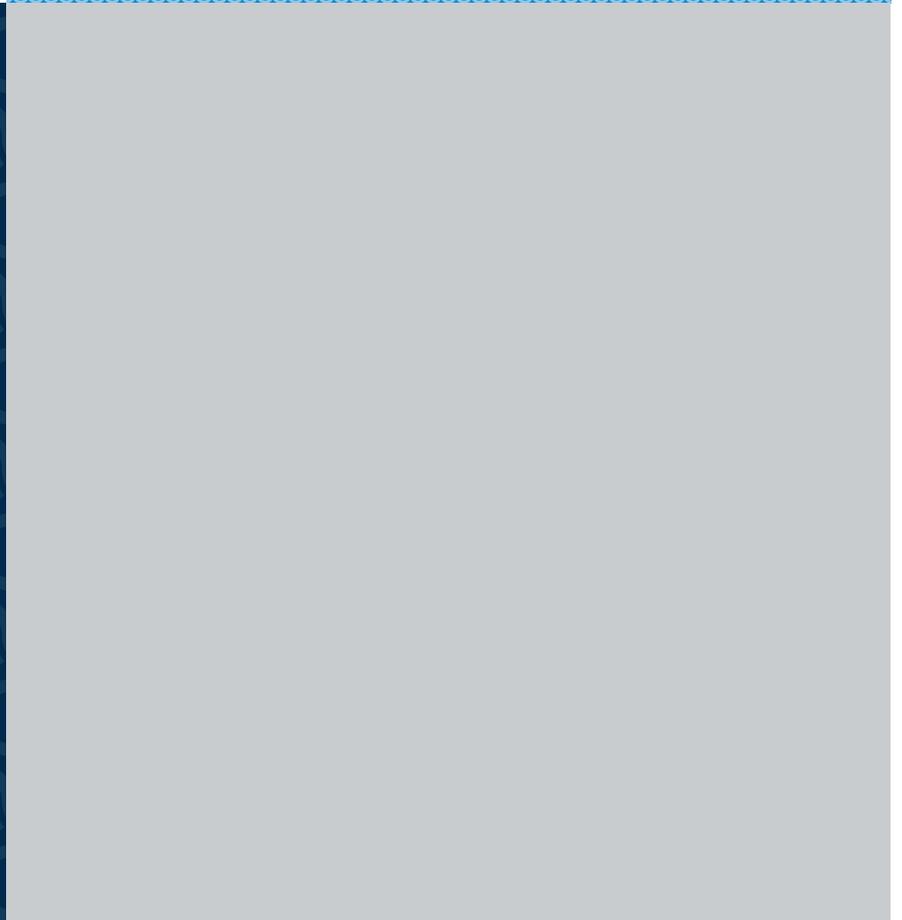
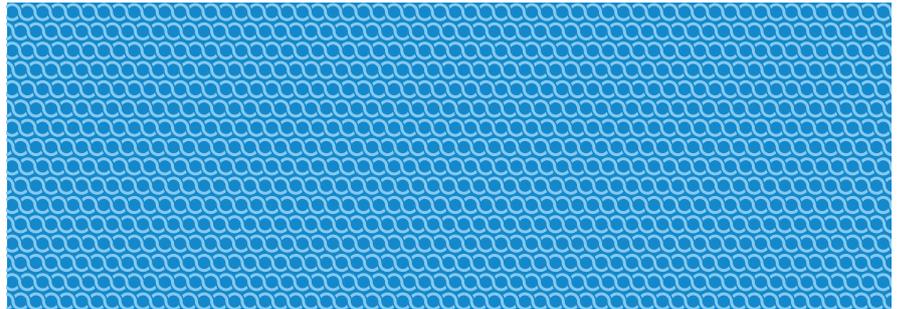




BANK OF ENGLAND

Bank of England response to HM Treasury RPI consultation

August 2020



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Prepared by PRA Insurance Directorate and Markets Directorate.

