Index-linked liabilities under IFRS 17 - considerations

How should contracts with cash flows which are linked to an external index (e.g. index-linked annuities) be treated under IFRS 17?

As in paragraph B74, index-linked contracts can either be valued using

- Nominal cash flows (including inflation) and discounted at rates that include the effect of inflation, or
- Real cash flows discounted at rates excluding the effect of inflation.

If discounting including inflation is used then the inflation rates used should be consistent with market interest rates (paragraph B51).

What does this mean in practise for fulfilment cash flows?

Cash flows subject to inflation may therefore either be projected

i. Including the effects of inflation and discounted with nominal rates, or
ii. Excluding the effects of inflation and discounted with real rates.

What types of claims inflation are life insurers exposed to?

Insurers write a range of contracts for which claims amounts are linked to the rate of inflation. The most complex inflation linkages often lie within pension business, which is where we focus our attention. Here, the insurer has either written the business directly or acquired the liabilities of a defined benefit pension scheme, e.g. through a buy-in or buy-out deal with the trustees, and in so doing can obtain exposure to a range of benefit types for annuities in deferment and in payment. We consider below the main types of linkages in existence in the UK.

Insurers can also be exposed to inflation through expense arrangements, for example the outsourcing of administration using contracts with a defined inflation arrangement.

Retail Price Index (RPI) – RPI is the traditional measure of inflation in the UK, having first been calculated in 1947, and, up until 2011, having been used for indexation of both public and private sector pension benefits. It continues to be published monthly by the Office for National Statistics (ONS) and continues to be used, for example, in calculating payments on index-linked bonds as well as some private sector pension benefits. The UK government is, at time of writing, consulting on reforms to the RPI measure, in order to align it more closely the Consumer Price Index – the impact of any such changes is excluded from the scope of this note.

Consumer Price Index (CPI) – CPI is a more recent measure of inflation, and in 2003 became the basis of inflation targeting by the Bank of England. In 2011, it replaced the RPI for indexation of certain pension benefits. While this change was applied to all public sector pensions, it typically can only be applied to private sector pensions where specific reference to RPI is not written into the scheme rules. This change has therefore left the private sector with a mix of RPI and CPI linked pension benefits. CPI too is published monthly by the ONS.

Limited Price Index (LPI) – Many pension schemes have upper and / or lower limits on the RPI / CPI related increases to pension benefits, and this is known as LPI. The upper limit is referred to as an increase ‘cap’, while the lower limit is referred to as a ‘floor’ or ‘collar’. The simplest example is the implicit floor of zero that applies in virtually all schemes; additionally, increases might be capped at, say 5% in each year, in which case we say that the pension benefit is linked to LPI (0, 5).

How might inflation assumptions be derived?

There are several potential methods that may be suitable for deriving inflation. It should be borne in mind that any method used will need to comply inter alia with paragraphs B44, B51 and B59 which cover how the future inflation rates should be consistent with market rates and reflect the probabilities for each inflation scenario in a way that is consistent with the probabilities implied by the market interest rates used in estimating the discount rate. While the discussion below is based on UK inflation definitions, the underlying principles apply more generally.

RPI assumptions

RPI curves can be derived implicitly by comparison of the yield curves for index-linked gilts and nominal gilts. In the UK, these 'break-even' curves are produced daily by the Bank of England, up to a duration of 40 years. Alternatively, RPI curves can be constructed based on traded prices of RPI swaps. Both approaches might be considered market-consistent, and the choice of approach will depend on an assessment of a number of factors, which we outline below:

- Liquidity of underlying market – it is important to consider the liquidity of the underlying market in the instrument from which the assumption has been derived. In the UK, there is an established market in both index-linked government bonds and RPI swaps, however this is not always the case elsewhere.

- Consistency with regulatory reporting – although not a requirement of IFRS 17, it is likely that firms employing market-consistent assumptions within their regulatory reporting, e.g. Solvency II, will want to achieve consistency for IFRS 17. This consistency may be helpful for external communication, e.g. where IFRS vs Solvency II reconciliations are disclosed to the market, as well as for internal management, e.g. ALM.

