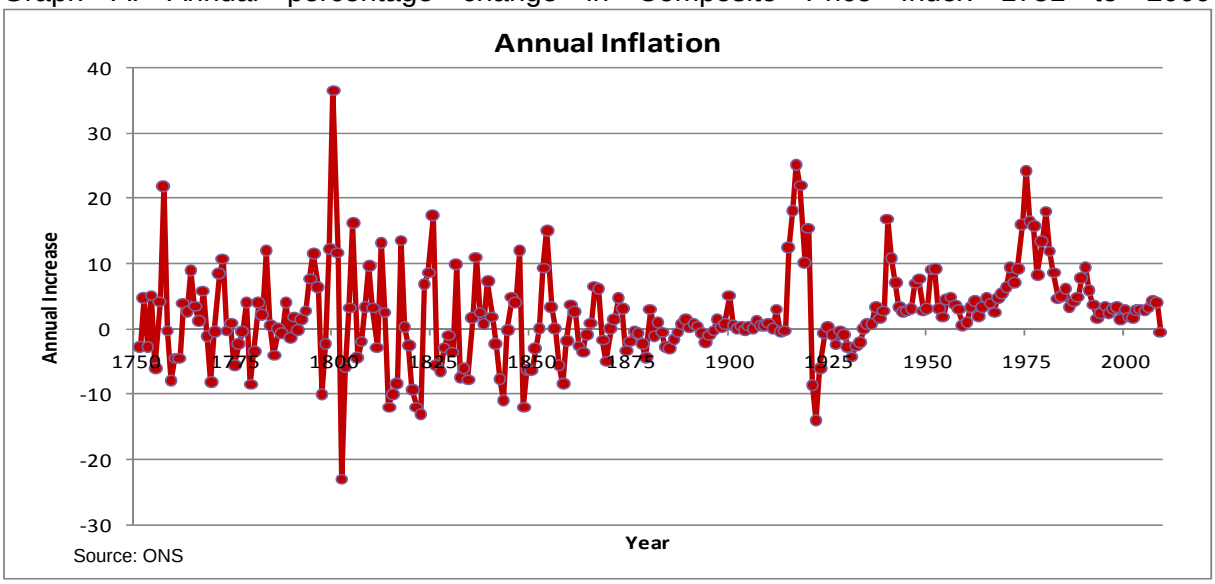
6. There are three sources of information for setting long-term financial assumptions:
   - Past experience
   - Current financial markets
   - Theoretical models and expert judgement

7. These are not independent. For example, past experience over some period will underlie the development of a model. Current market behaviour will reflect the collective views of buyers and sellers, who in turn are influenced by past experience or an implicit or explicit theoretical model of the future.

Past experience

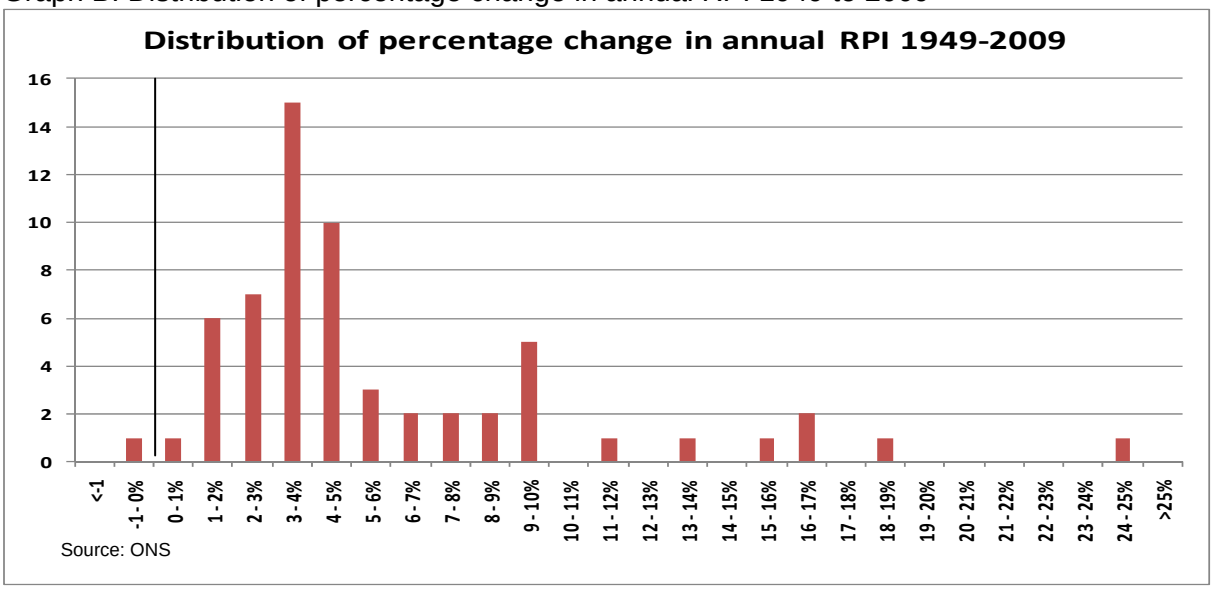
8. It is possible to construct a price inflation index for long periods into the past. Graph A plots annual inflation for each of the last 250 years. In this period Britain has changed from an agricultural economy to an industrial economy and now to a service-based economy. The main point of interest is the spikes of high inflation which have been a repeated feature at different times.