UK Statistics Authority (UKSA) and HM Treasury are currently consulting on the timing and technical matters of aligning the RPI with the CPIH — the consultation runs until 21 August, with the Chancellor giving his decision in the autumn.

We have been asked to provide information to HM Treasury on the impact of the proposals. We have responded to the questions as asked to us by HM Treasury. We expect this response to be placed in the public domain alongside the other evidence UKSA and HM Treasury receive.

Limitations

We do not have full data on the holders of index-linked gilts (ILGs). We have provided our response based on the detailed information that we do hold via regulatory reporting to the PRA. Other organisations, such as the Debt Management Office, may be able to provide more information on non-PRA-regulated holders of ILGs.

Declaration of interest

The Bank of England pension fund holds a substantial quantity of ILGs against liabilities. These liabilities are indexed mostly to RPI, but partly to CPI. The trustees of the pension fund have considered the implications of the future realignment of the RPI, which would have the effect of reducing the value of the pension fund's inflation hedge. The pension fund is consequently planning to make a provision against that reduction in value in the current triennial valuation. The provision will be based on statements that have been made by the Government to the effect that rates are expected to align by 2030. The trustees made their decision drawing on independent advice; they would not expect or ask the Bank to advise them on this issue.

The advice below was prepared without reference to the trustees of the Bank of England pension fund.

What is the impact of UKSA's proposal on the holders of index-linked gilts?⁽¹⁾

Who holds ILGs and for what purpose? Can we say who holds 'the relevant' gilts?

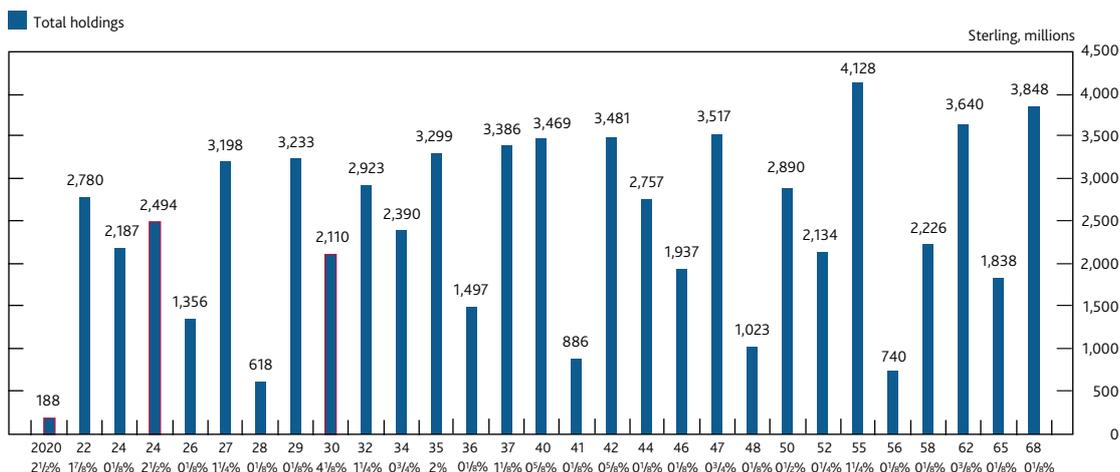
We do not have full data on the holders of the ILGs. We expect that ILGs are held by pension funds, insurers, asset managers, as well as monetary financial institutions and others.

Pension funds hold ILGs to hedge inflation-linked long-term liabilities. Some of the pension funds hedge their own liabilities (bigger pension funds), and some go via the liability driven investment (LDI) asset managers.

Life insurers hold ILGs mainly to cash-flow match inflation risk in index-linked occupational pension business transferred to them in the form of Bulk Purchase Annuities (BPAs). General insurers account for less than 2% of the insurance sector holdings of the ILGs and use them to match claims inflation or personal income protection products linked to the RPI.