- Consistency with discount rate derivation – firms who derive the risk-free discount curve from government bond prices may be more likely to use break-even inflation assumptions, also derived from government bond prices. Conversely, firms who derive the risk-free curve based on interest rate swap prices, may choose to derive their inflation assumptions from inflation swap prices.

CPI assumptions

Whilst in recent years some improvements in liquidity and pricing in the UK CPI swap market have been observed, it is not yet clear that a reliable term structure exists. Additionally, the market for CPI-linked bonds is, at time of writing, very small, with no governmental issuances to date and only a handful of corporate issuances. Construction of a CPI curve therefore, at the very least, could require significant interpolation / extrapolation across the term structure.

Alternatively, firms may consider the option of constructing the CPI curve via a level shift applied to the RPI curve, also known as an RPI-CPI 'wedge', with ongoing monitoring of the size of this 'wedge' with respect to current levels and future expectations. In doing so, firms should consider the extent to which this approach is forward looking and consistent with observable market data, however given that this approach is already in use by some under Solvency II, justification on market-consistency grounds may to some extent already exist.

LPI assumptions

Whilst some over-the-counter trading in LPI swaps exists, in general these markets are illiquid and suffer from (perceived) pricing distortions. One example is the relatively high cost of the floor (i.e. heavy

downward skew) that has been observed, at times, in LPI swap prices. Whilst some level of risk aversity would be expected within market pricing, this can be exacerbated by illiquidity in the LPI market. Such a distortion tends to increase the LPI – RPI spread, potentially overstating the value of linked liabilities (and creating ALM complications)[1]. In general, derivatives are not available for all combinations of caps and collars, or durations, and where they are available, markets are often not deep and liquid. Firms are however required to make assumptions about LPI making maximum use of available market data. One approach might simply be to interpolate / extrapolate from any existing market data, however this may not suffice for the reasons already mentioned.

A simple alternative would be to set market-based inflation assumptions in respect only of the underlying inflation driver (e.g. RPI, CPI), and then to apply inflation caps and collars explicitly within the modelling of the liability cash flows, on a deterministic basis. It may be felt, however, that such an approach does not fully satisfy the market-consistency objective, as it allows only for the intrinsic value of these caps and collars, and ignores their time value, which could be material. Hence it may be felt that some form of adjustment for this time value is required.

More sophisticated approaches to LPI modelling, capturing this time value component, involve stochastic simulation of the underlying inflation curve, applying caps and collars within simulations, and then averaging across simulations. In this case the underlying inflation volatility parameter is key and requires suitable justification. Two possible variants exist here:

i. Value the liability cash flows within each stochastic simulation, then take the average across simulations, or

ii. Derive the LPI curve itself via averaging of the stochastic simulations, and apply this curve to the liability cash flows in a deterministic manner

Method (i) is consistent with the general approach to the valuation of options and guarantees in life insurance, e.g. with-profits maturity guarantees. Method (ii) is a slight simplification, however has the advantage of operational ease, particularly when dealing with locked-in inflation assumptions (see below) - a single locked-in LPI curve is generated at contract inception, avoiding the need to lock in the whole economic environment at inception. In most applications the methods would be expected to give similar results, however firms applying method (ii) may want to consider whether any potential differences exist and the materiality thereof. Again, it is likely that Solvency II firms will have already developed LPI modelling approaches that they believe to be market-consistent, and may therefore wish to use under IFRS 17.

[1] For a detailed discussion, see https://www.lgim.com/landg-assets/lgim/web_resources/lgim-thought-leadership/files/client-solutions-lpi-linked-cashflows-sept-2018.pdf

How do changes affect the finance income and expense under the General Model?

Paragraph B128 provides guidance on when inflation risk is to be seen as financial risk:

Paragraph 87 requires an entity *to include in insurance finance income or expenses the effect of changes in assumptions that relate to financial risk. For the purposes of IFRS 17:*

(a) assumptions about inflation based on an index of prices or rates or on prices of assets with inflation-linked returns are assumptions that relate to financial risk; and

(b) assumptions about inflation based on an entity's expectation of specific price changes are not assumptions that relate to financial risk.