Graph A: Annual percentage change in Composite Price Index 1751 to 2009



9. The scope, size and sophistication of financial markets have also changed beyond recognition, even over the most recent few decades. Most relevant is the post-war period and the time since the late 1950s when most of this market development took place. This period also witnessed the advent of the global economy and the freeing of exchange rates. However, even when looking at this more recent experience it is clear that there have been periods of high inflation, as Graph B shows.

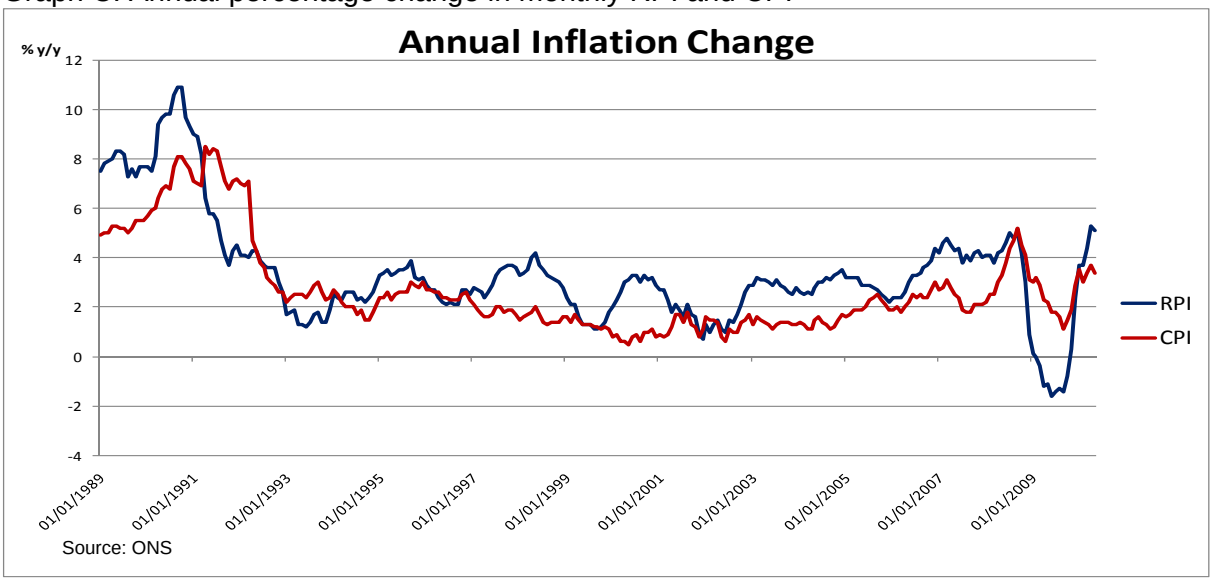
Graph B: Distribution of percentage change in annual RPI 1949 to 2009



10. Further changes have occurred in recent years. In particular, the move in 1997 to give the Bank of England independence to set interest rates alters our future expectations. Since then inflation has been relatively stable. However, we do not believe that assumptions about future inflation should rule out the possibility of again having periods of higher inflation. This could be either as a result of inflation shocks impacting on current policy or due to a change in policy.