We have access to detailed information for individual gilts holdings for insurers via regulatory reporting. Based on Solvency II data, 32 UK insurers held £70.2 billion of ILGs. Within that, 25 firms held a total of £4.8 billion of 'the relevant' gilts (those subject to s21 of the Statistics and Registration Service Act 2007) as of end of 2020 Q1 (see **Chart 1**; columns and markers for 'relevant' gilts are marked with red border).

Chart 1 Insurers' holdings of ILGs



Banks' (deposit-takers) net holding of ILGs were £50.5 billion at the end of 2020 Q1, which constituted only 0.56% of their total assets. We do not have detailed issue by issue information.

We do not have data for pension funds, asset managers or other investors ILG holdings.

What is the share of holdings between pension funds/asset managers/insurers/outright investors?

At the end of 2020 Q1, insurers held 15% of the nominal value of ILGs in issue, while for the 'relevant' gilts, the proportion of insurer holdings were 9%.⁽²⁾ Deposit-takers' share of the nominal value of ILGs was 11%.

We do not have information on holdings for other investors.

What proportion of investor holdings are ILGs?

The ILGs constituted 4.2% of the total assets of the 32 insurers with ILG investments in 2020 Q1 (with 'relevant' gilts constituting 0.3%).

The ILGs were 3.7% of the total assets held by aggregate insurance sector (including firms with no holdings of ILGs) in 2020 Q1, with relevant ILGs at 0.25% of the total assets correspondingly.

(1) Index-linked gilts for the purposes of this note cover all such gilts in issue and not just 'Relevant Index-Linked Gilts' which are subject to s21 of the Statistics and Registration Service Act 2007.

(2) Total nominal amount in issue based on '[Index-Linked Gilts in Issue](#)'.

The ILGs holdings constituted 0.56% of the total assets for banks (deposit takers) in 2020 Q1.

The Pensions Regulator reported that 21% of the DB pension funds' assets are ILGs (YE 2019).⁽³⁾

For asset managers, the Investment Association estimates that at the YE 2018, inflation-linked gilts were around 9% of invested assets.⁽⁴⁾

For those holding gilts to match liabilities, what liabilities are they seeking to match? How does this differ between pension funds/asset managers/insurers? How will these liabilities change in the future?

Both pension funds and insurers mainly seek to match inflation-linked (both RPI and CPI) liabilities; however we do not have detailed breakdown of CPI versus RPI-linked liabilities. LDI asset managers manage assets on behalf of some defined benefit pension funds and their assets by definition match their liabilities — they do not offer guarantees. This is a key difference between asset managers on the one hand and pension plans and insurers on the other, ie that asset managers cannot suffer a mismatch between assets and liabilities but insurers and pension plans can.

Life insurers typically use ILGs (and other inflation instruments) to match inflation-linked annuities, purchased either individually by clients or in bulk by defined benefit pension plans. General insurers may similarly use ILGs to match periodic payment orders (annuities paid to personal injury claimants). Defined benefit plans may use ILGs (and other inflation instruments) to match deferred annuities (which usually have inflation linkage both in the waiting period before they come into payment and during payment) and pensions in payment, to the extent that they are inflation-linked.

What proportion of pension funds/asset managers/insurers/outright investors will be winners and losers? How will this differ if implemented in each year from 2025–30?

Insurers

All the Category 1 and 2 UK solo life insurers submit data to the PRA summarising the sensitivity of their regulatory balance sheets to various market risk movements, including a parallel increase in inflation by 50 basis points across all tenors.⁽⁵⁾ Most of the major life insurers' balance sheets are not very sensitive to inflation risk. For the firms most sensitive to inflation risk, the Bank has undertaken analysis on the impact of changes in calculation of RPI in April 2019 and found that that a reduction in RPI-linked inflation would have a positive (rather than negative) impact on their solvency. This analysis has limitations due to the fact that the sensitivities data does not allow to account for basis risk between CPI and RPI and might underestimate losses for some of the annuity writers with CPI liabilities backed with RPI assets. However, the latest available data indicates that CPI-linked liabilities are at most 10% of total inflation-linked liabilities.