As per paragraph 87, if inflation risk is related to financial risk the effect of changes in the assumption should be included in insurance finance income and expenses.

If an assumption is not related to financial risk, then the effect of changes in the assumption adjusts the CSM where one exists (for onerous contracts it would flow to the insurance service result). Further, where material, the risk relating to changes in non-financial assumptions is allowed for within the Risk Adjustment calculation.

An interesting paper on possible interpretations of 'financial risk' has been produced by the IFRS 17 CSM Working Party and can be found at:
https://www.actuaries.org.uk/system/files/field/document/IFRS 17_CSMWP_Article_Locked-in%20assumptions_20190312.pdf

The paper identifies two separate interpretations, one which focuses on the existence of a contractual link, and the other focusing on the price change not being "specific".

In the case of index-linked annuities, or other insurance benefits linked to financial indices, both interpretations (contractual link and non-specific) point to the categorisation of financial risk. The situation is less clear-cut however for expense inflation (non-specific but typically no contractual link, even where the stated assumption references a published inflation index), and the categorisation is subject to interpretation.

Paper AP2 of the April 2019 TRG also considered this issue in s122 and concluded that :-
"*cash flows that an entity expects to increase with an index are considered to be an assumption that relates to financial risks, even if they are not contractually linked to a specified index*".

How do changes in non-financial assumptions interact with changes in inflation (where it is viewed as financial risk) under the General Model?

This is an area of particular significance when using nominal discount rates.

The treatment is important when considering which assumption changes affect the CSM and which do not. If both inflation, where it is viewed as financial risk, and non-financial assumptions change in the same period, the firm will need to decide the order in which to make the changes, since this will impact the CSM adjustment.

There is a specific issue regarding changes in non-financial assumptions where either

- the inflation in the past has been different to that assumed, or
- the future inflation assumption (which is financial risk) has changed in a prior period.

The change in the future inflation assumption and the divergence from the assumption at inception would not adjust the CSM as it is financial risk, however consideration will need to be given as to exactly how to adjust the CSM for the impact of changes in the non-financial risk as the impact may depend upon inflation in the prior periods.

Example

If we consider for illustration's sake a 10,000 pa benefit increasing at the rate of inflation each year. If our initial assumption had been for 1% inflation every year we would assume that the annuity benefit in force at the end of the first year would be 10,100 pa.

If instead inflation was 5% over the first year (without changing our future expectation of 1% inflation) the benefit at the end of the year would be 10,500 pa.

Interest rate expectations have remained unchanged as have inflation expectations in order to simplify the example.

If we now revise our longevity assumption increasing the cost of each 1 CU of benefit by 1% at the end of year 1, how do we adjust the CSM?

- Do we adjust this prospectively based on 10,500 x 1% valued on the initial locked-in interest rates, or
- Should it be based on the annuity value we expected to be in force i.e. 10,100 x 1% valued on initial locked-in interest rates.

It can be seen that having to determine what the original expectation of inflation versus what has actually happened to the benefit over the period can quickly cause a divergence between the two values.

This becomes more complex when the effect of changing the future inflation assumptions is also considered.

For example, if you change the inflation assumption at the end of year 1 for all future years and then at say the end of year 2 you change the non-financial assumption, to which annuity values should this be applied when using the locked-in interest rates – those currently expected, or those that were expected at the date of locking in the interest rates?

When you combine these two pieces we can have an example where actual inflation experience has diverged in the past and the future inflation assumption has also been changed in the past. Instead you would need to retain the expected annuity benefits you would have expected both retrospectively and prospectively and lock in the benefits that would have been provided if inflation had been as initially expected (adjusted for non-financial experience to date). This could quickly become operationally onerous.

Which assumption changes should adjust the CSM under the General Measurement Model?

The interaction between inflation, where it is viewed as financial risk, and non-financial assumption changes is subject to interpretation. This is unlike discount rates, where the standard is clear that the locked-in discount curve should be used when calculating the effect of non-financial assumption changes (and the resulting CSM / BEL mismatch has been well-publicised). The inflation issue is also more complex due to the reliance of future benefits on past inflation experience, as illustrated above.