11. CPI figures have only been calculated for a relatively short time period. Graph C shows the annual changes in both CPI and RPI since 1989. Over this period RPI has averaged 0.73% pa more than CPI[1]. RPI uses an arithmetic mean to combine prices at an individual level rather than a geometric mean. For each month's inflation figures the ONS calculates the difference that this 'formula effect' makes. The formula effect has consistently lowered annual CPI inflation compared to RPI inflation, on average by around 0.5%. In addition, the inclusion of mortgage interest in RPI means that the short term volatility of RPI has been greater than that of CPI. Since 1989 the annual standard deviation of RPI has been 2.2% compared to 1.8% for CPI.[2]

Graph C: Annual percentage change in monthly RPI and CPI



Current financial markets

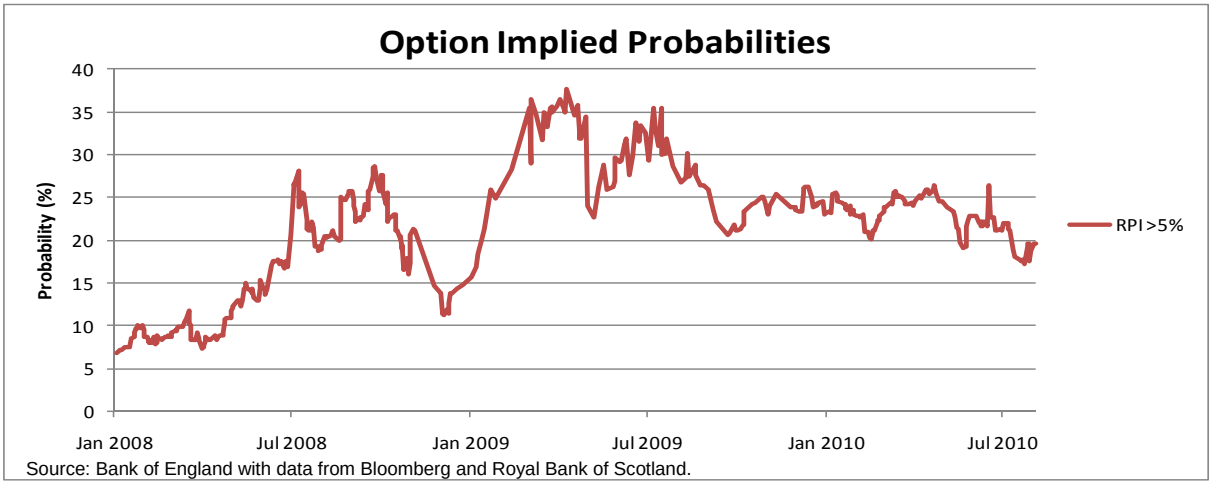
12. One method of estimating the mean future RPI is by considering breakeven inflation (i.e. the yield difference between nominal and index linked bonds). However, such breakeven rates may also contain risk premia and these must be removed to calculate expected inflation. An inflation risk premium is likely to increase the yield on nominal bonds and hence breakeven inflation. The inflation risk premium is difficult to estimate and may vary by term and through time.

13. Market prices for LPI increases can be derived from LPI swaps. For LPI (0,5) these suggest a small reduction when comparing LPI with full RPI increases. However, the swap market is distorted by supply and demand and we do not believe it is deep and liquid enough to give a "true" view of expectations (especially for CPI).

14. Inflation options are also traded and can give some idea of future inflation expectations (see Graph D). However, these are generally of a shorter term than we are interested in and suffer from similar market distortions as swaps.

[1] This is the difference between annualised returns between January 1988 and June 2010
[2] This is the standard deviation of the annual inflation increase between 1989 and 2009.

Graph D: Option implied probability of RPI inflation greater than 5% pa, six to seven years ahead.