It is also possible that insurers could suffer claims from policyholders to compensate them for the loss of benefits based on the historic 'wedge' between CPI and RPI. In other words, policyholders might consider that they have a reasonable benefit expectation of increases to their inflation-linked annuities in line with RPI. Historic experience suggests a difference between RPI and CPI of between 50 and 100 basis points (ie 0.5% and 1% per annum). Legal firms might pursue class action claims against life insurance companies in respect of these liabilities. A rational basis for a claim might be the best estimate of the value of the annuity liability at the date of the claim times the life expectancy of the policyholder times 1% (assuming that they start at the high end of the range for the wedge between RPI and CPI). For example, supposing that, after the proposed change, the best estimate of liabilities for an annuity were £100,000 for a policyholder with a life expectancy of 30 years. Then the claim might be for $£100,000 \times 30 \times 0.01 = £30,000$. Whether such litigation is likely to succeed may depend on the exact policy wording that each insurance company has used. We note that such disputes could also arise between holders and issuers of RPI-linked bonds and between pension plan members and trustees.

Pension funds

Defined benefit pension plans that are over-hedged in respect of inflation or with CPI-RPI basis risk (ie those with CPI-linked liabilities hedged with RPI-linked gilts) are likely to experience deterioration in their funding ratios.

(3) [DB Pension Scheme Leverage and Liquidity Survey, December 2019](#).

(4) ['Trends in client assets and allocation'](#).

(5) [Bank of England Supervisory Statement SS7/17, 'Solvency II: Data collection of market risk sensitivities.'](#)

Overall comments:

- The impact on pension funds will vary widely. There will be winners and losers and there are multiple factors which will determine how individual schemes are affected.
- Some schemes that have 'done the right thing' by taking action to hedge their inflation risk may end up being among the losers, whereas schemes that have not addressed their inflation risk may benefit from the change.
- Without access to more detailed data, it is not possible to answer some of the more specific questions. The Pensions Regulator may be able to provide more targeted insight.

Asset Managers

We expect that the main impact on the asset managers will be through reduced fees as a result of decreased market value of the assets under management.

Insurers

What will be the impact on insurers?

The impact on insurers will be similar to that of pension funds. One of the key differences is on the liability side where insurers' liabilities are valued on a market consistent basis under Solvency II.

- The impact will differ between firms depending on their business mix and the nature of their assets and liabilities.
- In some cases the risk and therefore the impact of any change in RPI will be borne by individual policyholders.
- Where firms' RPI-linked liabilities are matched with RPI-linked assets the impact should be fairly limited as the change in the value of assets should be offset by a corresponding change in the value of the liabilities.
- However, where insurance firms hold RPI-linked assets or RPI swaps to back CPI-linked liabilities, there will be no offsetting reduction in the value of their liabilities.
- The Solvency II market risk sensitivity (MRS) data provides an indication of the firms most exposed to changes in inflation, but does not capture the basis between RPI and CPI.
- The current market uncertainty may have an impact on both the volume and pricing of pension transfer business.

How will insurers' investment strategies change?

- Firms will have been aware of the potential change in the calculation of RPI for some time and to some extent may have already made some adjustments to their investment strategies or hedging ratios.
- However, the options are fairly limited given the lack of CPI-linked assets and the level of uncertainty regarding the timing of any change. Significant changes in investment strategies are therefore unlikely.
- In addition to ILGs, inflation swaps and index-linked corporate bonds the change will also impact other assets classes such as real estate and infrastructure investments where revenue streams are linked to RPI.

Pension funds

For schemes whose deficits increase or reduce, how large will the impacts be?

We do not have detailed data on all UK-defined benefit pension schemes, so are unable to quantify this, but can explain the variables that are likely to affect whether deficits increase or reduce and the size of the impacts.

- The change would decrease the value of RPI-linked assets of defined benefit pension plans. The market has anticipated some of this change but not the entire 'wedge' between RPI and CPIH. When the change is confirmed and markets fully price in the change, there would be a further reduction in the value of the RPI assets. This

reduction would be larger for assets with larger 'discounted mean terms'. (The discounted mean term of the assets is a measure of the average time in the future that cash flows are paid.)