Three potential interpretations of the standard, in respect of the treatment of financial inflation for the purpose of the non-financial CSM recalibration, are as follows:

A. Both future and past inflation are locked in
B. Future inflation is locked in but past (i.e. realised) inflation is unlocked, or
C. Neither future nor past inflation are locked-in

Below we provide some rationale for each of these interpretations, but note that it is for individual firms and their auditors to reach an appropriate view. It should also be noted that, for some of the references given below, the text does not make explicit reference to the situation envisaged here, i.e. an interaction between financial risks and changes in non-financial assumptions.

<u>Interpretation A: Lock in future and past inflation</u>

Paragraphs B96(b) and B97(a) state that the adjustment to the CSM should exclude the effect on estimated future cash flows of changes in the effect of financial risk. Future cash flows are a function of past inflation, hence the potential interpretation that both future and past inflation are locked-in, i.e. movements in both are excluded when adjusting the CSM. Furthermore, no explicit exception is made in respect of non-financial assumption changes, hence the above logic could be seen as extending to all CSM adjustments.

<u>Interpretation B: Lock in future inflation only</u>

Paragraphs BC233 and BC234 of the Basis for Conclusions have the following to say:

BC233 … The Board decided that for the liability for remaining coverage, in general, it was reasonable to assume that experience adjustments relate to current or past service. In contrast, changes in estimates of future cash flows in general can be assumed to relate to future service. The Board noted that experience adjustments relating to premiums received for future coverage relate to future service and are an exception to this general rule.

BC234 The Board considered whether to establish a further exception to the general rule, for situations in which an experience adjustment directly causes a change in the estimates of the future cash flows… The Board concluded that not establishing any further exceptions to the general rule described in paragraph BC233 gave an appropriate result in most cases and avoided excessively complex requirements.

This could be taken to mean that past inflation experience should not be excluded from adjusting the future service element for non-financial assumption changes. Under this interpretation, the change from outset in actual annuity in payment versus expected would be allowed for when considering the impact of non-financial risk changes to future service, i.e. it is only the change in inflation rate assumptions that would be excluded from the adjustment to the CSM. The CSM would then be adjusted by the effect of the non-financial assumptions, on the annuity benefits in force at the valuation date discounted using the locked-in discount rate specified in paragraph B72.

Interpretation C: Unlock future and past inflation

It may be felt that, whereas the standard is explicit in regard to the lock-in of discount rates for the future service recalibration, that there is no explicit requirement insofar as other financial risks are concerned.

Paragraph BC224(e) is also worthy of consideration:

Having concluded that changes in estimates of the fulfilment cash flows relating to future service should adjust the contractual service margin, the Board further decided that...
(e) adjustments to the contractual service margin are recognised prospectively using the latest estimates of the fulfilment cash flows…

Impact of interpretation

While firms will wish to develop an interpretation on theoretical grounds, it is worth noting the financial and operational impacts thereof.

Locking in of inflation assumptions for the purpose of the non-financial recalibration increases systems storage requirements. Additionally, locking in to 'past inflation' assumed at inception, i.e. excluding the impact of variances in actual realised inflation relative to initial expectations, requires the generation of two sets of cash flows – one for the FCF calculation based on actual current benefit levels, and another for the CSM calculation based a 'shadow' current benefit level. This 'shadow' benefit differs to the actual benefit level, and is derived (at a policy level) by rolling up the inception benefit level using forward rates from the inception locked-in curve.

As with discount rates, the lock-in of inflation assumptions again leads to a CSM / BEL mismatch, i.e. the change in non-financial assumptions impacts the P&L to the extent that current inflation assumptions differ from the locked-in assumptions. The level of this mismatch, and its behaviour over time, depends on the precise interpretation of inflation lock-in adopted. Where inflation and discount rates are positively correlated, the overall level of mismatch may be reduced, however this is of course not guaranteed to be the case.

It is also worth noting that firms opting to implement net-of-inflation discount curves, as per paragraph B74, will implicitly be locking in to future inflation via the locking-in of these net curves.