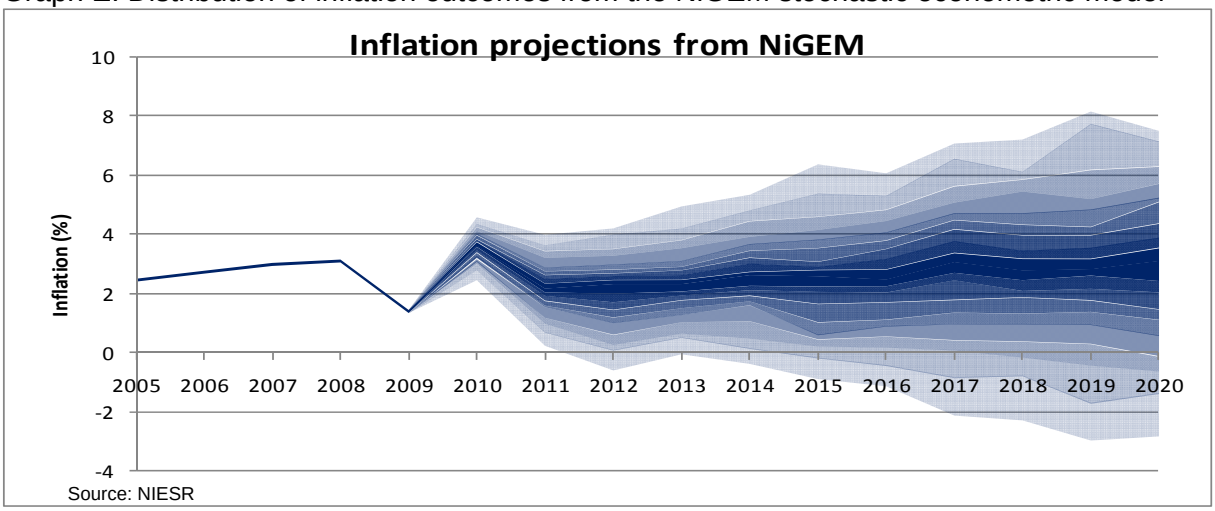
Source: Bank of England with data from Bloomberg and Royal Bank of Scotland.

Models

15. All models, no matter how complex, depend upon the assumptions. There is inevitably some circularity in using a financial model to set long-term assumptions when the model is itself dependent on such assumptions. There are conflicting indicators depending upon the historical perspective adopted, which can produce widely differing outcomes. For example, how well do models cope with the 1970s type of external shock and how much weight should be attached to such shocks?

16. One model that might be considered is the NiGEM stochastic econometric model used by the National Institute of Economic and Social Research (NIESR), although this model is not normally used for projections over timescales as long as those that are relevant for broad comparability purposes. NiGEM is most commonly used for scenario analysis under the assumption that expectations in financial markets are rational. A variety of shocks are taken at random from a particular distribution of past shocks and repeatedly applied to the model. Chart D gives an indication of the spread of outcomes for inflation (specifically the consumer expenditure deflator, expected to be somewhere between increases in CPI and RPI) over a 10 year projection from NiGEM.

Graph E: Distribution of inflation outcomes from the NiGEM stochastic econometric model[3]



Source: NIESR

[3] The fan chart depicts the probability of various outturns for inflation over the next 10 years. It is constructed so that there is a 10% chance of inflation falling within each pair of identically coloured bands and a 10% chance of inflation falling outside the blue area of the chart.

17. In considering the likely range of inflation outcomes in the future, we have also looked at the inflation outputs from other economic scenario generators, for example, Barrie & Hibbert's model which is widely used in the insurance and pensions industries. Although the outputs from these models are widely varying, collectively they are broadly supportive of our conclusions.

18. When considering pension increases where the cap is over the period of deferment it is important to consider the serial correlation of inflation. In other words whether inflation is likely to be high if inflation was high in the previous year. Experience strongly indicates that there is serial correlation and so economic scenario generators which make this assumption are to be preferred to models that assume that inflation in consecutive years is independent.

GAD view

19. GAD recognises that it would be possible to come to a number of different conclusions in the light of the evidence presented above. It is not possible to forecast the future with any degree of precision, nor even to assess an accurate probability distribution for future events. Nevertheless, we believe that consideration of possible probability distributions is the best way to ensure that the potentially large number of assumptions that may be required are consistent with one another. It is also our belief that such a distribution should encompass the possibility of substantial inflation at some point in the future.

20. Based on such methods, GAD believes the assumptions in paragraph 2 are appropriate for broad comparability purposes. Where since 2005 a gap of 0.75% pa has been used between RPI and RPI capped at 5% pa, we are now assuming a slightly smaller gap of 0.65%. The assumed gap between CPI and CPI capped at 5% pa is lower at 0.3% pa (as we expect CPI increases to have a lower mean and volatility than RPI increases).

21. GAD will continue to keep all its assumptions under regular review. However, it is not our current intention to change these assumptions prior to the outcome of the Government's planned consultation on the Fair Deal policy as announced in the Spending Review statement on 20th October 2010.