- The value of defined-benefit pension plan liabilities is likely to reduce in value only when the change is confirmed, though there may be some reductions before then in anticipation of the change or as a result of the use in actuarial valuations of market-consistent inflation parameters and the market adjustments described above. As is the case for assets, the reduction would be larger for liabilities with larger discounted mean terms.
- The overall effect on pension plan deficits depends on whether the decrease in the value of assets is larger than the decrease in the value of liabilities. If the decrease in the value of the assets is larger than the decrease in the value of liabilities, then the pension plan's deficit will increase or its surplus will decrease.
- A key determinant of the relative behaviour of assets and liabilities under an inflation stress is the degree of inflation hedging. An inflation hedge ratio of more than 100% is termed 'over-hedged', and means that assets increase by more than liabilities if inflation increases, and decrease by more than liabilities if inflation decreases. Conversely, an under-hedged pension scheme is one where assets increase by less than liabilities if there is an inflation increase, and decrease by less than liabilities if there is an inflation fall.
- A key determinant of the size of the impact is the proportion of inflation linkage in the liabilities. This can vary considerably between defined benefit pension plans. The higher the proportion of inflation linkage in the liabilities, the higher the potential impact.
- The degree of inflation hedging differs according to the measure used. The two main measures are the funding valuation, used to determine the contributions that an employer must make to a pension plan, and the accounting valuation, used to determine pension costs for financial reporting purposes. These measures may diverge, and the funding valuation usually shows a larger deficit or smaller surplus than the accounting valuation. Related to this point, it usually shows a lower hedge ratio than the accounting valuation.
- Hence a defined benefit pension plan may be over-hedged on an accounting valuation basis but under-hedged on the funding valuation basis, because of the different valuations of liabilities.
- A pension plan with only RPI-linked liabilities and RPI-linked assets and which is over-hedged is likely to find that its RPI-linked liabilities fall less than its RPI-linked assets as a result of the proposed RPI reforms, and hence, other things being equal, that its surplus falls or deficit increases. Conversely, a pension plan that is under hedged (that is, has an inflation ratio of less than or equal to 100%) is likely to experience an increase in its surplus or decrease in its deficit.
- UK-defined benefit pension plans typically hedge CPI-linked liabilities with RPI-linked assets, and, in doing so, assume that there is a constant wedge between RPI and CPI inflation. Such pension plans would experience an immediate fall in the value of their assets without any accompanying impact on liabilities. The effect on the deficit is likely to be geared in this case — that is, it will be disproportionate to the existing size of the deficit.
- Another influence is the impact of caps and floors embedded in pension increase promises. There are various types of caps and floor but in many pension plans, these are 5% and 0% respectively. The caps protect the pension plans against high inflation and the floors protect the pensioner against deflation. A fall in the rate of inflation would mean that the value of the floor protection for the pensioner increases, and would reduce the value of the ceiling protection to the pension plan. The overall impact might be to tend to increase the deficit or decrease the surplus.
- We estimated the impact on the ratio of assets to liabilities on some defined-benefit pension plans for which we have some limited data on inflation sensitivities and inflation hedging. Our estimates are given in the table below. We have not sought to allow for inflation caps and floors in our calculations and assume that the pension plans have no CPI-linked liabilities. Schemes would be more likely to have a deterioration in the ratio of assets to liabilities if there were CPI-linked liabilities and they were hedged using RPI-based assets:

	Pension plan 1	Pension plan 2	Pension plan 3
Inflation hedge ratio	97%	42%	107%
Estimated reduction (increase) in ratio of assets to liabilities	(0.4%)	(5.1%)	0.5%

- We also estimated the impact on the ratio of assets to liabilities on the same defined benefit pension plans assuming that a third of liabilities have CPI linkage and that they are hedged using RPI assets:

	Pension plan 1	Pension plan 2	Pension plan 3
Inflation hedge ratio	97%	42%	107%
Estimated reduction (increase) in ratio of assets to liabilities	3.7%	(2.2%)	3.0%

How will this differ if implemented in each year from 2025–30?

If the change were announced immediately for implementation in a year in the range mentioned (2025–30), there would be an immediate change in the market-implied inflation curve from that year onwards. The impact on pension plans' accounting and funding valuations may be somewhat dampened compared with immediate implementation. We do not have the detailed data required to calculate what these impacts would be, and suggest that HM Treasury obtains these from the Pensions Regulator if possible.

What might be the subsequent impacts on sponsoring employers of pension schemes?

An increase in the funding valuation deficit of a defined benefit pension plan, if substantial, is likely to put additional strain on the finances of an employer. An employer which is already under strain could be pushed into insolvency by such an increase in deficit.

Our judgement is that defined benefit sponsors who are already struggling are less likely to have over-hedged their inflation-linked liabilities, and hence unlikely to be pushed into insolvency by this change in inflation. However, there may be a handful of exceptions to this, and these exceptions could have quite a significant impact if they have large memberships.

How do you expect pension funds to change their investment activities?

If the funds judge that the change is inevitable, it would be rational for them to reduce their inflation hedging ahead of the announcement. They might do this by reducing their holdings of ILGs and closing out their inflation swaps until such time as the change is finalised.

Once the change has been announced, we would expect them to reinvest in ILGs.

What type of assets might funds seek to invest in if they were to reduce their holdings of index-linked gilts?

This is difficult to judge, because of the wide variety of investment options available. It would also depend on the economic and financial outlook at the time. One option might be to invest in overseas inflation-linked bonds and to swap those into sterling cash flows.

On the other hand, once the change has been fully priced in, we would expect schemes to be more incentivised to hedge. Previously, they had to accept the basis risk between CPI and RPI. After 2030 (or earlier), this basis risk reduces substantially and hence removes one of the reasons not to hedge.

Where is RPI and RPIX used in financial markets and contracts?

How widely is RPI used in financial contracts and markets?

The principal tradeable financial instruments linked to RPI beyond ILGs are: inflation swaps; inflation options; and inflation-linked corporate bonds. Of these, inflation swaps are by far the most widely traded instrument and form the focus of subsequent responses below.

(1) Inflation swap market

Zero coupon inflation swaps are interest rate swaps where the floating leg references realised and unrevised RPI in a given month.⁽⁶⁾ A single exchange happens at the maturity between realised inflation accrual and a compounded fixed rate set at inception.⁽⁷⁾

Demand for inflation swaps and inflation-linked products more generally primarily comes from investors seeking protection against the depreciating effect of inflation on nominal asset returns and/or those with liabilities exposed to inflation. In particular, the LDI investors described earlier in this response have an estimated £1.6 trillion⁽⁸⁾ in liabilities that must typically be hedged against realised inflation. Banks meet this demand by offering inflation protection at a premium. Other investors are also relevant (Hedge Funds, Asset Managers and Bank treasury functions) but their activity is dwarfed by flows from LDI strategies.

In the UK, one natural supply of inflation-linked assets comes from index-linked government bonds (ILGs), issued by the Debt Management Office. At the end of 2019, there were £433 billion of ILGs in outstanding issuance, constituting ~28%⁽⁹⁾ of sovereign bond issuance in the UK. So-called 'zero coupon' inflation swaps are a synthetic product which, combined with the natural supply from ILGs, help meet the demand for inflation protected assets. Estimates suggest that the notional size of outstanding inflation swap contracts is multiple times the size of the stock of ILGs in issue.

(2) Inflation options

Inflation options are derivative instruments used to hedge against high or low inflation outturns or to speculate on the future path of inflation. The most commonly traded forms of inflation options are inflation caps and floors.

Historically, inflation caps and floors were introduced to support LDI investors with 'Limited Price Indexation' (LPI) obligations. This limited inflation compensation to a window — so, for example, protection might be provided against inflation in a range of 0%–5%, but not outside it.

The RPI option market never fully took off. Although some LDI investors have managed extreme inflation divergences by using inflation options, given the illiquidity in this market, most funds have found that managing exposures via vanilla swaps is more efficient. As such we have limited available data to estimate the size of the RPI options market accurately.

(3) Inflation-linked corporate bonds

Issuance of index-linked corporate bonds stems from firms with cash flows linked to inflation and therefore it can make sense for them to pay coupons that are themselves index-linked. Examples in the UK include National Rail (before it was reclassified as a public-sector body), student accommodation, utilities companies and social housing.

The total amount outstanding is small. Initial estimates from Bloomberg, suggest that there are ~£87 billion in outstanding inflation-linked corporate bonds. The vast majority of outstanding inflation-linked corporate bond issuance is linked to RPI, however investor interest in CPI protection has led to a small volume of CPI-linked issuance.

Who will be impacted by UKSA's change?

Market intelligence informs us that the inflation swap market in the UK broadly consists of two main groups of market participants, trading RPI-linked swaps with each other. This is supported by initial analysis of trade repository data. The

(6) UK RPI inflation swaps trade with a two-month lag to the reference index which is not interpolated. UK index-linked bonds trade with a three-month lag and are interpolated. The zero-coupon swap is the standard swap traded in the market. Other types of swap (such as year-on-year inflation swaps) are available in theory. Where inflation-linked bonds are purchased on asset swap the inflation swap that is included in the transaction may be more bespoke.

(7) The rate charged on the fixed leg of an inflation swap is also referred to as the break-even inflation rate, since the two rates should be linked by a no-arbitrage principle.

(8) As of March 2019, see *Purple Book 2019*.

(9) *Debt Management Report 2020-21*.

first group are LDI investors, such as asset managers with LDI mandates, and the subset of insurance and pension funds (IPFs) who employ these strategies to protect against rising inflation due to the nature of their liabilities. These participants are the main buyers of inflation protection. The second group are G15⁽¹⁰⁾ dealers, who are large banks, who supply this inflation protection to their clients. Dealers are therefore structurally net short, ie net sellers of inflation protection. They are the largest suppliers of inflation protection where there is a shortfall of supply in ILC issuance to satisfy market demand.

What could be the unintended impacts/risks?

How RPI is redesigned is key to the impact it will have on markets and investors

As mentioned above a large number and value of financial market contracts are linked to RPI. Market participants tell us that they think the most likely single outcome is that the ONS aligns RPI with CPIH after 2030 — though they consider a few other options are also plausible, such as a redesigned RPI which embeds compensation for the losses incurred for the alignment to CPIH. The current traded market pricing of RPI linked instruments puts some weight on each of these outcomes, given there is no certainty yet on which outcome will be selected, and the different outcomes have different net impacts on investors.

The way the DMO responds as a result of the reforms may also have an impact as it is unclear whether new and legacy instruments will price identically. Alternative outcomes will have different implications for market liquidity and fragmentation.

Market functioning and price discovery have been influenced by the uncertainty around the nature and timing of the final outcome

Contacts have reported lower liquidity than usual in tenors with a maturity greater than 2030. This in turn has contributed to volatility in market pricing as participants digest information on the reforms. For example, the September 2019 announcement of a consultation led to a fall in 1y25y inflation swap rates of ~21 basis points, though this move was reversed in a few days. While a proportion of the difference between RPI and potential future measures may be priced into longer-dated forward inflation instruments, room for a sizeable pricing shock still remains in the RPI curve. Going forward, if the eventual alignment and compensation decision is a surprise to financial market participants there is likely to be localised volatility, at least for a period.

Market participants suggest that some investors are less engaged in the market than they were before the uncertainty began. However, many liability driven investors continue to fulfil their hedging requirements and therefore are active in inflation markets. It is unclear what the prolonged impact of weak investor sentiment could be on market functioning. For example, it is plausible that liquidity will be lower for longer even when uncertainty dissipates as investors take time to return to the market. One contact mentioned that in theory full conversion from RPI to CPIH should be negative for inflation breakevens, even at prevailing levels but too many investors have been 'burnt in the past' and so there aren't many putting on active positions.

Alongside the uncertainty around RPI reform, market contacts have noted the lower issuance of RPI linked instruments

Issuance in maturities of +20y index-linked bonds have fallen compared to last year, a factor which market participants feel may have put some upwards pressure on market rates of inflation compensation in the UK relative to their US and euro-area counterparts. How this supply demand balance will develop after RPI reform is completed is unclear, which may itself be contributing to market price volatility.

Another risk is that demand for non-RPI inflation-linked (eg CPI-linked) issuance will increase. This demand may be moderated by the type of inflation hedging strategies used by investors. For example, if the majority of investor liabilities for which they require hedging are RPI-linked then demand for RPI-linked instruments will remain at prevailing levels.

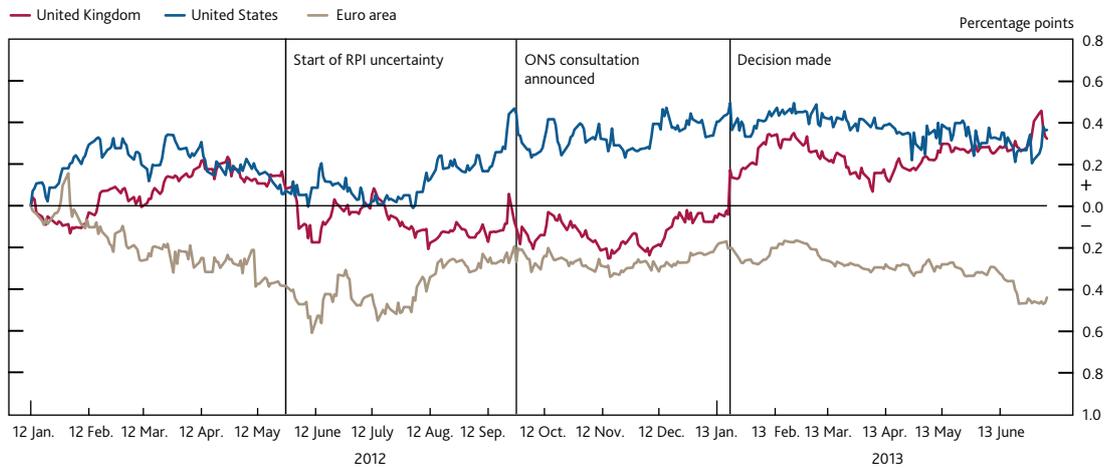
How will these impacts differ dependent on when the proposal is implemented?

The ongoing debate around RPI reform has been a feature of the inflation market since 2010 when clothing price collection changes were made to the index. The Consumer Prices and Advisory Committee (CPAC) consultation into RPI methodological changes started in 2012, and the National Statistician announced the RPI calculation would not be

(10) The G15 dealers are the Group of 15 largest derivatives dealers.

altered on 10 January 2013. There was a marked impact on UK (but not euro-area/US) inflation swaps in reaction to these announcements (**Chart 2**). This offers a case study for how market prices may react during the current RPI reform consultation process.

Chart 2 Impact on long-dated inflation swaps in reaction to RPI reform announcements



The consensus view among market participants is that implementation will take place after 2030. If the proposal were implemented earlier, there would likely be some market price volatility.

How widely is RPIX used in financial contracts?

What will be the impact of RPIX no longer being published, and on whom will these impacts fall? What is the potential scale of disruption?

RPIX-linked instruments are traded significantly less frequently than CPI-linked instruments, and transactions are typically highly bespoke. To our knowledge, RPIX positions should reflect a tiny proportion of the market, with most transactions likely to be found in small legacy portfolios on dealer balance sheets. Initial analysis of trade repository data over a limited time horizon seems to confirm this, identifying a very small number of RPIX-linked trades.